

University of Nevada, Reno

**Effect of Using the Ages and Stages Questionnaires on Childcare
Providers' Developmental Assessment Ability**

A dissertation submitted in partial fulfillment of the requirements for the degree of
Doctor of Philosophy in Special Education and Disabilities Studies

By

Diane Marie Branson

Dr. Ann Bingham/Dissertation Advisor

May 2009



University of Nevada, Reno
Statewide • Worldwide

THE GRADUATE SCHOOL

We recommend that the dissertation
prepared under our supervision by

DIANE M. BRANSON

entitled

**The Effect Of The Ages And Stages Questionnaires On
Childcare Providers' Developmental Assessment Ability**

be accepted in partial fulfillment of the
requirements for the degree of

DOCTOR OF PHILOSOPHY

Ann Bingham, Ph.D., Advisor

MaryAnn Demchak, Ph.D., Committee Member

Shanon Taylor, Ed.D., Committee Member

Debra C. Vigil, Ph. D., Committee Member

Cleborne Maddux, Ph.D., Graduate School Representative

Marsha H. Read, Ph. D., Associate Dean, Graduate School

May, 2009

© Diane Marie Branson 2009
All Rights Reserved

Abstract

Benefits of early intervention for children who are identified with developmental delays and who receive early intervention are confirmed in the literature. Yet the majority of children are not identified prior to age 5 years. Childcare providers are a group of professionals who spend time with young children and who could assist with early recognition of children at risk for developmental delay, but there is a lack of research on this topic.

Mixed methods sequential explanatory design was used to investigate childcare providers' ability to accurately assess child development and make appropriate referrals to child find agencies. A secondary goal of the study was to determine if certain childcare provider characteristics could predict which childcare providers would have high agreement between their developmental impression of a child and the ASQ results. Results from the quantitative data analysis suggest that childcare providers are able to recognize children at risk for developmental delays regardless of whether the ASQ was given first or second. Childcare providers were able to administer the ASQ with acceptable accuracy, sensitivity and specificity. The majority of childcare providers (89%) demonstrated high agreement between their developmental impression of a child and ASQ results. Specific childcare provider characteristics (age, experience, and level of education) did not predict which childcare providers would have high agreement between their developmental impression and ASQ results. Qualitative results showed that comparison of children to same-age peers was an important cue childcare providers used to recognize

children with developmental differences and identified several barriers that interfere with childcare providers making appropriate referrals to child find agencies.

Acknowledgments

I want to acknowledge and thank all of the people who have helped me to realize my personal dream of completing a doctoral degree. First I would like to thank my dissertation committee chair, Dr. Ann Bingham, for her support, encouragement, patience and faith in me to tackle a complicated study. In addition to Dr. Bingham, I want to thank my committee members, Dr. MaryAnn Demchak, Dr. Debra Vigil, Dr. Shanon Taylor, and Dr. Cleborne Maddux for their time, patience, and wise counsel. Their contributions to this study are very much appreciated. I especially want to thank Dr. Maddux for his help with the statistical analysis. Without Dr. Maddux's help I would still be trying to interpret the logistic regression analysis. I also want to thank Jennifer Kimble, my research assistant, for her persistence in tracking down participants for testing during the summer vacation season. Finally, I want to thank all of the childcare providers, parents and children who participated in this study. There would be no study without your generous gift of time and energy.

I want to express my gratitude to my family and friends who provided encouragement, support and love to keep me moving towards my goal. Thanks to my siblings, Denise, Tim, and Sean and their spouses and my brother-in law, Tom and his spouse, to Aunt Pete and all the Stimmann cousins for their words of encouragement. I want to thank our daughter, Katie and our son, Mike for their support, love and also their understanding when I was not as available as I would have liked to be the past four years. You both have grown into thoughtful, caring, and responsible adults who make your father and I proud everyday.

I am grateful to Jackie and Art McCutcheon, my mother and father, for their determination that I would be the first member of our family to attend college. I wish that my mother could be alive to witness my graduation, but I know that she will be smiling down from heaven amazed at how far those dinner table conversations about the importance of getting a college degree have taken me.

I want to thank my mother-in law, Margaret Stimmann Branson, who has served as mentor, final editor, top supporter, and mother to me for many years. It was Margaret's words of support that convinced me to take the initial steps towards earning a doctorate and her unfailing emotional and financial support that provided the grist to see me through to completion.

Finally, my deepest love and appreciation go to my husband, David Branson. I owe him a debt of gratitude for understanding my desire to earn this degree, for all of the sacrifices he made over the past four years, for keeping me grounded when I started to panic, and for continually reminding me, with help from our pets Midnight, Peaches and Simba, to occasionally take breaks for fun.

Table of Contents

ABSTRACT.....	i
ACKNOWLEDGEMENTS	iii
LIST OF TABLES	ix
LIST OF FIGURES	xi
CHAPTER ONE. Introduction	1
Statement of the Problem.....	4
Purpose of the Study	4
Research Design.....	5
Quantitative Methods.....	5
Qualitative Methods.....	5
Research Questions.....	7
Significance of the Study	7
Summary	8
CHAPTER TWO. Review of the Literature	9
Search Techniques	9
Theoretical Frameworks	10
Early Intervention Theories	10
Transactional Theories.....	11

Social Judgment Theories	13
Children with Developmental Delays	14
Impact of Early Experiences on Child Development	16
Critical periods for Brain Development.....	17
Critical period for Language Development	19
Critical period for Social-emotional Development.....	19
The Efficacy of Early Intervention	20
Interventions to mitigate the effects of poverty	21
Studies of interventions with children with disabilities.....	22
Identification of Developmental Delay.....	26
Developmental Screening	27
Developmental screening in pediatric settings	30
Screening in childcare settings.....	33
Problem.....	37
CHAPTER THREE. Methodology.....	38
Overview.....	38
Participant selection	40
Measures	42
Quantitative Procedures	46
Reliability and Research Fidelity.....	47

Qualitative Procedures	50
Quantitative Data Analysis	51
Qualitative Data Analysis	55
Ethical Issues	58
CHAPTER FOUR. Results	59
Phase I – Quantitative Results	59
Results of quantitative research questions	65
Summary of quantitative data analysis	77
Phase II – Qualitative Participant Selection.....	79
Phase III – Qualitative Data Analysis.....	80
Qualitative results - Themes	83
Qualitative results - Themes	83
Summary of Qualitative Results	89
CHAPTER FIVE. Discussion	92
Summary, Integration, and Interpretation of Results	92
Factors that Support Childcare Provider Recognition	103
Perceived Barriers to Making Referrals	108
Implications for Practice	114
Significance of the Study	116
Limitations of the Study	117

Implications for Future Research.....120

Summary120

Implications for Future Research.....120

Summary120

REFERENCES.....121

APPENDICES.....142

Effect of Using the Ages and Stages Questionnaires on Childcare Providers’
Developmental Assessment Ability

List of Tables

TABLE 1	Benefit-Cost Analysis of Three High-quality Preschool Programs....	22
TABLE 2	Cost Efficient and Effective Developmental Screening Tools.....	29
TABLE 3	Screening and Referral Practices of Childcare Providers.....	35
TABLE 4	Summary of Research Questions and Analyses.....	54
TABLE 5	Characteristics of Childcare Centers	60
TABLE 6	Characteristics of Child Participants.....	61
TABLE 7	Characteristics of Parents.....	63
TABLE 8	Characteristics of Childcare Providers.....	65
TABLE 9	Observed and Expected Frequencies-Order of ASQ and Agreement Between ASQ and CPDI.....	66
TABLE 10	Observed and Expected Frequencies of Actual Referral Outcome to Childcare Provider Decision about Referral.....	67
TABLE 11	Comparison of Referral Outcomes between Groups.....	69
TABLE 12	Logistic Regression Coefficients for Dependent Variable ASQ-CPDI Agreement.....	71
TABLE 13	Classification Table for Agreement.....	71

TABLE 14	Classification Table for Child Variables Predicting ASQ Outcome...	72
TABLE 15	Logistic Regression.....	72
TABLE 16	Classification Table for Childcare Provider Referral.....	73
TABLE 17	Logistic Regression Coefficients for Dependent Variable Decision to Refer.....	74
TABLE 18	Psychometric Values for the ASQ.....	75
TABLE 19	Frequencies and Percentages of ASQ and MSEL Crosstabulation.....	76
TABLE 20	Observed and Expected Frequencies Comparing Parent and Childcare Provider Agreement about a Child's Development.....	77
TABLE 21	Characteristics of Qualitative Interview Participants.....	80
TABLE 22	Sample of Theme Generation.....	81

List of Figures

FIGURE 1	Experimental Groups.....	6
FIGURE 2	Explanatory Design for Mixed Methods Research.....	40
FIGURE 3	Estimating Sensitivity and Specificity of the ASQ.....	52
FIGURE 4	Conceptual Framework Describing the Supports and Barriers to Early Identification.....	84
FIGURE 5	The Lens Model Conceptualization of Childcare Provider Judgment Process.....	106
FIGURE 6	Flow Chart for Developmental Surveillance in Childcare Settings..	115

CHAPTER ONE

Introduction

The first years of a child's life represent a crucial period of time for optimal brain development. Although most of the neurons in a child's brain are formed prior to birth, the child's experiences complete the brain's development through formation of synaptic connections. These early experiences determine which synaptic connections are created and strengthened and which are eliminated (Hawley, 2000; Knudsen, 2004; Shonkoff & Phillips, 2000). Interactions between a child and his or her caregiver provide the experiences that lay the foundation for further brain development. Sameroff and Fiese (1990, 2000) coined this theoretical construct as the transactional model of development. Simply stated, "Children affect their environments at the same time that their environment is affecting them" (Shonkoff & Phillips, 2000, p.24).

According to Shonkoff and Phillips (2000), some children will need access to early intervention in order to achieve healthy development. Early intervention is described by Shonkoff and Phillips as "more of a concept than a specific program" (p. 338), due to the diversity of targeted groups (e.g., children affected by poverty, developmental disabilities, parental substance abuse). The goal of early intervention is to support a caregiver's ability to provide a social and physical environment that promotes optimal child development. This is particularly important when child characteristics (e.g., lack of responsiveness, irritability) or parent characteristics (e.g., lack of experience, high stress level) interfere with positive reciprocal interactions between parent and infant.

Evidence of critical periods for optimal development in at least some developmental domains has led policymakers to call for early identification of children at risk for developmental delays, including autism spectrum disorders (Glascoe, 2005; Rydz, Shevell, Majnemer, & Oskoui, 2005). Despite the urgency for early identification of developmental delays, there is evidence that the majority of children with developmental delays are not being identified prior to age 5. It is estimated that more than 2 million children in the United States have physical, behavioral, emotional or learning disorders which require specialized services (Barbouth & Brosco, 2002; Merrick & Carmeli, 2004). Prevalence rates for developmental delays for children birth through 8 years of age have been reported between 12-16% (American Academy of Pediatrics Committee on Children with Disabilities, 2001; Bailey, Hebbeler, Scarborough, Spiker, & Mallik, 2004; Boyle, Decoufle, & Yeargin-Allsopp, 1994; Hamilton, 2006). In contrast to the 12-16% children anticipated to be present in this population, prevalence rates for children *receiving* early intervention or early childhood special education are reportedly much lower; approximately 1.8% for children birth through age 2 years and 5% for children 3-5 years of age (Bailey et al., 2004). This discrepancy in expected number of children needing early intervention and number of children actually receiving these services demonstrates that infants and toddlers in need of early intervention services are not being identified and served adequately.

One method recommended for identifying children at risk for developmental delays in the general population is developmental surveillance (Filipek et al., 1999; Glascoe, 2005). Developmental surveillance is defined as the periodic monitoring of a

child's developmental and behavioral skills through a partnership between parents and professionals who understand typical child development (Dworkin, 1989). There is evidence that asking parents about their concerns, in combination with screening tools increases the efficiency of screening instruments (Glascoe, 2005).

In 2001, the American Academy of Pediatrics called for all pediatricians to conduct developmental surveillance as a part of routine medical care at all well-child visits as preventative care for all children and as a method for identifying children at risk for autism spectrum disorders. However, a recent survey of pediatricians identified lack of time, lack of available staff to conduct the screenings, and inadequate reimbursement for developmental screenings as barriers to this practice (Sand, Silverstein, Glascoe, Tonniges et al., 2005).

Community childcare providers are another group of professionals who have access to large numbers of young children. Childcare settings are ideal locations for on-going developmental surveillance for several reasons: (a) childcare providers receive training in typical child development and are encouraged by their professional organization to screen child development (NAEYC, 2003), (b) multiple opportunities exist for a childcare provider to monitor child development when the child is present in the childcare setting on a daily basis, (c) quality of care for all children is improved as childcare providers increase their skills and knowledge and (d) collaborative relationships can be established between community childcare settings and early intervention to identify and serve children with developmental delays (Miller, Mutton, & Williams, 1993).

Statement of the Problem

Developmental screening using a standardized, validated test can improve the early identification of developmental delays and result in children receiving early intervention services designed to mitigate the impact of developmental delays (Squires, Nickel, & Eisert, 1996). While pediatricians have been the group of professionals most often targeted to perform developmental surveillance and screenings to aid in early identification of young children with developmental delays, recent research has shown that the majority of pediatricians do not follow the practice guidelines proposed by the American Academy of Pediatrics in 2001 due to lack of time, training, and resources, as well as inadequate reimbursement for developmental surveillance. It is important, therefore, that other professionals in the community who interact with young children on an ongoing basis be targeted to help with early identification procedures.

Purpose of the Study

The purpose of this study was to investigate the effect of administering a standardized developmental screening tool, the Ages and Stages Questionnaire (ASQ; Bricker & Squires, 1999), on childcare providers' ability to accurately assess child development and make appropriate referrals. The secondary goal of this study was to determine which childcare provider factors (e.g., age, years of experience, educational level), were related to accurate identification of delayed development leading to a child's appropriate referral to an early intervention agency.

Research Design

A mixed methods, sequential explanatory design was the methodological approach used to study the affect of using a standardized developmental screening tool.

Quantitative Methods

The quantitative portion of the study used a single-variable experimental design. The independent variable was the order and use of childcare provider-completed ASQ (Bricker & Squires, 1999) on the dependent variable; childcare providers' ability to accurately assess child development and make appropriate referrals as measured by the Childcare Provider Developmental Impression [CPDI] (Hix-Small, Marks, Squires, & Nickel, 2007). Accuracy of the childcare providers' developmental assessment was verified by giving a standardized developmental assessment, the Mullen Scales of Early Learning [MSEL] (Mullen, 1995) to 19% of the children who were screened using the ASQ. The professional who administered the MSEL was blind to the results of the ASQ at the time of administration.

Qualitative Methods

The qualitative portion of the study was conducted following the quantitative study. A phenomenological study using semi-structured interviews with selected participants who demonstrated high-agreement between the CPDI and ASQ and those who demonstrated low-agreement was conducted in order to understand the experience of childcare providers screening child development in childcare settings. Participants for the semi-structured interviews were selected after the quantitative data had been collected and analyzed. Results from the initial interviews indicated

that the culture of the childcare center might play a role in childcare providers' experience of developmental screening. Therefore, additional interviews were completed until there was representation from each of the participating childcare centers. A letter of invitation was delivered to each of the 9 childcare centers asking for volunteers from the sample of childcare providers who had participated in the quantitative portion of the study. Recruitment continued until at least 1 childcare provider from each participating childcare center had agreed to participate in an interview and until there was a mix of providers who displayed a high-degree of agreement between their responses on the CPDI and an individual child's ASQ and those who displayed a low-degree of agreement between their response on the CPDI and individual child's ASQ. Figure 1 illustrates the experimental design.

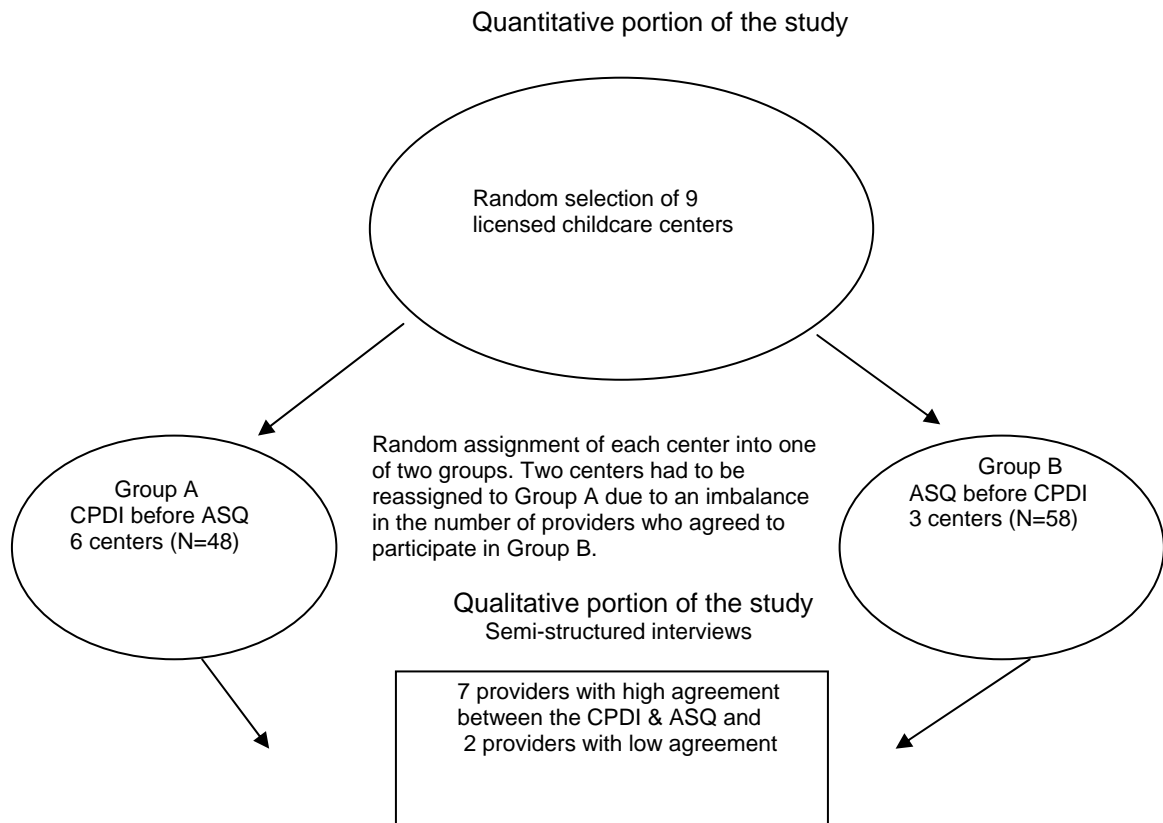


Figure 1. *Experimental groups*

Research Questions

The purpose of this study was to investigate the effect of administering a standardized developmental screening tool, the ASQ, on childcare providers' ability to accurately assess child development. Specific research questions included:

Question #1. Is the order in which the Ages and Stages Questionnaire (ASQ) is completed related to whether or not a childcare provider's developmental impression (CPDI) agrees with the ASQ?

Question #2. Is there a difference between the number of children identified as needing further evaluation on the CPDI and the actual number of children referred by the researcher based on ASQ results?

Question #3. Do certain childcare provider characteristics, or child characteristics, or a combination of characteristics increase the probability of ASQ-CPDI agreement and/or decisions about referring a child for further evaluation?

Question #4. Can childcare providers administer the ASQ with acceptable accuracy and validity?

Question #5. What is the agreement between a parent's reported impression of a child's development and the childcare provider's impression?

Significance of the Study

While studies have been conducted on pediatricians' use of developmental screening instruments to identify children with developmental delays, there is no evidence of direct research on childcare providers' use of developmental screening instruments in the literature. This study could potentially identify an untapped

community resource for the early identification of children at risk for developmental delay. Results from this study could illuminate supports that facilitate a childcare provider's ability to recognize and refer a child with a developmental delay, as well as barriers that interfere with this process. Study results could be used to identify training needs for childcare providers related to monitoring and screening child development. Moreover, study results could offer insight for early intervention agencies about the need to work more closely with community childcare providers in identifying children who need early intervention services.

Summary

This introduction provided a brief overview of this dissertation research along with an argument for why early identification of children at risk for developmental delay is important. The next chapter will review pertinent literature related to the prevalence of children with developmental delays, identification of developmental delays in children, reasons it is important to identify children early, and the benefits of early identification.

CHAPTER TWO

Review of the Literature

The purpose of this chapter is to provide foundational understanding of literature related to the early identification of young children at risk for developmental disabilities. This review begins with several theoretical frameworks supporting the effectiveness of early intervention followed by a discussion of *Social Judgment Theory*. After that is an overview of the prevalence of developmental delays and disabilities, and their impact on society. The next section focuses on the reasons it is important to identify and begin intervention as early as possible, including research on brain development and early intervention efficacy. Next is a description of current efforts of identifying children with developmental delays. The chapter concludes with support for implementing developmental screening in childcare settings.

Search Techniques

Three techniques were used to locate pertinent literature: (a) computerized searches of abstract databases, (b) hand searches of pertinent journals, and (c) ancestral searches of references cited. Computerized searches of abstract databases (e.g., *PsychINFO*, *ERIC*, *MEDLINE*, *CINAHL*, and *Academic Search Premier*) were implemented using the following keywords: *early intervention*, *early identification*, *developmental screening*, *assessment*, *childcare providers*, and *child find*. While a wealth of information was located on most topics identified above, and policy statements regarding the importance of screening and assessment of child development in early childhood education were available (e.g., NAEYC, 2003), there was a noticeable lack of

research on childcare providers' use of developmental screening instruments available in the literature.

Theoretical Frameworks

This study was grounded on theories related to the efficacy of early intervention. In addition, *Social Judgment Theory* was utilized to aid in understanding how childcare providers' make decisions regarding children's developmental status.

Early Intervention Theories

Early intervention practices have been shaped by behavioral, constructivists, and transactional theoretical perspectives (Odom & Wolery, 2003).

Behavioral theories. Behaviorist theories of Skinner, Pavlov and Bandura (Strain et al., 1992) have influenced early intervention practices of individualization, systematic instruction and assessment practices (e.g., positive behavior supports, incidental teaching). Behavioral theories have helped to increase the effectiveness of intervention practices for children of all ages.

Constructivists theories. Constructivist theories espoused by Piaget and Vygotsky (Fosnot, 1996) have led to acknowledgment of the importance of children's self-initiated actions and interactions with the environment and the role of adults as mediators of child learning. Constructivist theories have been particularly important for guiding development of curricula that is based on developmentally appropriate practices for young children (Bredekamp & Copple, 1997). Bronfenbrenner's ecological systems theory (Bronfenbrenner, 1979) and his subsequent bioecological systems theory (Bronfenbrenner & Evans, 2000) have helped early interventionists understand the importance of the child's immediate setting (e.g., home, childcare setting) for

intervention, the interrelationship between the different settings in which a child participates (e.g., communication between settings) and the influence of the broader ecology (e.g., state policies and cultural views) on intervention practices. (See Odom & Wolery, 2003 for an in-depth discussion of these theoretical perspectives) These theories have informed evidence-based early intervention practices and set a foundation for understanding the effectiveness of early intervention. However, the theories described above do not provide a framework for understanding why early identification and early intervention are important.

Transactional theories. The transactional theoretical construct highlights the importance of early identification and early intervention for optimal developmental outcomes. Sameroff and Chandler (1975) explain the transactional relationship between biological and experiential factors on child development as follows, “Although reproductive casualties may play an initiating role in production of later problems, it is the caretaking environment that will determine the ultimate outcome” (p.274). This theory has been further developed as the transactional model of development (McLean & Synder-McLean, 1978; Sameroff & Fiese, 2000). An illustration of this model is the impact of bi-directional, reciprocal interactions between a child and his or her caregiver on early social communication development. Researchers have noted that parent responsiveness leads to an increase in a child’s frequency of intentional communication acts, which may lead to an increase in parental use of *linguistic mapping* (e.g., parent repeats and expands the child’s message using words), which in turn supports further communication development for the child (McLean & Synder-McLean, 1978; Warren et al., 2006). Conversely, young children with developmental delays such as autism

spectrum disorders tend to initiate and respond at lower rates than children with typical development (Yoder, Davies, & Bishop, 1994). Over time, parents of children with low-initiating skills may become less responsive to their children's communicative overtures which in turn may inadvertently compound a child's developmental delay (Hart & Risley, 1995; Saxon, Colombo, Robinson, & Frick, 2000). Early identification followed by early intervention supporting parents in becoming more responsive and teaching the child to use more recognizable communicative signals could improve the transactional interactions between a child and his or her caregivers, setting the child on a more typical developmental trajectory (Kaiser, Hester, & McDuffie, 2001; Warren et al., 2006; Yoder & Warren, 1998).

The theoretical frameworks discussed above provide a lens for viewing the importance of early intervention and rationale for why early intervention works to improve children's developmental trajectories in many cases. The purpose of this dissertation study was to investigate the effect of using a standardized screening tool on childcare providers' ability to make judgments about children's developmental status and need for referral for further evaluation. Therefore, it was important to look at theoretical frameworks used to understand the factors that influence decision-making processes. Social Judgment Theory provides a framework for examining the interplay of an individual childcare provider with cues available in the environment to make a judgment about children's developmental status.

Social Judgment Theory

Egon Brunswik's probabilistic functionalism theory is credited with providing the foundation for Social Judgment Theory (Brunswik, 1955). Cooksey (1996) explained the basis for Brunswik's theory as follows:

Brunswik called his approach *Probabilistic Functionalism* to capture the primary emphases of his view: (1) the chief task of psychology was to understand the functional *relationship* between an organism and its environment; and (2) the essence of this organism-relationship was necessarily based on probabilistic (uncertain) relations among environmental variables (p.1).

In other words, our task as individuals is to interpret social information (cues) available in the environment to make judgments. Different individuals viewing the same environmental cues may attach different levels of importance to certain cues which leads to inconsistency and uncertainty. Arkes and Hammond (1986) described judgment as a cognitive process in which a person draws a conclusion, or inferences about something that cannot be seen, by analyzing data (or cues in the environment) that can be seen.

Hammond, Hirsch & Todd (1964) utilized Brunswik's Social Judgment Theory (SJT) to describe the 'Lens model' of cognition and information use as a means to describe how decision-makers weigh and combine information to reach decisions in complex environments. Hammond argued that the complexity of the judgment ecology (decision-making situation), the number of pieces of information available to aid in making the decision (cues), and the time available for exercising judgment influences what kind of information and processing will be required to make the decision.

Hammond postulated that different kinds of tasks called for different kinds of cognitive processing aligned along a cognitive continuum from intuitive processing to analytical processing. According to Hammond, intuitive thinking was characterized by rapid

information processing, simultaneous cue use, lack of logical rules, and an untraceable judgment process. This is contrasted with analytical thinking which tends to involve slow information process; use of sequential cues, based on logical rules, and a retraceable judgment process.

Social Judgment Theory approaches have been used to understand a variety of decision-making processes including: (a) medical personnel's use of information in making critical care decisions with actual outcomes (Beckstead & Stamp, 2007; Brannen, Godfrey, & Goetter, 1989; Thompson & Foster, 2005), (b) occupational therapists judgment of level of disability for clients with cerebral palsy (Rassafiani, Ziviani, & Rodger, 2008) and (c) teacher judgment about students' work (Cooksey, Freebody, & Davidson, 1986; Cooksey, Freebody, & Wyatt-Smith, 2007).

This study used Social Judgment Theory to understand the decision-making process used by childcare providers to make decisions about a child's developmental status and whether or not the child should be referred for further evaluation in this study.

Children with Developmental Delays

Prevalence

It is estimated that 1 in every 6 children, or approximately 16.8% of children under the age of 17 years, has physical, behavioral, emotional or learning problems requiring specialized services (Boyle, Decoufle, & Yeargin-Allsopp, 1994; Williams, Klinepeter, Palmes, Pulley, & Foy, 2004). Prevalence rates for children between the ages of birth and 8 years of age have been reported between 12-16% (American Academy of Pediatrics Committee on Children with Disabilities, 2001; Bailey, Hebbeler, Scarborough, Spiker, & Mallik, 2004; Boyle, Decoufle, & Yeargin-Allsopp, 1994). These

numbers contrast with the prevalence rates for children *receiving* intervention services. Furthermore, there are proportionately far more older children receiving special education services than younger children (e.g., more than 11% of the total 6-to-17-year population, 5% of the 3-5 year old preschool population) Only 1.8% of the birth to 3-year-old infant-toddler population receives services (Scarborough et al., 2004).

The National Early Intervention Longitudinal Study (NEILS) was the first study of a nationally representative sample of children and families who had received early intervention services (Bailey, Hebbeler, Scarborough, Spiker, & Mallik, 2004). This study followed children receiving early intervention from the time they entered services (between 1997 and 1998) through their transition out of the Part C system at or before 36 months of age. According to NEILS data, early identification of children with obvious developmental problems (e.g., Down syndrome) occurred earlier and more efficiently. Children who began services later were more likely to be diagnosed on the basis of a developmental delay rather than a specific diagnosis, and their parents had a more difficult time connecting to services than families of younger children (Bailey et al., 2004). The average time between parent's first concerns and the development of an Individualized Family Service Plan (IFSP) in the early intervention program was 8.3 months. The largest lag in time occurred between the child's diagnosis by a medical professional and when the child was referred for early intervention services, an average of 5.2 months after diagnosis. The authors of the NEILS study indicated that although more research was needed to pinpoint the cause for the delay in the referral process, possible reasons could include parent factors (e.g., uncertain desire for services), as well

as system factors (e.g., failure to incorporate developmental screening in pediatric examinations or lack of coordination between systems).

Identifying children at risk for developmental delay and providing effective interventions as early as possible has been described as “a public health imperative” (Pinto-Martin, Dunkle, Earls, Fliedner, & Landes, 2005, p. 1928). Research shows that intervention prior to kindergarten dramatically reduces the high costs associated with elevated healthcare, education and ongoing service provision for children with disabilities (Boyle, Decoufle, & Yeargin-Allsopp, 1994; Gallaher, Christakis, & Connell, 2002; Shonkoff & Phillips, 2000). In addition to the direct costs identified above, there are indirect costs related to lost productivity over a lifetime. The lost wages are estimated to average between \$417,000 for an individual with a hearing impairment to \$1,014,000 for an individual with mental retardation (Honeycutt, Grosse, & Dunlap, 2003).

Impact of Early Experiences on Child Development

Early treatment of developmental delays leads to better outcomes for children resulting in a cost savings to society (Sices, 2007). This section explains the neurobiological benefits of early intervention on a child’s developing brain as well as the negative neurological consequences resulting from a lack of appropriate growth-promoting experiences early in life (National Scientific Council on the Developing Child, 2007). This will be followed by a review of the short- and long-term benefits reported by early intervention efficacy studies.

Advances in neurobiological testing have led to an increased understanding of the importance of early brain development. Use of sophisticated techniques like magnetic resonance imaging (MRI) and electroencephalograms (EEG) allow researchers to view

how babies' brains change with development. This ability provides empirical evidence that early experiences directly wire a baby's brain for later learning (Friedman, 2006). For hundreds of years there has been a debate over the relative importance of nature (genetics) versus nurture (environmental effects) [see for example, Itard, 1962]. Recently, researchers are focusing on the interaction of these factors as the critical determinant of development (Cicchetti & Stroufe, 2000; Nelson, 2000; Ramey & Ramey, 1998; Shonkoff & Phillips, 2000). This interaction of nature and nurture was described eloquently in the book *From Neurons to Neighborhoods* "Genetically guided processes of neural development are designed to capture experience and to incorporate the effects of experience into the developing architecture of the nervous system" (Shonkoff & Phillips, 2000, p.53).

Critical Periods for Brain Development

Most neurons in the brain are formed prior to birth. Brain development after birth occurs through neuronal migration and the creation of synaptic connections between cells which are formed on the basis of experience. Synapses that are used remain and those that are not used are pruned away (Huttenlocher & Dabholkar, 1997; Knudsen, 2004). This elimination of synapses allows the brain to function more efficiently, except in cases of "over-pruning" where synaptic connections that are needed are eliminated, such as when a child is deprived of critical experiences early in life (Hawley, 2000). For example, children deprived of exposure to patterned light or auditory stimulation early in life face life-long deficits in these areas. Lack of input to these sensory organs during the first few years of life result in permanent decreases in visual or auditory acuity despite later medical treatment (e.g., cataracts removed, strabismus treated, hearing aids fitted or

cochlear implants placed; Shonkoff & Phillips, 2000). This example illustrates that for some brain systems there is a critical period of openness to environmental input. If the input fails to happen, or if input is abnormal during this critical period, then the development is permanently affected.

Greenough and colleagues provide a framework for looking at both the nature and timing of experience through their model of neural plasticity that refers to sensitive periods of sensory development early in life as *experience-expectant* and later learning as *experience-dependent* (Greenough et al., 1987). Experience-expectant development relies on input from the environment that should be available to all members of a species under normal circumstances. Greenough proposes that the mammalian brain relies on an overabundance of synaptic connections among neurons in the sensory and motor systems, and that input from the environment determines which of the synapses survive and which are eliminated during a predetermined developmental schedule due to lack of confirmation or competition from confirmed synapses.

Knudsen (2004) argues that experience during a sensitive period allows the developing neural circuit to be customized to the needs of the individual. Experience provides the precise information about the individual and the environment in which the individual is developing. Knudsen gives examples of neural circuits being calibrated to process stereoscopic visual information based on the physical properties and exact separation of an individual's eyes. Experience with a specific language is another example of the need for experience after birth to facilitate the processing of speech sounds for the particular language that will be spoken in the child's home (Newport, Bavelier, & Neville, 2001).

Critical period for language development. Examples of linguistic deprivation come from deaf children born to hearing parents who were not exposed to sign language until adolescence and from cases of children raised in isolation without the benefit of normal language stimulation. Genie, a child who experienced extreme deprivation for the first 13 years of her life is contrasted with Isabelle who experienced extreme deprivation for the first 6 years of her life. In the case of deaf children deprived of sign language until adolescence and Genie deprived of verbal language until age 13, language developed after extensive intervention, but certain aspects of language development, such as the ability to discriminate grammatical errors failed to develop (Newport, Bavelier, & Neville, 2001). In contrast, Isabelle received intervention at age 6 and was able to recover normal linguistic ability in all areas. Kuhl (1992) demonstrated that the speech perception system remains open to experience for a limited period of time and then, if experience is not forthcoming, the ability to discriminate phonemes from non-native languages declines. Kuhl found that 6-month-olds raised in English speaking homes were able to discriminate contrasts from Swedish or Thai languages as well as from their own language, but by 12-months of age the infants had lost their ability to detect contrasts from a nonnative tongue (Kuhl, 1992). Newport and colleagues identified age 12 as the end of the critical period for language learning for grammatical and phonemic discrimination. This is contrasted with the semantic features of language which can be learned throughout life.

Critical period for social-emotional development. The critical period for emotional development has been proposed to be 10-18 months (Stern, 1985). During this time period infants and toddlers are particularly vulnerable to the negative effects of

maternal depression. Frontal lobe asymmetry usually associated with depressed adults can be seen in the brains of young children being raised by mothers with major depressive disorder (Dawson, Hessel, & Frey, 1994). The effect of early deprivation is evident in research done with children reared in institutions. Children adopted from Romanian orphanages displayed a range of developmental delays that improved after they were placed in a loving adoptive home if the adoption occurred early in development. Children who were adopted during their first year of life showed the best outcomes and those who were most severely deprived and were adopted after the age of 2-years showed the greatest developmental delays and social attachment disorders (Rutter et al., 1999).

The research cited above demonstrates that a child's development is influenced by his or her genetic make-up interacting with the child's environment. This gives credence to the notion that intervening early using effective strategies with children at risk for developmental delays may maximize development and possibly lesson further atypical development. Cicchetti (2002) made the following pertinent observation:

Thus, children with genetically constructed abnormal brains must have their environments tailored to their specific deficits. If these environmental modifications are not introduced, then these children's subsequent experience-expectant and experience-dependent processes will manifest additional aberrations and development will proceed on an even more maladaptive pathway (p. 1415).

The Efficacy of Early Intervention

Evidence for the effectiveness of early intervention and early childhood education programs for children in the first 5 years of life comes from a wealth of methodologically sound studies published since the 1980s (Guralnick, 1997; Shonkoff & Hauser-Cram,

1987; Shonkoff & Phillips, 2000). These studies have focused on intervention programs for children with specific disabilities (e.g., Down syndrome, autism), children with developmental delays, and children from families living in poverty (Guralinick, 2005). The literature regarding delivery models for early intervention services varies according to where the services were provided (e.g., home based, center based), the primary target of intervention (e.g., child, parent, or both), and the focus of intervention strategies employed (e.g., narrow focus - applied behavioral analysis; wide focus- enhancing parental efficacy).

Studies of Interventions to Mitigate the Effects of Poverty

One of the most robust findings regarding early intervention is the short-and long-term benefits of high-quality preschool education on mitigating the effects of living in poverty. The result of longitudinal studies conducted on the Carolina Abecedarian (Campbell & Ramey, 1995), Chicago Child-Parent Centers (Fuerst & Fuerst, 1993), and Perry Preschool (Schweinhart, Berrueta-Clement, Barnett, Epstein, & Weikart, 1985) indicated that children enrolled in these programs had an average increase in IQ scores of 6.5 points, a 14% reduction in special education placement later in childhood, a 13% reduction in not passing a grade, increased rates of high school graduation, and increased employment in early adulthood (Anderson, Shinn, & Fullilove, 2003; Bryant & Maxwell, 1997). The National Institute for Early Education Research (NIEER) conducted a cost-benefit analysis of the Abecedarian, Perry Preschool, and Chicago Child-Parent Centers using 2006 dollars, discounted at 3%. Costs of the programs per child were compared to the benefits of increased earning potential and the cost savings of reduced crime, welfare, abuse and neglect, and health expenditures (Barnett & Yarosz, 2007). Table 1 presents

the total cost per child, benefit, and benefit-to-cost ratio for the three programs.

(Interested readers are directed to Barnett & Yarosz, p.11 for a full analysis).

Longitudinal studies and economic analysis demonstrate that even when the initial cost of an intensive intervention program is high such as with the Abecedarian program, the long-term cost savings to society support this expenditure.

Table 1.

Benefit-Cost Analysis of Three High-quality Preschool Program

	Benefits	Cost	B/C Ratio
Abecedarian	176,284	70,697	2:5
Chicago Child-Parent Centers	83,511	8,224	10:1
Perry Preschool	284,086	17,599	16:1

Note. B/C represents Benefit to Cost.

Studies of Interventions with Children with Disabilities

Much research has been conducted on the efficacy of early intervention for children with disabilities. These studies indicate that, in general, children who received early intervention services from qualified personnel had higher IQ scores (Brooks-Gunn, Gross, Kraemer, Spiker, & Shapiro, 1992; Shonkoff & Hauser-Cram, 1987), attained developmental milestones earlier (Hanson, 2003), had better educational outcomes (Iovannone, Dunlap, Huber, & Kinkaid, 2003), and enjoyed better family functioning than peers who did not receive early intervention services (Guralnick, 1997; Odom & Wolery, 2003).

Children with Down syndrome. Multiple conditions that lead to developmental delay or disability have been researched extensively in an effort to alleviate the disabling

effects of those conditions. Down syndrome (DS) was one of the first syndromes associated with mental retardation to be identified (Roizen, 1997) and longitudinal data are available on one of the first cohorts of children with DS to participate in an early intervention program following the enactment of the Education of All Handicapped Children Act (P.L. 94-142) in 1975 (Hanson, 2003). Results of Hanson's qualitative study following 12 children with DS and their families indicate that although the early intervention program helped the parents cope with their children's diagnosis and improved their children's developmental outcomes, ongoing challenges such as medical complications, disappointment in their children's inability to achieve some adult milestones, and lack of adequate services and supports when the children reached adulthood remained (Hanson, 2003). Down syndrome is a disorder which demonstrates the effect child characteristics (e.g., biological constraints imposed by a genetic disorder) can have on the transactional model of development. Conversely, premature birth, autism spectrum disorder, and congenital hearing loss are three conditions where there is documentation that early intervention makes a dramatic difference in children's developmental trajectories (Fombonne, 2005; Goldberg-Hamblin, Singer, Singer, & Denney, 2007; Yoshinaga-Itano, 2003).

Children born prematurely. Children born premature with very low birth weight (VLBW [> 1500 grams]) or extremely low birth weight (ELBW [>750 grams]) are at risk for increased infant mortality, school failure, health problems, and disability (Als, 1997; Goldberg-Hamblin, Singer, Singer, & Denney, 2007). The use of developmental care strategies in the neonatal nursery has led to immediate positive outcomes such as decreased hospital time, decreased medical complications, and improved weight gain

(Als et al., 1994), as well as long-term outcomes, such as improved reading, mathematics, and behavioral outcomes for preterm infants (McCormick, Brooks-Gunn, Buka, Goldman, & Salganik, 2006). Early intervention services for children born premature with low birth weight typically begin in the neonatal nursery and then continue at home after the infant is discharged. Blair and Ramey (1997) reviewed randomized controlled trials of early intervention for LBW (>2800 grams) infants conducted between 1986 and 1996. Most intervention programs reviewed in their study consisted of both parent education (e.g., understanding infant distress signals, increasing maternal responsiveness) and direct intervention (e.g., sensory stimulation) with the infants. Positive results were reported for parents and children in the intervention groups for parenting outcomes (e.g., greater satisfaction in parenting role and greater sensitivity to infant behaviors) and for infant outcomes (e.g., higher mental and motor skills development) when compared to the control groups (Brooks-Gunn, Gross, Kraemer, Spiker, & Shapiro, 1992; Rauh, Achenbach, Nurcombe, Howell, & Teti, 1988).

Children with Autism Spectrum Disorders. The prevalence of autism spectrum disorder (ASD) has risen dramatically in the past 20 years and the Centers for Disease Control (CDC, 2007) currently estimates that 1 in 150 children are impacted by ASD. Developmental differences associated with autism include delayed development across domains with significant delays noted in communication development, social reciprocity, and the presence of stereotyped behaviors and restricted interests. A variety of intervention methods have reported positive outcomes for children with ASD. Intervention methods can be classified as predominately behavioral or predominately developmental-responsive approaches (Yoder & McDuffie, 2006). Examples of

behavioral intervention methods include applied behavioral analysis [ABA] (Lovaas, 1987), incidental teaching (McGee, Morrier, & Daly, 1999), and pivotal response training (Koegel, Koegel, Harrower, & Carter, 1999). Developmental-responsive approaches include the developmental, individual-difference, relationship-based (DIR) Model (Greenspan & Wieder, 1997), responsive teaching (Mahoney, 2003), and the social-communication, emotional-regulation, transactional support [SCERTS model] (Wetherby, Prizant, & Schuler, 2000). Behavioral approaches emphasize structured teaching of discrete skills while developmental-responsive approaches focus on improving social-communication skills through child-centered methods (National Research Council, 2002). No single intervention approach has been determined superior for all children with ASD, however, there is evidence that early (e.g., prior to age 5 years), intensive (e.g., 25 hours or more a week), comprehensive intervention programs for children with ASD lead to increased IQ scores, verbal language skills, and placement in a less restrictive educational placement (Dawson & Osterling, 1997; Pianta & Cox, 1999).

Children with hearing loss. Children who are not identified with congenital hearing loss prior to 6-months of age are at risk for significant speech, language and cognitive delays (Erenberg, Lemmons, Sia, Trunkel, & Ziring, 1999). Prior to the advent of universal newborn hearing screening/early hearing detection and intervention (UNHS/EHDI) programs, the average age of detection of a hearing loss occurred around 24 months of age when a child failed to develop verbal language. Yoshinaga-Itano, Coulter, and Thomson (2000) matched 50 pairs of children ages 9-61-months with congenital hearing loss who either were or were not born in hospitals requiring newborn

hearing screening on measures of communication and speech development. Early identified children (e.g., before 6 months of age) were found to have significantly better vocabulary, general language abilities, speech intelligibility, social-emotional development, parent bonding, and parent-grief resolution. These positive effects of early identification and early intervention were found regardless of severity of hearing impairment, ethnicity, gender, socio-economic status, cognitive level, mode of communication (sign language or oral-aural), or presence of additional disabling conditions. Universal newborn hearing screening is a positive illustration of how efforts to identify children early can lead to early intervention with positive outcomes.

Research supports the premise that the earlier a child in need of early intervention is identified and services are provided, the greater the potential for optimal child development (Gilliam, Meisels, & Mayes, 2005; Shonkoff & Phillips, 2000). The National Scientific Council on the Developing Child (2007) provided a strong endorsement of early intervention in the following statement: “Enrolling *all* children who meet eligibility criteria for early intervention programs as early as possible would help infants and toddlers with developmental delays and disabilities build the foundational skills needed to realize their full potential” (p.13).

Identification of Developmental Delay

Most children acquire skills in a fairly predictable sequence with variations due to individual and cultural differences. The term developmental delay refers to a child who has not met the developmental milestones, specific skills, and abilities expected by a certain age (Allen & Cowdery, 2005). The lag in development may be in one

developmental domain only, such as communication skills, or it may be a global delay affecting all developmental domains.

Many infants and toddlers are said to be at risk for developmental delays due to biological risk factors (e.g., premature birth, chromosomal disorder) and/or environmental risk factors (e.g., living in poverty, exposure to lead). Although these risk factors increase the likelihood that the child will have a developmental delay, there is the potential for healthy development following early intervention (Allen & Cowdery, 2005). Research supports the tenet that early intervention helps reduce developmental delays and attenuates the effects of biological and environmental risk factors (Gilliam, Meisels, & Mayes, 2005), however, there must be a system for identification of children who are at risk for developmental delays.

Developmental Screening

Developmental screening refers to a brief process of testing large numbers of children in order to identify those who are at high risk for developmental delay and who are in need of further evaluation (Rydz, Shevell, Majnemer, & Oskoui, 2005). The methods used for screening include assessment of an individual child's development either by direct assessment of the child by the person conducting the developmental screening (e.g., pediatrician, childcare provider) or by caregiver report (Glascoe, 2005).

Choosing a developmental screening tool. Several factors must be considered when choosing a screening tool. First, the tool should have adequate reliability, validity, and positive predictive powers. The accuracy of the screening test is measured by its *sensitivity* and *specificity*. Sensitivity refers to the percentage of children with true problems who are correctly identified by the test. The standards for screening test

sensitivity are the identification of at least 70-80% of children with disabilities during a single screening. Specificity refers to the ability of the test to correctly identify children with typical development and should be at 80% in order to avoid over-referrals (Glascoe, 2005). Squires et al., (1996) reported physician detection rates of children with developmental delay of 70-80% when a validated screening tool was used, compared to only 30% when clinical judgment or informal checklists alone were used.

Second, the tool should focus on all areas of development including communication, cognition, motor, adaptive, and social-emotional domains. Screening for differences in the social-emotional domain is particularly important for children at-risk for ASD. Parents might report concern about a child's aggressive behavior, but parents rarely express worries about their child's social engagement unless they are also concerned about another area of development (Lord & Luyster, 2005).

Third, the tool should be efficient and cost effective to ensure that it is used on a regular basis. The purpose of screening child development is to identify children in need of further assessment. Therefore, screening itself should not be as costly as a comprehensive assessment (Gilliam & Mayes, 2004). Efficient screening tools should also be easy to administer and to interpret by trained paraprofessionals to encourage accurate use and appropriate referrals to receiving agencies (e.g., early intervention agencies, special education preschool programs, or community professionals).

Fourth, and perhaps most important, developmental screening programs must have clear procedures in place for making appropriate referrals for subsequent evaluation and early intervention, if deemed necessary. An effective developmental screening procedure would require a partnership between the settings conducting the screenings

(e.g., pediatric and other health care settings, community childcare settings) and the agencies prepared to conduct further evaluation and provide intervention. Table 2 identifies selective developmental screening tools that have good sensitivity and specificity, as well as being cost-effective and easy to administer.

Table 2.
Cost Efficient and Effective Developmental Screening Tools

Developmental Screening Tool	Age Range	Accuracy	Time/Cost
Ages and Stages Questionnaires (ASQ) Parent-completed, child-monitoring system (Bricker & Squires, 2004)	4-60 months	*70-90% **76-91%	15 minutes \$199 for complete kit
Parent's Evaluation of Developmental Status (PEDS; Glascoe, 1998)	Birth-9 years	*68% **88%	2 minutes \$30 for manual & protocols
Child Development Inventory (Ireton, 1990;2004)	18-60 months	*68% **88%	5 minutes \$47 for Manual & protocols

* Sensitivity ** Specificity

Federally mandated screening and child find systems. The importance of effective systems of developmental screening for young children is demonstrated by federal legislation governing both Medicaid services for low-income families and mandated early intervention and preschool special education services. Medicaid's Early and Periodic Screening, Diagnosis and Treatment (EPSDT) Title V of the Social Security Act (42 U.S.C., §701-710, 1981) program entitles children eligible for Medicaid to receive health and developmental screening and referrals provided by pediatricians. However, this program of developmental surveillance has not been successful in providing either health

or developmental screenings to eligible children. The United States General Accounting Office (USGAO, 2001) reported that 60% of children participating in managed care Medicaid did not receive any EPSDT screenings to which they were entitled.

The federal mandate requiring states to create a system for identifying children eligible for special education services has been part of federal legislation since the passage of the Education for All Handicapped Children Act of 1975 (P.L. 94-142) and continues to be a requirement in the most recent revision - The Individuals With Disabilities Improvement Act (IDEA) of 2004 (P.L. 108-446). This system is referred to as a *child find system* and includes various methods of recruitment and developmental screening for young children.

Mandated federal systems of screening and referral, such as Medicaid EPSDT and special education, are available and can be used to create a comprehensive system of developmental screening for children at-risk for developmental delay. The effectiveness of these systems is dependent on the cooperation and collaboration of referral sources (e.g., pediatricians, health, education, and social services providers, childcare providers, and parents) and early intervention and special education providers.

Developmental screening in pediatric settings. The American Academy of Pediatrics (AAP) issued a number of policy statements and reports encouraging pediatricians to conduct ongoing developmental surveillance at all well-child visits before age 5 and developmental screening whenever a concern is voiced by parents (American Academy of Pediatrics Committee on Children with Disabilities, 2001; Filipek et al., 2000; Filipek et al., 1999). The most recent report issued by the AAP also includes a recommendation that “all children be screened with a standardized developmental

screening tool at the 9-, 18-, and 24- or 30-month visit regardless of whether or not a concern has been raised or a risk has been identified during the surveillance process” (Johnson, Myers, & Council on Children with Disabilities, 2007, p. 1195). Practice guidelines strongly encourage the use of a standardized developmental tool to conduct developmental screening in primary care. A recent survey of pediatricians, however, identified lack of time, lack of available staff to conduct the screenings, inadequate reimbursement for developmental screenings, and unfamiliarity with community resources as barriers to this practice (Sand, Silverstein, Glascoe, Tonniges et al., 2005).

Another survey of pediatricians conducted by Sices and colleagues (2003) found that only half of the responding physicians used formal developmental screening tools. These practitioners reported using informal measures, such as clinical judgment alone, which only detected 30% of children with disabilities (Squires, Nickel, & Eisert, 1996). Developmental surveillance without developmental screening using a standardized tool is inadequate as an approach to identify children at-risk for developmental delay in pediatric settings. Moreover, there is evidence that pediatricians miss a high proportion of problems in the children they see in routine care. Sharp, Pantell, Murphy, & Lewis (1992) reviewed videotapes of 34 pediatric and family medicine residents during child health visits for 34 children ages 5-12 years. These researchers found that physicians responded with information, reassurance, guidance, or referral in only 40% of the cases. The same study also looked at experienced, board-certified pediatricians in private practice and noted that these pediatricians responded to fewer than half of the psychological concerns of mothers. Lavigne, Binns, Christoffel, and colleagues (1993) compared pediatrician intuition against a complete standardized assessment for behavioral problems and found

that pediatricians were able to detect behavioral and emotional problems less than 20% of the time based on their clinical opinion alone. Hix-Small, Marks, Squires, and Nickel (2007) compared pediatrician developmental impression (PDI) alone with use of the Ages and Stages Questionnaire at 12- and 24-month well-child visits. These researchers found that 37 out of a total 82 children who were referred to early intervention services and found to be eligible would have been missed if pediatrician developmental impression alone had been used. Moreover, referral rates increased a total of 224% when the study years were compared to previous years illustrating that use of a standardized tool helped pediatricians identify more children with developmental delay.

The practice parameters endorsed by the AAP for pediatricians include both a general developmental screening tool as well as an autism-specific screening tool at the first level. Dosreis and colleagues (2006) investigated pediatricians' use of autism-specific screening tools and found that only 8% of the pediatricians surveyed screened for autism spectrum disorders. The respondents indicated time constraints and lack of familiarity with ASD screeners as the primary barriers. Another key finding of this study was that nearly 20% of the pediatricians who responded to the survey indicated that they would be inclined to adopt a "watch-and-wait" strategy, if they suspected ASD in a child 2 years or younger.

Lack of reimbursement is only one of the barriers cited by pediatricians. Another barrier is lack of sufficient child development training in medical school. Currently, the curriculum on child development in medical school is one month of formal training during a three-year pediatric residency program (ACGME, 2004). This paucity of training may explain why the majority of pediatricians report difficulty following the

practice guidelines for developmental surveillance and developmental screening during well-child visits.

A further barrier to using pediatricians as the sole providers of developmental screening is that not all families have a medical home. This is particularly true for children from poor and low-income homes who are less likely to have health insurance and less likely to have an ongoing relationship with a primary care physician (Stebbins & Knitzer, 2007). Relying on pediatricians alone for developmental surveillance can result in missing a vulnerable population of children who are at risk for developmental delays. Therefore, it is important to identify additional sources in the community who have regular contact with young children to conduct developmental surveillance.

Screening in childcare settings. High-quality childcare has the potential to serve as a setting for developmental screening of young children and as a link between children and families and early intervention or preschool special education services. It is estimated that 5 million of the nation's 11 million infants and toddlers from all socioeconomic strata spend 25 hours or more each week in out-of-home care (Larner, Behrman, Young, & Reich, 2001).

Community childcare settings are ideal locations for on-going developmental surveillance for several reasons: (a) childcare providers receive training in typical child development and are encouraged by their professional organization to screen child development (NAEYC, 2003), (b) childcare providers have multiple opportunities to monitor child development when the child is present in the daycare setting on a daily basis, and (c) the possibility exists to establish a collaborative relationship between community childcare

settings and early intervention and school district special education programs to identify and serve children with developmental delays (Miller, Mutton, & Williams, 1993).

Federally funded early care and education programs are required to screen children. For example, Head Start and Early Head Start require that all children be screened within 45 days of entering their program with screening results being used to make referrals to appropriate professionals for further assessment. This screening process is used both to identify children in need of further evaluation and to begin building partnerships with families enrolled in Head Start or Early Head Start services (Head-Start, 1996).

Preliminary Data on the Developmental Screening Practices of Childcare Providers

The developmental screening practice of pediatricians has been reviewed. Comparable data on the developmental screening practice of community childcare providers is not available in the literature. Preliminary data were collected by this researcher on the developmental surveillance practices of childcare providers in a western state of the United States in 2007. A survey entitled, *Childcare Provider Practices Regarding the Screening, Referral and Inclusion of Children with Autism* (Branson, 2007, unpublished raw data) was made available at a statewide early childhood conference in April 2007.

A total of 473 registered participants attended the two-day conference, 224 of the registrants were eligible to participate in the survey because they were employed in a licensed childcare center. Of the 224 eligible registrants, 155 participants returned a completed survey yielding a return rate of 69%. In addition, when the demographics of this study were compared to the 2000 *Nevada Childcare Workforce Study* (Essa, 2002) it

was determined that the survey study was a small, but representative sample of the childcare worker population in the state of Nevada. Table 3 illustrates responses to pertinent questions for this discussion culled from the survey.

These preliminary data indicate that the majority of centers claim to screen the development of children. However, the screening tools they are using fail to identify many children younger than 3 years of age. Another troubling finding is that even when childcare providers had a concern about development, it resulted in a referral to the school district for children 3 years and older only 22% of the time and only 15% of the time for children who are younger than 3 years old.

Table 3.

Screening and Referral Practices of Childcare Providers

	Yes	No		
Have you ever been concerned about a child's development in your care?	92%	8%		
Does your center screen the development of children?	75%	24%		
Did you contact Nevada Early Intervention Services (NEIS) to make a referral?	15%	85%		
Did you contact the local school district to make a referral?	22%	78%		
	1yr	2yr	3yr	4yr
How old was the child when you became concerned about his/her development?	7%	17%	25%	29%

Childcare providers are a feasible resource for developmental surveillance for several reasons: (a) professional organizations for childcare providers encourage developmental screening and assessment of children in childcare settings, (b) federally funded childcare programs such as Head Start and Early Head Start mandate developmental screening for all children enrolled in care, (c) trends in the early childhood field, such as emphasis on quality in early care and the national movements towards pre-

kindergarten and school readiness support prevention and early intervention programs in childcare and; (d) large numbers of children from all socio-economic levels spend 25 hours or more in childcare settings each week guaranteeing access for developmental screenings,

Survey research on childcare practices in Nevada (Branson, 2007) illustrates that the majority of childcare providers in Nevada perform some level of developmental screening on children in their care. Several limitations to their current screening efforts were noted: (a) only a few centers use standardized tools, (b) screening tends to only happen at time of enrollment and then again at transition to kindergarten, (c) concern about developmental delays increases with the age of the child and (d) standardized referral procedures are lacking, so that even when a childcare provider is concerned appropriate referrals are not consistently made.

Summary

The transactional model of development (Sameroff & Fiese, 2000) provides a theoretical framework from which to view the impact of early intervention on a child's developmental potential. Research reviewed in this chapter provides examples of both the positive outcomes associated with early intervention (e.g., improved IQ scores, better school performance) and the negative results linked with failure to provide experiential input during critical developmental periods (e.g., permanently impaired vision, attachment disorders). Guidelines for identifying children with developmental delays using developmental surveillance and screening procedures were outlined. Research was presented that indicated that current efforts using pediatricians to identify children with developmental delays are ineffective.

Problem

There is evidence that current efforts at early identification and early intervention of children with developmental delays are not effective based on: (a) the discrepancy between expected prevalence rates for children with developmental delays in the population and number of children receiving services, (b) the time delay between when parents first express concern for their child's development and age of diagnosis, and (c) the greater proportion of children receiving special education services in elementary school compared to children receiving early intervention (Sices, 2007). Use of standardized developmental screening tools has been shown to increase the ability of pediatricians to identify children with developmental delays. However, many pediatricians do not use standardized tools due to expense, lack of staff, and poor reimbursement. Childcare providers are another group of professionals who have been encouraged by their professional organization to screen the development of children in their care. An informal survey (Branson, 2007) indicated that some childcare providers are currently using informal methods to screen children's development. It is hypothesized that use of a standardized screening tool, such as the Ages and Stages Questionnaire (ASQ), would improve the ability of childcare providers to accurately assess child development and to make appropriate referrals to early intervention or early childhood special education services. The next chapter outlines the methodology used to determine the effect of childcare providers' use of the ASQ on their abilities to assess child development accurately.

CHAPTER THREE

Methodology

Overview

Chapter Three describes the purpose and design of this mixed methods study. Parameters of the study including participant selection, measures used, and the research protocol followed for both the quantitative and qualitative phases of the study will be outlined in detail. This discussion will be followed by a preliminary discussion of the data analysis for both quantitative and qualitative data collected.

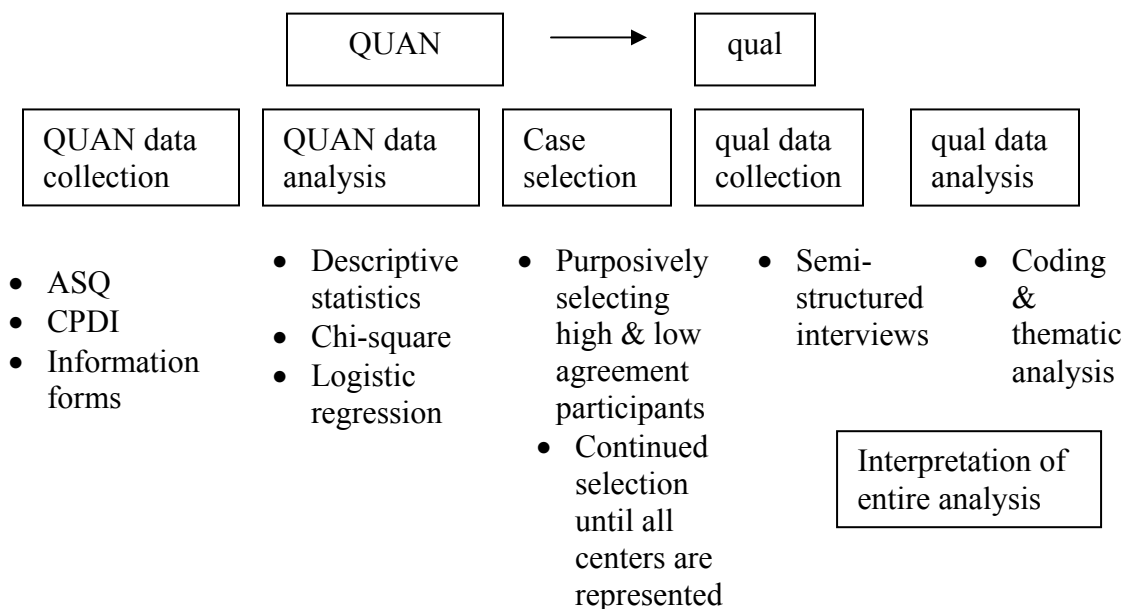
The purpose of this study was to investigate the effect of administering a standardized developmental screening tool, the Ages and Stages Questionnaires (ASQ), on childcare providers' ability to accurately assess child development and then to make appropriate referrals for the child's further evaluation, if indicated by results. In addition to investigating whether the use of a standardized screening instrument increased a childcare provider's ability to accurately assess a particular child's developmental status and make referrals, another goal of this study was to understand which childcare provider characteristics (e.g., years of experience, education level) or child characteristics (age, ethnicity) increased the probability that the childcare provider accurately assessed a child's developmental status and made a referral if warranted. The extent to which a relationship exists between childcare provider characteristics, child characteristics, use of a standardized screening instrument and accurate developmental appraisal was analyzed using a mixed methods research design.

Creswell and Plano Clark (2007) define mixed methods research design as follows:

As a method; it focuses on collecting, analyzing, and mixing both quantitative and qualitative data in a single study or series of studies. Its central premise is that the use of quantitative and qualitative approaches in combination provides a better understanding of research problems than either approach alone. (p. 5)

The four major types of mixed methods designs are the Triangulation Design, the Embedded Design, the Explanatory Design, and the Exploratory Design. These designs vary according to when data are collected, either sequentially or simultaneously, the relative weight given to each type of data, and the data analysis used (Creswell & Plano Clark, 2007). In the present study, the Explanatory Design was used to help explain and to build upon the initial quantitative results. The Explanatory Design consisted of a four-phase mixed method. First, the quantitative portion of the research was conducted and the data were analyzed. Quantitative data analysis helped identify results for which further qualitative data collection was needed. Figure 2 presents the schematic Explanatory Design (Creswell & Plano Clark, 2007) of the present mixed methods study. In figure 2, the term quantitative is referred to as QUAN, and the term qualitative is referred to as qual. Tashakkori and Teddlie (1998) recommend using capitalization of the letters in mixed methods research to illustrate the relative priority each method is given in the study. In this study the emphasis was placed on collection and analysis of quantitative data.

Figure 2. Explanatory design for mixed methods research



Parameters of the Study

Participant Selection

Based on childcare licensing regulations for child:staff ratios in childcare centers, the population of licensed childcare providers in Washoe county in the state of Nevada was determined to be 860 located at 102 licensed centers (LeMoine, 2005). The target sample was childcare providers who worked in a licensed childcare facility in this county serving children between the ages of 4 months and 36 months. The first step in sample selection was to randomly select 9 licensed childcare centers located in the county. Childcare centers employing childcare providers who met the inclusion criteria (i.e., County Department of Social Services licensed facility that serves children between the ages of 4 months and 36 months) were assigned a number between 1- 100 and then the Ten Thousand Random Numbers Table (Table A.1) found in *Educational Research:*

Competencies for Analysis and Applications (Gay, Mills, & Airasian, 2006) was used to randomly select childcare centers for participation. Directors at the selected sites were contacted by telephone to determine their willingness to have their childcare center used as a performance site. Those directors who gave their verbal agreement were asked to sign a written permission form (see Appendix A). Following obtainment of written permission to use the childcare center as a performance site, recruitment letters describing the purpose of the study and the risk and benefits of participation were placed in the staff rooms of the participating centers inviting childcare providers who care for children between the ages of 4 months and 36 months to participate. A follow-up visit was made to the childcare center 1 week later. During the follow-up visit the researcher was available in the staff room to answer questions and to obtain written consent from childcare providers who wished to participate in the following activities associated with the study: 1) complete an Ages and Stages Questionnaire on a minimum of 3 children after obtaining parental consent, 2) complete a Childcare Developmental Impression Form, 3) complete a simple demographics questionnaire requesting information on ethnicity, age, education, and employment history, and potentially participate in a semi-structured interview lasting 20-45 minutes. Recruitment continued in this manner until 105 participants were enrolled in the study. Prior to collecting any data, childcare centers were randomly assigned to one of two experimental conditions described above by pulling their name out of a hat while alternating between the two conditions. It had been anticipated that there would be an equal number of childcare centers in both the experimental and control groups, but due to differences in the number of childcare

providers and children enrolled at various centers, two centers were reassigned to the control group prior to their training and data collection.

Measures

Quantitative measures used in this study included: (a) the Ages and Stages Questionnaires [ASQ] (Bricker & Squires, 1999; Squires, Nickel, & Eisert, 1996; Squires, Potter, Bricker, & Lamorey, 1998), (b) the Mullen Scales of Early Learning [MSEL] (Mullen, 1995) which was used to confirm the screening results of 19% of the children in the sample, (c) Childcare Provider Information Form (demographics), (d) Family Information Form (demographics), and (e) Childcare Provider Developmental Impression form (CPDI); which was modified with permission from a pediatrician-completed developmental impression form to be used with childcare providers (Hix-Small, Marks, Squires, & Nickel, 2007).

Qualitative data were collected through the use of a semi-structured interview format with 9 childcare providers who represented childcare providers with high-agreement between their CPDI ratings of children's developmental status and the ASQ scores and childcare providers with low-agreement between their CPDI ratings of children's developmental status and the ASQ scores.

The Ages and Stages Questionnaires. The Ages and Stages Questionnaires [ASQ] (Bricker & Squires, 1999; Squires, Nickel, & Eisert, 1996; Squires, Potter, Bricker, & Lamorey, 1998) is a parent-completed child developmental screening test with 19 questionnaire intervals ranging from 4 to 60 months (4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 27, 30, 33, 36, 42, 48, 54, and 60 months). All the questionnaires follow the same format; six questions for each of five domains (e.g., communication, gross motor, fine

motor, problem-solving and personal-social), for a total of 30 questions. ASQ questions are written at the fourth to sixth grade reading level. An example of one of the communication questions on the 24 month ASQ reads: “If you point to a picture of a ball (kitty, cup, hat, ect.) and ask your child, ‘What is this?’ Does your child *name* at least one picture?” The ASQ takes approximately 15 minutes to complete and 2-3 minutes to score.

Parents check “*yes*”, “*sometimes*” or “*not yet*” in response to each item. Domain scores are calculated by adding the item scores for each question under the domain assigning 10 points for *yes* responses, 5 points for *sometimes* responses, and 0 points for *not yet* responses. Each domain score is compared to a cut-off score. If a child’s score is at or below the established cut-off score in one or more domains, it is recommended that the child be referred for further evaluation.

The ASQ was developed at the University of Oregon where the psychometric properties have been studied for 20 years (Squires, Potter, & Bricker, 1999; Squires, Potter, Bricker, & Lamorey, 1998). The ASQ has excellent reliability (test-re-test = .95, inter-rater = .95), moderate to high concurrent validity (0.76 - 0.88) and moderate to high sensitivity (0.70 - 0.90) and specificity (0.60 - 0.91). Spanish and French versions of all 19 of the questionnaires are available. The Spanish questionnaires have been field tested with Spanish-speaking parents in several geographic areas of the United States; however, separate psychometric properties have not been completed to date on the Spanish version (Squires, Potter, & Bricker, 1999).

The Mullen Scales of Early Learning (Mullen, 1995). The Mullen Scales of Early Learning (MSEL) was used to confirm the validity of a proportion (19%) of the screening results obtained from the ASQ in both the experimental (ASQ 1st) and control condition

(CPDI 1st). MSEL is a standardized, norm-referenced test designed to assess the cognitive functioning of young children from birth to 68 months. Skills are measured by five scales: Gross Motor, Visual Reception, Fine Motor, Receptive Language, and Expressive Language. The scales are administered individually through direct child assessment, although parent report may be used to answer some of the items. Results for each scale are described by *T* scores ($M = 50$, $SD = 10$), percentile ranks, or age equivalents. Overall results are reported as an *Early Learning Composite* which is represented by a standard score ($M = 100$, $SD = 15$), percentile, or descriptive category (e.g., average, below average).

The psychometric properties of the MSEL were collected on a normative sample of 1,849 children. Test-re-test reliability ranged from 0.85 to 0.96 and inter-scorer reliability ranged from 0.91 to 0.99. Concurrent validity of the MSEL was obtained by correlating individual scales with instruments that measured similar skills. For example, the MSEL Receptive Language scale had a high correlation with the Preschool Language Assessment Auditory Comprehension scale (0.85) and the MSEL Fine Motor scale was strongly correlated with the Peabody Fine Motor Scale, across four age groups of children between 6 and 36 months (0.65 to 0.82) (Mullen, 1995). It should be noted that the purpose of this study was not to compare concurrent validity between the ASQ and the MSEL. The MSEL was used to verify or refute a child's development as "of concern" on the ASQ (< 2 SDs on ≥ 1 domain on the ASQ). While it would have been interesting to compare specific domains on the ASQ with comparable domains on the MSEL (e.g., ASQ communication with MSEL receptive and expressive language) that level of analysis was beyond the scope of this study.

Childcare Provider Information Form. The Childcare Provider Information Form consisted of demographic questions requiring childcare providers to provide information about their age, years experience in the childcare field, level of education, prior experience using a standardized developmental screening instrument, and ethnicity. This form was created for use in this study. A copy of this form can be found in Appendix B.

Family Information Form. The Family Information Form was created for use in this study. The purpose of this form was to gather demographic information about the families of children screened at participating childcare centers. Each parent who completed this form provided information about age, level of education, ethnicity, and home language in addition to the child's language and ethnicity. Copies of this form can be found in Appendix C.

The Childcare Provider Developmental Impression (CPDI). Childcare provider rating of a child's developmental status was documented on the Childcare Provider Developmental Impression (CPDI) form. This form was modified (with permission) for use with childcare providers from a measure used by Hix-Small, Marks, Squires and Nickel (2007) to document pediatricians' rating of a child's developmental status in the first author's dissertation study of pediatricians' use of the Ages and Stages Questionnaires in their pediatric practices.

Based upon group assignment, the CPDI was either completed by the childcare providers *prior* to their administration of the ASQ on an individual child or *after* they had administered the ASQ. The form was used for the childcare provider to rate a child's overall development as compared to other children the same age as (1) No concern or (2) Of concern. The form also contained an area for the childcare provider to indicate which

developmental area(s) were of concern, if the child's development was rated as "Of concern." The developmental areas listed on the form included: communication, gross motor, fine motor, problem-solving, and personal-social. The last section of the form asked the childcare provider to indicate whether they would recommend referring the child to the early intervention agency for further evaluation. The CPDI form can be found in Appendix D.

Semi-structured interview. Open-ended questions were used to gain an understanding of what factors influence a childcare provider's ability to recognize children who are at-risk for developmental delays and to make appropriate referrals. Five open-ended questions were asked of 9 childcare providers who agreed to participate in the qualitative portion of the study. Semi-structured interview questions are found in Appendix E.

Quantitative Procedures

ASQ research protocol

Sixty minutes of initial training was provided to all participants on ASQ administration and data collection procedures. Training was provided at each participating childcare center to the childcare center director, individuals participating in the study, and other interested staff. The training consisted of showing a brief video on the ASQ, a PowerPoint presentation illustrating how to administer the ASQ in a childcare setting, and a question and answer period. Research protocol packets were also distributed and explained at that time. Participants were asked to make the research packets available to parents of all children in their classrooms. The packets contained an introductory letter explaining the study, parental informed consent and parental

demographic form. A copy of the introductory letter is found in Appendix F. The introductory letter instructed parents to return the consent form and demographic form if they wished to participate.

Participants randomly assigned to Group A were instructed to *first* complete the Childcare Provider Developmental Impression (CPDI) on all children whose parents signed the informed consent form and *then* to complete the Ages and Stages Questionnaire (ASQ) on the same child. Participants assigned to Group B were instructed to *first* complete the ASQ on a participating child and *then* to complete the CPDI on the same child. Completed ASQ and CPDI were collected and stored in a secure location until they could be collected by the researcher. The instruments were scored, but the results were not shared with the unbiased second researcher who conducted and scored a Mullen Early Learning Scale (MESL) on a randomly selected 19% of the child participants. All of the quantitative data were collected, scored according to established procedures, and analyzed prior to beginning the qualitative portion of the study.

Reliability and Research Fidelity

ASQ training fidelity. ASQ training sessions followed a training protocol to ensure that participants in both the experimental and control groups received identical trainings. Additionally, two of the nine training sessions were randomly selected for observation and coding for fidelity of training by the dissertation chair. A copy of the training protocol is found in Appendix G. Training sessions were rated on a 3-point scale (3 = excellent) on the following components: description of study procedures, description of ASQ administration, responding to participants' questions, and evaluating participants' understanding of study procedures. The first training session was observed and was rated

as a 2=good and resulted in minor changes to the training protocol. These changes included giving participants multiple opportunities to demonstrate their understanding of the research protocol for their study condition (i.e., experimental or control). The final training fidelity measure was a training evaluation and pre/post training measure found in Appendix H. This measure was designed to evaluate participants' understanding of study procedures and ASQ administration.

ASQ research protocol fidelity. In addition to providing all participants with standardized training, two additional measures were put in place to make certain that participants followed the correct study procedures determined by their group assignment. First, each participating childcare center identified one person to serve as a *research facilitator* to the study. The research facilitator was the childcare center director or assistant director in 8 out of the 9 centers and a Head Teacher in the 9th center. The research facilitator was given a research folder that contained the appropriate research protocol for that center, two large manila envelopes for collecting completed parent consent forms and completed ASQs, and contact information for the researcher. Second, the researcher controlled access to the ASQ and CPDI research instruments for all participants. When participants in the experimental group completed an ASQ on a child, that participant was given a CPDI to complete on the same child. When participants in the control group completed a CPDI on a child, that participant was given the appropriate ASQ to complete.

MSEL Procedures. Reliability training on administration of the MSEL began soon after data collection at the first childcare center was initiated. The research assistant who administered the MSEL on a randomly-selected subset of children was a graduate student

in the Educational Specialties Department at the University of Nevada, Reno with experience testing children, but no specific experience administering the MSEL.

Therefore, the research assistant completed 10 hours of training on MSEL administration.

Training consisted of the following:

- One hour viewing the MSEL test administration video
- One hour reading the MSEL test administration manual
- Two hours observing the researcher administer the MSEL
- Three hours practicing administering the MSEL on children not enrolled in the study
- Three hours MSEL administration with inter-rater reliability check with researcher

Inter-rater reliability was conducted by comparing researcher and research assistant MSEL administration and scoring on three different children; an 8 month old, a 27 month old, and a 48 month old. The research assistant was judged ready to begin independent administration on the MSEL when inter-rater reliability on scoring the MSEL was 90% on two MSELs. Ongoing reliability checks were conducted throughout the data collection period by two means: (1) the researcher independently checked the scores on each MSEL protocol for accuracy, and (2) the researcher randomly chose four MSEL administrations to observe throughout the 5 month data collection period.

Independent scoring of the MSEL allowed the researcher to identify two cases of incorrect scoring due to the presence of a second basal. Corrective feedback was provided to the research assistant and all further protocols were scored correctly.

Qualitative Procedures

Results of the quantitative data analysis helped to identify areas of interest for which qualitative data was collected in order to fully understand the phenomenon of childcare providers conducting developmental screenings in childcare settings. One area of interest was agreement between childcare provider developmental impression and the results of the ASQ. In order to determine potential participants for the qualitative phase based on level of agreement, all participants were ranked according to the percentage of agreement between their assessment of child development on the CPDI and a child's ASQ score. Recruitment was limited to those participants who had completed at least 3 ASQs and began at the extreme ends of the ranking (e.g., high= 3/3 agree; low=0/3 agree). It became apparent during analysis to determine high and low-agreement providers that the majority (88.8%) of childcare providers who completed at least 3 ASQs fell into the high-agreement range. Therefore, recruitment was modified to also identify 1 participant from each of the participating centers with an effort to recruit participants representing a range of age, experience, level of education and ethnic background.

The interviews were conducted in the staff lounge of the childcare center or in the childcare provider's classroom during the children's naptime. Interviews lasted approximately 20-30 minutes and focused on questions designed to understand what factors influenced a childcare provider's decisions about a child's development. Interviews were audio-recorded and transcribed verbatim. The researcher also took field notes during the interviews. Nine interviews were conducted resulting in approximately 3 hours of interviews.

Quantitative Data Analysis

Quantitative analyses included: (1) routine descriptive statistics, (2) chi-square, and (3) logistic regression. Descriptive statistics included calculations of the mean and standard deviation for demographic information collected on all participants. Chi-square test of independence was calculated on questions #1, #2, #4, and #5. A significant chi-square for question #1 would indicate that the independent variable (order of completion of the ASQ) is not independent of the probability of CPDI and ASQ agreement about the child's development. In other words, a significant chi-square would indicate a relationship between order of completion and agreement about a child's developmental status. A non-significant chi-square would indicate that order of completion and agreement regarding a child's developmental status is independent and there is no relationship beyond chance. A significant chi-square for question #2 would indicate that childcare provider decisions about referring a child for further evaluation and researcher referrals were related. A non-significant chi-square would indicate that there was no relationship between a childcare provider's decision to refer a child and the researcher's decision. A significant chi-square for question #4 would indicate that the order of completing of the ASQ was not independent of parent-childcare provider agreement about the child's development. If the chi-square is significant for either question #1, #2 or #4, adjusted residuals were calculated for each cell to determine which cells contributed most to the significance of the chi-square. Phi coefficient, which is a statistical measure of relationship between variables, was calculated on all chi-square analyses. Phi coefficient is similar to a correlation coefficient and the score varies between 0 and 1. A chi-square test of independence was calculated to compare the results from the ASQ and

CPDI with results from MSEL. Significant chi-squares on question #3 would indicate that there was a difference between the expected and observed frequency of agreement between the ASQ and MSEL and the CPDI and MSEL.

In addition to calculating chi-squares for this question, several psychometric values were calculated: *positive predictive value*, *negative predictive value*, *sensitivity* and *specificity*.

		True diagnosis MSEL		
		Delay present	Delay absent	
ASQ results	Positive	a True positive	b False positive	a + b
	Negative	c False negative	d True negative	c + d
		a + c	b + d	

Figure 3. Estimating Sensitivity and Specificity of the ASQ. Adapted from Australianprescriber.com

Positive predictive value is the proportion of children with positive test results who are correctly identified as having a developmental delay. (e.g., ASQ says child's development is of concern and MSEL says that child's development is delayed). *Negative predictive value* refers to the proportion of children with negative test results who are correctly identified as not having a developmental delay. (e.g., ASQ says child's

development is of no concern and MSEL says child's development is not delayed).

Sensitivity is the statistical measure of how well a binary classification test (e.g., ASQ) correctly identifies a child with a developmental delay. Figure 3 demonstrates the relationship among all the terms described.

To determine the sensitivity of a screening instrument the screening instrument results are compared to a "gold standard," in this case the Mullen Early Learning Scales (MSEL). The sensitivity of the ASQ is the probability that if the child has a developmental delay, the ASQ will be positive. *Specificity* is a statistical measure of how well a binary classification test (e.g., ASQ) correctly identifies children who do not have a developmental delay. The specificity is the proportion of true negative cases in the population.

A summary of the research questions and analyses are presented in Table 4.

Table 4.

Summary of research questions and methods of analyses

Question	Analysis	Variables
1. Is the order in which the Ages and Stages Questionnaire (ASQ) is completed related to whether or not a childcare provider's developmental impression (CPDI) agrees with the ASQ?	Chi-square (Test of Independence)	<i>Independent</i> Order in which ASQ and CPDI are completed <i>Dependent</i> Agreement between ASQ and CPDI
2. Is there a difference between the number of children identified as needing further evaluation on the CPDI and the actual number of children referred by the researcher based on ASQ results?	Chi-square (Test of Independence)	<i>Independent</i> Person making referral decision (childcare provider or researcher) <i>Dependent</i> Referral decision
	Analysis	Variables
3. Do certain childcare provider characteristics or child characteristics or a combination of characteristics increase the probability of ASQ-CPDI agreement?	Logistic regression	Childcare provider demographics (e.g., age, educational level, years experience, participation in childcare provider training initiatives) child demographics (e.g., age, ethnicity, primary language) and ASQ-CPDI agreement.
4. What is the agreement between the ASQ-MSEL for a randomly selected subset of children?	Chi-square (Test of Independence)	Positive predictive value, negative predictive value, sensitivity, specificity. Figure 3 illustrates these psychometric calculations
5. What is the agreement between a parent's reported impression of a child's development and the childcare provider's impression?	Chi-square (Test of Independence)	Parent Information Form, CPDI classification

Qualitative Data Analysis

Qualitative data were analyzed using an inductive, constant-comparative approach in which key concepts grounded in the data were allowed to emerge. This approach examines data occurrences for similarities that reflect general categories. The categories are then compared to one another to discern a general framework that can be used to interpret the data (Bogden & Biklen, 1998). Open codes were assigned to meaningful occurrences in the data on a line-by-line basis. New codes were assigned until all of the data had been carefully analyzed and placed into existing codes. The codes were then grouped together by common themes. Themes were compared across interview participants and refined, expanded, or deleted. Final themes that emerged from each participant's interview were displayed as a visual conceptual framework that was shared with each participant to confirm validity. The final level of analysis examined themes which emerged from the qualitative interviews to discern if the resulting themes identified child and/or childcare provider characteristics that helped to explain why some childcare providers accurately recognized children at risk for a developmental delay and indicated they would refer the child for further evaluation, while other childcare providers had difficulty.

Verification procedures. The criteria for judging qualitative data in mixed methods studies differs from the criteria for judging quantitative data. Creswell (2003) explains that quantitative results are evaluated in terms of reliability (i.e., stability and consistency of responses) or generalizability (i.e., external validity of applying results to new settings, people or settings), while qualitative researchers are concerned with the accuracy or credibility, referred to as "trustworthiness" (Guba, 1981) of their findings.

Creswell recommends at least one of the following eight primary strategies be used to check the accuracy of qualitative findings: (a) triangulation of data from multiple sources, (b) member-checking, (c) using thick-rich description of data, (d) clarifying researcher bias, (e) presenting both data that confirms and data that refutes themes, (f) spending prolonged time collecting data, (g) peer debriefing, and (h) using an external auditor to review the entire project.

In this study, four primary verification procedures were used to ensure the credibility and trustworthiness of the qualitative data:

1. Member checking – obtaining feedback from participants on the accuracy of the identified categories and themes. Participants were asked to review their individual interview transcripts for accuracy and to evaluate the conceptual framework that was developed to illustrate the qualitative research findings.

2. Clarifying researcher bias – Self-reflection was used to identify areas of researcher bias that might influence credible data collection and analysis.

3. Peer debriefing – Dependability of the data was achieved through peer review by two professionals who work in the early care and education field allowing for external reflection and input on the research.

4. Auditing - the researcher's dissertation advisor independently read and analyzed each of the interview transcripts in addition to providing careful auditing of all research procedures and data analysis in the study.

Researcher's role. In qualitative research, the researcher is the primary data collection instrument. Therefore, it is important to reveal any personal biases, values and

interests. Creswell (2003) recommends that the researcher identify these biases, values, and interests directly using the first person.

My interest in understanding childcare providers' developmental screening practices has been shaped by my personal experiences. I have worked as a speech pathologist in early intervention for the past 19 years. During that time I have seen the dramatic developmental progress of children who began services closer to their 2nd birthday and the frustrations of parents whose children were not referred for an evaluation until their children were almost 3 years old. When conducting interviews with parents of children who had not entered the early intervention system until close to their third birthday, I learned that many of these parents had discussed their concerns with their child's pediatrician when their child was younger, but they had been reassured that their child would "catch up." These experiences shaped my concerns that children were not being referred to early intervention services in a timely manner.

Ten years ago, I began working closely with community childcare providers both as a consultant supporting inclusive early intervention services in childcare settings and as an Early Childhood Education (ECE) teacher at the local community college. Those experiences convinced me that childcare providers could play a more active role in identifying and referring children who might be at risk for developmental delays.

I approached this study with awareness that I have biases regarding the ability of childcare providers to conduct developmental screenings in childcare settings. My assumptions and biases are that childcare centers are appropriate settings to conduct developmental screenings and childcare providers can successfully conduct developmental screenings on children in their care. During the interviews, I made a

conscious effort to remain unbiased and objective. Using a standardized semi-structured interview protocol allowed me to maintain this unbiased stance.

Ethical Issues

Researchers have a responsibility to “respect the rights, needs, values, and desires of informants” (Creswell, 2003, p. 201). This study’s research plan was submitted and approved by the Institutional Review Board (IRB) committee at the University of Nevada, Reno. Participants were given an informed consent form that clearly articulated the goals of the study, how data would be collected, and how the data would be used. This form acknowledged that the rights of the participant were protected during data collection, analysis, and reporting.

Summary

This chapter described the mixed methods research design which was used to identify the effect of completing a standardized developmental screening test on childcare providers’ developmental assessment ability and to identify which childcare provider characteristics, child characteristics, or combinations of both can be used to predict ASQ-CPDI agreement. The quantitative phase of the study consisted of a single-variable experimental design. Data was analyzed using descriptive statistics, Chi-square, and Logistic regression statistics. The qualitative data were collected and analyzed from a purposeful sampling of participants. Using a sequential explanatory design, the qualitative phase of the study followed the quantitative phase. The qualitative data extended and explained the knowledge gained in the quantitative phase. Chapter four presents the results of both quantitative and qualitative data analysis.

CHAPTER FOUR

Results

The rationale and methodology for using a mixed methods sequential explanatory research design were described in Chapter Three. This chapter presents the results of the mixed methods study in three phases. Phase one results present quantitative data analysis including: descriptive analysis, logistic regression, and chi-square analysis. Phase two results describe the two-stage case selection procedure whereby quantitative results were used to identify participants who could provide additional data to help explain the results of the quantitative phase, and Phase three presents the results of qualitative interviews.

Phase 1-Quantitative Results

Childcare center characteristics. Childcare centers employing childcare providers who met the inclusion criteria (i.e., County Department of Social Services licensed facility that serve children between the ages of 4 months and 36 months) were assigned a number 1- 100 and then the Ten Thousand Random Numbers Table (Table A.1) found in *Educational Research: Competencies for Analysis and Applications* (Gay, Mills, & Airasian, 2006) was used to randomly select childcare centers for participation. Thirty-two center directors were contacted using this procedure until the target number of 9 childcare center directors agreed to participate. Reasons for not participating included: (a) center did not enroll children under the age of 3 years, (b) center was already using ASQ for developmental screening, (c) director did not think parents would be interested in participating, and (d) corporate office would not give permission for the center to participate.

The participating childcare centers were all privately-owned, for-profit centers except for center #2 which was a faith-based preschool associated with a Christian church. Centers ranged in number and ages of children for which they were licensed and number of staff employed at the center. The smallest center was licensed for 22 children and the two largest centers were licensed to care for 200 children each. Six of the centers began care with infants (either designated as at birth or 6 weeks of age) and the other three centers cared for children two years and older. Number of staff participating ranged from 4 to 32 staff members. Table 5 presents childcare center characteristics.

Table 5.

Characteristics of childcare centers

Center	Group assignment	Number and Ages of children center is licensed	Number of staff trained on ASQ	Number of staff who completed ASQ (%)	Number of children enrolled in study	Number of ASQs completed (%)
1	ASQ 1st	120; 6 weeks to 12 years	16	14 (88)	31	31 (100)
2	CPDI 1st	22; 2 years to 5 years	4	4 (100)	14	14 (100)
3	CPDI 1st	200; 2 months to 12 years	13	11 (85)	40	37 (93)
4	CPDI 1st	160; Infant to 18 years	14	12 (86)	35	33 (94)
5	ASQ 1st	200; Infant to 10 years	32	23 (72)	32	29 (91)
6	ASQ 1st	148; Birth to 6 years	10	10 (100)	28	26 (93)
7	CPDI 1st	63; 6 weeks to 18 years	5	5 (100)	19	17 (89)
8	CPDI 1st	72; Birth to 16 years	7	7 (100)	19	16 (84)
9	CPDI 1st	100; 2 years to 18 years	4	4 (100)	13	13 (100)

Child characteristics. There were 230 children enrolled in the study. Out of the 230 sample, ASQs were completed on 217 children. Nine ASQs were not completed on children enrolled in the study because those children stopped receiving care at the childcare center before the ASQ had been completed. Four other children were eliminated from the study after it was discovered that the children had already been identified as having a developmental delay by an early intervention agency. Slightly more male children (55.8%) than female children (44.2%) participated in the study. The majority of the participants were identified as Caucasian by their parents (76.0%). Participants ranged from 4 months to 63 months of age. Individual ages were collapsed into 5 groups which each spanned an 11 month interval (4-15, 16-27, 28-39, 40-51 and 52-63 months). This was done to make analysis of demographic variables more manageable. The largest number of participants was between 40-51 months of age. The fewest number of participants were between 4-15 months of age. Table 6 summarizes the characteristics for the total sample and the experimental and control group separately.

Table 6.

Characteristics of child participants

	Total Sample N=217	Experimental Group N=87	Control Group N=130
Child gender, n (%)			
Female	96 (44.2)	34 (39.1)	62 (47.7)
Male	121 (55.8)	53 (60.9)	68 (52.3)
Age, n (%)			
4-15 months	28 (12.9)	15 (17.2)	13 (10.0)

	Total Sample	Experimental Group	Control Group
16-27 months	43 (19.8)	18 (20.7)	25 (19.2)
28-39 months	51 (23.5)	19 (21.8)	32 (24.6)
40-51 months	56 (25.8)	18 (20.7)	38 (29.2)
52-63 months	39 (18.0)	17 (19.5)	22 (16.9)
Ethnicity, n (%)			
Caucasian	165 (76.0)	72 (82.8)	93 (71.5)
Hispanic	20 (9.2)	3 (3.4)	17 (13.1)
African American	4 (1.8)	1 (1.1)	3 (2.3)
Multi-racial	22 (10.1)	9 (10.3)	13 (10.0)
Asian	4 (1.8)	1 (1.1)	3 (2.3)
Native American	1 (.5)	0	1 (.8)
Pacific Islander	1 (.5)	1 (1.1)	0

Parent characteristics. A proportion of the parents in this study had more than one child participating. In order to avoid skewing the data, parent demographics were only reported for the first child. Parents completing the *Family Information Form* were predominately mothers or step-mothers (89.7%). Respondent mean age was 32.96 years with 84.6% self-reporting some form of higher education beyond High school graduation. The majority of parents identified themselves as Caucasian (79.5%) followed by Hispanic (10.3%), Multi-racial (5.1%) and African American (3.6%). Parents who identified themselves as Asian, Native American or Pacific Islander represented less than 1% of the

sample. English was the primary language spoken by 93.3% of the parents in this sample.

Table 7 summarizes the parent characteristics for the total sample and the experimental and control groups.

Table 7.

Characteristics of parents

	Total Sample N= 195		Experimental Group N= 76		Control Group N= 119	
Parent's age	Range	M (SD)	Range	M (SD)	Range	M (SD)
	20-57	32.96 (6.23)	22 – 57	34.21 (6.30)	20-51	32.19 (6.40)
Mother/step-mother	175 (89.7)		70 (92.1)		105 (88.2)	
Father/step-father	19 (9.7)		6 (7.9)		13 (10.9)	
Ethnicity						
Caucasian	155 (79.5)		65 (85.5)		90 (75.6)	
Hispanic	20 (10.3)		5 (6.6)		15 (12.6)	
African American	7 (3.6)		2 (2.6)		5 (4.2)	
Multi-racial	10 (5.1)		2 (2.6)		8 (6.7)	
Asian	1 (.5)		1 (1.3)		0	
Native American	1 (.5)		0		1 (.8)	
Pacific Islander	1 (.5)		1 (1.3)		0	
Primary Language	N (%)		N (%)		N (%)	
English	182 (93.3)		73 (96.1)		109 (91.6)	
Spanish	6 (3.1)		1 (1.3)		5 (4.2)	
Other	7 (3.6)		2 (2.6)		5 (4.2)	
Education level	N (%)		N (%)		N (%)	
< High School	5 (2.6)		0		5 (4.2)	
High School	25 (12.8)		7 (9.2)		18 (15.1)	
Technical School	6 (3.1)		1 (1.3)		5 (4.0)	
Some College	48 (24.6)		15 (19.7)		33 (27.7)	
College	111 (56.9)		53 (69.7)		58 (48.7)	
Graduate						

* 22 parents had 2 or 3 children participating in the study. Parent information was only reported for the first child.

Childcare provider characteristics. A total of 105 childcare providers signed the consent form and participated in the ASQ training. Fifteen of the initial participants were removed from the data analysis because they did not complete an ASQ. The primary reason given for childcare providers not completing an ASQ was that the childcare provider was not currently working in a classroom with children the majority of their day (e.g., bus driver, cook, owner of the facility). Other reasons for not completing an ASQ included: (a) no longer employed at the center, (b) on maternity leave, and (c) left to attend college. The total sample of childcare providers who completed at least 1 ASQ was 89; 46 in the experimental group (ASQ completed first) and 43 in the control group (CPDI completed first). All participants were female (100%). Age of childcare providers ranged from 17 years to 70 years ($M = 32.88$; $SD = 13.32$) with a median age for the total sample of 30 years. Providers in the control group were slightly older ($M = 34.35$; $SD = 14.17$) compared to the experimental group ($M = 31.50$; $SD = 12.49$). Years of experience in working in childcare ranged from 1 year to 42 years with a median of 4 years experience for the total sample and both subsamples. The highest percentage of participants had taken some early childhood education college courses; 63.0% of the participants in the experimental group and 51.2% of the participants in the control group. Childcare provider characteristics are summarized in Table 8.

Table 8.

Characteristics of childcare providers

	Total Sample	Experimental Group	Control Group
	N=89	N=46	N=43
Age (years, M (SD))	32.88 (13.32)	31.50 (12.49)	34.35 (14.17)
Experience (median)	4 years	4 years	4 years
Education level, N (%)			
	Total Sample	Experimental Group	Control Group
High school	24 (26.6)	8 (17.0)	16 (37.2)
Some college	51 (57.3)	29 (63.0)	22 (51.2)
AA or CDA	6 (6.7)	4 (8.5)	2 (4.7)
BA	6 (6.7)	3 (6.4)	3 (7.0)
MA	2 (2.2)	2 (4.3)	0 (0.0)
Gender			
Female	89 (100)	46 (100)	43 (100)
Male	0 (0)	0 (0)	0 (0)
Ethnicity, N (%)			
Caucasian	72 (80.0)	39 (83.0)	33 (76.7)
Hispanic	8 (8.9)	5 (10.6)	3 (7.0)
African American	3 (3.3)	1 (2.1)	2 (4.7)
Multi-racial	2 (2.2)	0 (0)	2 (4.7)
Asian	4 (4.4)	2 (4.3)	2 (4.7)
Native American	1 (1.1)	0 (0)	1 (2.3)

Results of Quantitative Research Questions

Question 1: Is the order in which the Ages and Stages Questionnaire (ASQ) is completed related to whether or not a childcare provider's developmental impression (CPDI) agrees with the ASQ?

Childcare providers were randomly assigned to either give the Ages and Stages Questionnaire (ASQ) first (experimental group) to a child participating in the study or to give Childcare Provider Developmental Impression (CPDI) first (control group). Each childcare provider who agreed to participate in the study was asked to complete an ASQ on 3 different children; however, this did not always happen. The majority (34.8%) of the

childcare providers only completed an ASQ on 1 child. The remaining childcare provider participants completed between 2 and 6 ASQs on children in their care: 24.7 % completed 2 ASQs, 19.1% completed 3 ASQs, 10.1% completed 4 ASQs, 5.6% completed 5 ASQs, 3.4% completed 6 ASQs, and 2.2% completed 7 ASQs.

The null hypothesis for question #1 stated that the order of giving the ASQ would be independent of childcare providers' developmental impression agreement with the actual results of the developmental screening done with the ASQ. This hypothesis was tested using the chi-square statistic assuming equal probabilities. The two variables were order the ASQ was given with two levels (before the CPDI or after the CPDI) and agreement between the ASQ and CPDI with two levels (no agreement or agreement). A chi-square test of independence was not significant [$\chi^2(1, N = 217) = .768, p > .05, \phi = -.059$], thus the null hypothesis of independence between the order ASQ administration and agreement between the ASQ and CPDI failed to be rejected.

Table 9.

Observed and Expected Frequencies-Order of ASQ and Agreement between ASQ and CPDI

Order ASQ given	Agreement		Total
	Disagree	Agree	
Experimental group- ASQ 1st	Ob. 17 Ex. (19.6)	Ob. 70 Ex. (67.4)	Ob. 87 Ex. (87.0)
Control group- CPDI 1st	Ob. 32 Ex. (29.4)	Ob. 98 Ex. (100.6)	Ob. 130 Ex. (130.0)
Totals	Ob.49 Ex. (49.0)	Ob.168 Ex. (168.0)	Ob.217 Ex. (217.0)

$\chi^2(1, 217 = .768), p = .381, \phi = -.059$; Ob. = Observed freq.; Ex. = Expected freq.

Question 2: Is there a difference between the number of children identified as needing further evaluation on the CPDI and the actual number of children referred by the researcher based on ASQ results?

The null hypothesis for Question #2 stated that there would be no difference in the number of children needing further evaluation identified by childcare providers on the CPDI and the actual number of children referred.

Chi-square analysis was done to test the null hypothesis that there would be no difference between the childcare providers' decisions to refer or not refer as measured by their response to the questions, "Would you refer this child for further evaluation?" on the CPDI and the actual referral results based the ASQ results. A chi-square test of independence was significant [$\chi^2(1, N = 217) = 28.71, p < .001, \phi = .36$].

Table 10.
Observed and Expected Frequencies of Actual Referral Outcome to Childcare Provider Decision about Referral

Actual referral	Childcare provider decision about referral		
	No referral	Referral	Totals
No referral	Ob. 151	Ob. 9	Ob. 189
	Ex. (139.4)	Ex. (20.6)	Ex. (189.0)
	Adj. 11.6	Adj. -11.6	
Referral	Ob. 38	Ob. 19	Ob. 57
	Ex. (49.6)	Ex. (7.4)	Ex. (57.0)
	Adj. -11.6	Adj. 11.6	
Totals	160	57	217

$\chi^2(1, N=217) = 28.71, p < .001, \phi = .36$; Ob= Observed frequencies; Ex. = Expected frequencies; Adj. = Adjusted residuals

The effect size for chi-square test of independence is the phi coefficient. Phi ranges between 0 and 1.00. Phi for this chi-square analysis was .36, considered a medium effect size according to Cohen's (1988) conventions.

There was a significant difference between actual referrals made and the childcare providers' decisions to refer or not refer. Therefore, the null hypothesis of no difference was rejected. Inspection of the adjusted residuals shows that all cells contributed to the significant chi-square, since all four are greater than 2.0. Inspection of observed and expected frequencies shows that when childcare providers do not refer, there are more actual non-referrals (151) than expected (139.4) and fewer referrals (38) than expected (49.6). When childcare providers do refer, there are fewer non-referrals (9) than expected (20.6) and more referrals (19) than expected (7.4). Table 10 presents the results.

Table 11 presents a comparison of the ASQ results, provider only referrals and the actual referrals made by the researcher based on ASQ results. Childcare providers in the control group who completed the ASQ after completing the CPDI indicated they would refer more children (N = 21, (16.2%) than the ASQ 1st group (N = 7, (8%), however both groups failed to refer a significant number of children who scored below the cut-off score on one or more areas of the ASQ and were subsequently referred by the researcher for either monitoring or further evaluation (ASQ 1st- 14.9% and CPDI 1st- 10.8%).

Table 11.

Comparison of referral outcomes between groups

	ASQ 1 st (N=87)		CPDI 1 st (N=130)	
	Pass	Fail	Pass	Fail
ASQ results N (%)	68 (71.5%)	19 (21.8%)	93 (71.5%)	37 (28.5%)
Provider referral	No referral	Referral	No referral	Referral
	80 (92.0%)	7 (8%)	109 (83.8%)	21 (16.2%)
Actual referral outcome	No referral	Referral	No referral	Referral
	67 (77.0%)	20 (24%)	93 (71.5%)	37 (28.5%)
Difference	13 (14.9%)		14 (10.8%)	

Question #3: Do certain childcare provider characteristics, child characteristics or a combination of characteristics increase the probability of ASQ-CPDI agreement about a child's development and/or decisions about referring a child for further evaluation?

To determine if selected childcare provider characteristics (age, education level and experience) could be used to predict ASQ agreement about a child's development, a binary logistic regression was conducted. When interpreting logistic regression output, the odds ratio, $Exp(B)$, of significant variables was used to interpret how the variable affected membership in the output group. A one-unit increase in the significant independent variable increases the probability of a case being classified in the higher level of the dependent variable by a factor of the odds ratio. Multinomial categorical variables were interpreted in the same manner, although each level of the categorical independent variable (e.g., ethnicity; Caucasian, Hispanic) was compared to a reference category of the independent variable.

In addition, the -2 Log Likelihood value was used to assess the model fit of each result. Mertler & Vannatta (2005) explain that the -2 Log Likelihood provides an index of

model fit where 0 would indicate a perfect fit, therefore the lower the Log Likelihood number, the better the fit of the model. The chi-square goodness of fit statistic was used to assess how well the model actually reflects the data. A significant finding indicates that the model developed through the test is better at classifying cases than the constant-only model, which does not include any of the independent variables. Finally, the Cox and Snell and Nagelkerke values will be reported to indicate the amount of variance found in the dependent variable that can be accounted for in the model (Mertler & Vannatta, 2005). Regression results presented in Table 12 indicate the overall model of three predictors (age, level of education, and experience) was not effective in distinguishing between childcare providers with high agreement between their developmental assessment and the actual ASQ results ($-2 \text{ Log Likelihood} = 228.501$; $X^2(3), N = 217 = 3.324, p > .05$). The Cox and Snell R^2 (0.15) and Nagelkerke R^2 (.023) showed the predictor variables accounted for little variability in the dependent variable. The model generated based on specific childcare provider characteristics was not significantly better in predicting which childcare providers would have high agreement between the ASQ and CPDI than the constant-only model.

Table 12 presents the regression coefficients where all variables were entered at once to determine significance. None of the variables (age, experience, education level) significantly improved the odds ratio of agreement between developmental assessment ability and ASQ outcome, therefore the null hypothesis (there is no relationship between childcare provider characteristics and level of agreement) failed to be rejected.

Table 12.

Logistic Regression Coefficients for Dependent Variable ASQ-CPDI agreement

Variable	β	SE	Wald	df	p	Odds ratio
Age	.015	.017	.710	1	.399	1.015
Experience	-.053	.030	3.088	1	.079	.948
Education	.072	2.079	.010	1	.919	1.235

Table 13.

Classification Table for Agreement

Observed		Predicted		
		No agreement	Agreement	Percentage correct
Step 1 Average agreement	No Agreement	0 (0)	49 (49)	.0 (.0)
	Agreement	0 (0)	168 (168)	100.0 (100.0)
Overall percentage				77.4 (77.4)

Constant model percentages presented in parenthesis.

Both models predicted 77.4% of the cases of agreement between the childcare provider's developmental impression and the ASQ results. Table 13 presents the classification table for agreement for both models.

To determine if certain child characteristics (age, gender, ethnicity) could predict which children would pass the ASQ, a second binary logistic regression was conducted. Regression results indicated that a child's chronological age was the only variable that significantly improved the predictive ability of the model (-2 Log Likelihood= 225.628; $[X^2(8, N = 217)] = 22.196, p < .005$). Cox and Snell R^2 (.007) and Nagelkere R^2 (.143) showed that although age was a significant predictor, none of the predictors accounted for

much variability in the model. The model correctly classified 96.3% of children who passed the ASQ and 12.5% of children who failed the ASQ with an overall percentage of 74.7%. (See Table 14) According to the logistic regression model data presented in Table 15, for each increase in age of one month, the odds of successfully passing the ASQ is 1.04 times greater.

Table 14.

Classification Table for Child Variables Predicting ASQ Outcome

Observed		Predicted		
		ASQ overall classification		Percentage correct
		Did not pass	Passed ASQ	
Step 1 ASQ overall classification	Did not pass	7 (0)	49 (56)	12.5 (.0)
	Passed	6 (0)	155 (161)	96.3 (100.0)
Overall percentage				74.4 (74.2)

* Constant only model percentages in parentheses

Table 15.

Logistic Regression Coefficients

Variable	β	SE	Wald	df	p	Exp β
CA	.043	.011	15.375	1	<.001	1.044
Gender	.636	.343	3.444	1	.063	1.889
Ethnicity			.640	6	.996	1.235

CA = Chronological age

A third logistic regression test was run to determine if childcare provider variables or child variables could predict a childcare provider's decision to refer or not refer a child for further evaluation. The regression analysis was first run on the childcare provider variables (age, experience, and years of education). The regression results indicated that

years of education was the only predictor that contributed significantly in classifying cases (-2 Log Likelihood = 158.477; $X^2(3) = 8.41$, $p < .03$). The model correctly identified 87.1% of the cases.

Table 16.

Classification Table for Childcare Provider Referral

Observed		Predicted		
		Would childcare provider refer child?		Percentage correct
		No referral	Referral	
Step 1 Would childcare provider refer child?	No referral	189 (189)	0 (0)	100.0 (100.0)
	Referral	28 (28)	0 (0)	.0 (.0)
Overall percentage				87.1 (87.1)

* Constant model percentages in parenthesis

See Table 16 for an illustration. For each year of education beyond High school, childcare providers were .574 times as likely to refer a child for further evaluation. None of the child variables significantly contributed in classifying cases (-2 Log Likelihood = 166.892; $X^2(8) = 12.80$, $p = .119$). Table 17 summarizes the regression coefficients for the dependent variable decision to refer.

Table 17.

Logistic Regression Coefficients for Dependent Variable Decision to Refer

Variable	β	<i>SE</i>	Wald	<i>df</i>	<i>p</i>	<i>Odds ratio</i>
Provider Age	.024	.019	1.640	1	.200	1.024
Experience	.022	.036	.377	1	.539	1.022
Education	-.544	.276	4.039	1	.044	.574
Child Age	-.007	.014	.228	1	.633	.993
Gender	.591	.435	.174	1	.174	.770
Ethnicity			10.349	6	.111	

Question #4: Can childcare providers administer the ASQ with acceptable accuracy and validity?

The Mullen Early Learning Scales was used as the “gold standard” by which the psychometric properties of the ASQ were judged for a randomly selected subgroup of child participants. The goal had been for an independent evaluator who was blind to the ASQ results to complete a MSEL on 20% of the sample. To that end, 46 children were randomly selected to receive a MSEL, but only 41 children (19%) successfully completed a MSEL. Five children who were selected were unable to complete the MSEL for the following reasons: 2 children were uncooperative during testing, 2 children could not complete the MSEL due to repeated scheduling conflicts, and 1 child was eliminated from the study when it was determined that he had already been identified as having a developmental delay.

Table 18 summarizes the psychometric properties of the ASQ as administered by childcare provider participants in this study. The results indicate that the ASQ administered by the childcare provider participants had acceptable sensitivity, specificity, positive predictive value and accuracy. Levels of 70% to 80% are considered acceptable for developmental screening tests due to the inherent challenges of measuring child development (Council on Children with Disabilities, 2006). The only psychometric value below 70% was the one for negative predictive value (65%).

Table 18.

Psychometric values (sensitivity, specificity, positive predictive value, negative predictive value and accuracy) for the ASQ

	MSEL		Total	Sensitivity	Specificity	PV+	PV-	Accuracy
	Fail	Pass						
ASQ								
Fail	17	4	21	0.72	0.76	0.72	0.65	0.73
	<i>True negative</i>	<i>False positive</i>						
Pass	7	13	20					
	<i>False negative</i>	<i>True positive</i>						
Total	24	17	41					

ASQ = Ages and Stages Questionnaires; MSEL= Mullen Early Scales of Learning; PV+ = positive predictive value; PV- = negative predictive value

In addition to calculating the psychometric properties of the ASQ as administered by childcare provider participants, a chi-square test of independence was completed to determine if there was a relationship between a child's performance on the MSEL and the child's performance on the ASQ. Results of the chi-square indicated a significant

relationship between a child's classification on the ASQ (pass or fail) and a child's classification on the MSEL (average or below average) [$\chi^2(1, N = 41) = 11.072$, $p < .001$, $\phi = .52$]. Phi (.52) indicated a large effect size. Inspection of cell counts and percentages (see Table 19) indicated that all four cells contributed to the significant chi-square, since all adjusted residuals were higher than 2.0. There was higher agreement between the ASQ and MSEL than would be expected by chance.

Table 19.

Frequencies and percentages of ASQ and MSEL crosstabulation

ASQ Classification	MSEL Overall classification		
	Fail	Pass	Total
Fail	Ob. 18 Ex. (12.8) Adj. 3.3	Ob. 3 Ex. (8.2) Adj. 3.3	Ob. 21 Ex. (21.0)
Pass	Ob. 7 Ex. (12.2) Adj. 3.3	Ob. 13 Ex. (7.8) Adj. 3.3	Ob. 20 Ex. (20.0)
Total	Ob. 25 Ex. (61.0)	Ob. 16 Ex. (39.0)	Ob. 41 Ex. (41.0)

$\chi^2(1, N=41) = 11.07$, $p < .001$, $\phi = .52$; Ob. = Observed frequencies; Ex. = Expected frequencies; Adj. = Adjusted frequencies

Question #5: What is the agreement between parents' reported impression of a child's development and childcare providers' impression?

A chi-square test of independence was conducted to evaluate whether parental concern and childcare provider concern about a child's development were independent. Parent concern and childcare provider concern were found to be significantly related, [$\chi^2(1, N = 217) = 6.29$, $p < .01$, $\phi = .012$]. Phi (.012) is interpreted as a small effect size. The null hypothesis of independence between parent and childcare provider impression about a child's development was rejected. Table 20 presents the results demonstrating

that agreement about a child's development was highest when neither the parent nor childcare provider were concerned about a child's development (68.2%) compared to when there was concern (6.0%). Childcare providers reported being concerned about slightly more children's development (22.6%) than parents (15.2%).

Table 20.

Observed and Expected Frequencies Comparing Parent and Childcare Provider Agreement about a Child's Development

CPDI overall classification		Total	
No concern	Of concern		
No concern	Ob. 148 Ex. (142.5) Adj. 2.5	Ob. 36 Ex. (41.5) Adj. -2.5	Ob. 184 Ex. (184.0)
Of concern	Ob. 20 Ex. (25.5) Adj. -2.5	Ob. 13 Ex. (7.5) Adj. 2.5	Ob. 33 Ex. (33.0)
Total	Ob. 168 Ex. (168.0)	Ob. 49 Ex. (49.0)	Ob. 217 Ex. (217.0)

$\chi^2 (1, N = 41) = 11.07, p < .001, \phi = .52$; Ob. = Observed frequencies; Ex. = Expected frequencies; Adj. = Adjusted frequencies

Summary of Quantitative Data Analysis

Level of agreement between childcare providers' developmental impression and ASQ results was high for both participant groups indicating that the order the ASQ was given was not a significant variable. Childcare provider characteristics (age, education level, and years of experience) did not significantly predict which providers would have high agreement between the CPDI and ASQ or which providers would have low agreement. One child variable (age) was significant in predicting which children would pass the ASQ.

Even though results indicated that childcare providers could accurately judge a child's development, fewer than expected childcare providers indicated that they would refer a child for further evaluation, even when they were concerned about a child's development.

Finally, there was a significant relationship between parent and childcare provider impression about a child's development, especially when both caregivers felt that the child was developing as expected for his or her age.

The next section provides information on participant selection for the qualitative study and qualitative results of semi-structured interviews conducted with 9 childcare providers in order to extend and explain the quantitative results by answering the following questions:

1. What factors contributed to differences between childcare providers with high agreement and those with low agreement?
2. Why were both groups of childcare providers able to judge children's developmental skills with high accuracy independent of the order of giving the ASQ?
3. How were childcare providers able to make those developmental judgments independent of childcare provider variables such as age, years of experience, and education level?
4. What prevents a childcare provider from making referrals for further evaluation of a child, even when she is concerned about that child's developmental skills?

Phase II – Qualitative Participant Selection

Participant selection is typically the first connecting point between the quantitative and the qualitative phases of a study in the mixed methods sequential explanatory design (Hanson, Creswell, Plano Clark, Petska, & Creswell, 2005). The first step in this phase was to identify childcare provider participants with high and low agreement between their CPDI and ASQ results. This was accomplished by comparing the CPDI and ASQ results for each ASQ completed by an individual childcare provider. When there was agreement (e.g., childcare provider indicated *No concern* on the CPDI and the child passed the ASQ) this was coded as 1 in the data file. When there was a disagreement between the CPDI and ASQ (e.g., the childcare provider indicated *No concern* on the CPDI and the child scored below the cut-off score on the ASQ) this was coded as 0 in the data file. Only providers who had completed three ASQs were considered, since it would be difficult to determine the average of only two scores.

Using this process, 2 childcare providers with low-agreement and 4 providers with high-agreement were identified and recruited for the qualitative phase. It was not possible to recruit equal numbers of high and low-agreement providers due to the higher percentage of high-agreement providers. As stated previously, 88.8% of all the providers had high agreement between their CPDI and the child's ASQ.

Initial interviews conducted with the first 6 qualitative participants did not reveal meaningful differences between the high and low-agreement participants, therefore recruitment continued until there was at least 1 participant from each center and participants represented a range of demographics present in the larger sample. The final number of qualitative participants was 9. The participants ranged in age (21-60, $M = 34$)

and years of experience (1-14, M = 7.5). The majority of the participants were Caucasian (2 were African American) and all the participants had attended some college courses.

Demographic characteristics are outline in Table 21.

Table 21.

Characteristics of Qualitative Interview Participants

Participant*	Center	Ethnicity	Age	Experience	Education	# of ASQ	Agreement level
Anna	04	Caucasian	31	8	14	3	Low 0%
Justine	02	Caucasian	21	4	14	6	Low 50%
Lanni	05	Caucasian	47	14	14	4	High 75%
Lizzie	01	Caucasian	32	11	14	6	High 83%
Julia	03	Caucasian	60	6	12	5	High 80%
Jenna	07	Caucasian	34	7	16	5	High 80%
Brianna	09	Caucasian	21	1	14	5	High 100%
Kalie	08	African American	32	4	14	3	High 100%
Monica	06	African American	26	7	14	3	High 100%

*Participant names have been changed to ensure anonymity

Phase III-Qualitative Data Analysis

Data from the nine semi-structured interviews were analyzed using an inductive, constant-comparative approach in which key concepts grounded in the data are allowed to emerge. This approach examines data occurrences for similarities that reflect general categories. The categories are then compared to one another to discern a general framework that can be used to interpret the data (Bogden & Biklen, 1998).

The interview transcripts were coded on a line-by-line basis using QSR NVivo 8 qualitative software. Meaningful words, phrases or sentences were coded either to a new code or at an existing code until all the data had been carefully analyzed and placed into

codes. The codes were then grouped together by common themes. Table 22 illustrates the process used to derive themes from the data.

Table 22.

Sample of Theme Generation

Text from interview	Code	Theme
“I’ve always been interested in working with children since I was probably in Junior High.”	Aptitude for working with children	Workforce aptitude
“He doesn’t interact like the other kids. He’s not quite where the other kids are and he is one of the oldest kids.”	Comparing child to same-age peers	Factors that support childcare provider recognition of developmental differences
“I’m a little nervous. I keep thinking about the emotions that go through a parent’s mind when they find out their kid has a developmental delay.”	Affective concerns about parent’s feelings	Perceived barriers to making referrals

Qualitative Results- Contrast Analysis

Quantitative data was analyzed to identify childcare providers who had high-agreement between the CPDI and ASQ and those who had low-agreement between the CPDI and ASQ. Average agreement was determined by averaging the scores (1 = agreement between the CPDI and ASQ; 0 = no agreement between CPDI and ASQ) for childcare providers who had completed ASQs on at least 3 children. It was difficult to identify an equal number of low and high-agreement participants, because the majority of childcare providers were had high-agreement (88.8%). Recruitment ended when two childcare providers with low-agreement and 7 childcare providers with high-agreement were selected in order to conduct a qualitative contrast analysis. According to Onwuegbuzie and Teddlie (2003), the purpose of this kind of analysis is to determine why two groups differ on some quantitative measure, in this case, agreement between the CPDI and ASQ. To understand how the low-agreement and high-agreement groups differed in this study, a comparison of demographics, center characteristics, and interview responses were analyzed.

Demographics. The 2 groups did not differ markedly on any demographic characteristics. The 2 low-agreement providers were similar to the 7 high-agreement providers on age, education, and experience. The low-agreement participants were between 21-47 years old, they both had taken some college courses, and their years of experience ranged from 4-14 years. The high-agreement participants were between 21-60 years old, their educational level ranged from High school only to one participant with a Bachelor's Degree, and years of experience ranged from 1-14 years.

Childcare Center Characteristics. There were some differences in childcare center characteristics between the low and high-agreement providers. Anna worked with the youngest children (12-27 months) out of all of the 9 participants in the qualitative phase and Justine worked at a church sponsored preschool that only provided a half-day program

Interview responses. Anna was the only respondent who mentioned needing to read the ASQ questions several times to make sure that she understood what to do. The literacy level of the childcare provider participants was not determined, but there is a possibility that the reading level (4th grade) was too high for Anna. The other low-agreement participant did not indicate having difficulty completing the ASQ.

Summary of contrast analysis. The contrast analysis identified three differences between the two low-agreement participants (Anna-0% and Justine-50%) and the high-agreement participants: (a) age of the children –Anna worked with the youngest children out-of the nine participants, (b) amount of time spent with the children- Justine works in a half-day program compared to a full-day daycare, and (c) ease of administering the ASQ- Anna reported some difficulty reading and understanding the ASQ items.

Qualitative Results-Themes

Data from the qualitative interviews were coded and recoded to reflect common categories of responses. This process led to development of a conceptual framework surrounding issues of early identification of children at risk for developmental delays. Two major themes were evident from the data: (a) factors that support childcare provider

recognition of developmental differences, and (b) perceived barriers to making referrals.

The framework is illustrated in Figure 4.

Early Identification of Children at-risk for Developmental Delays

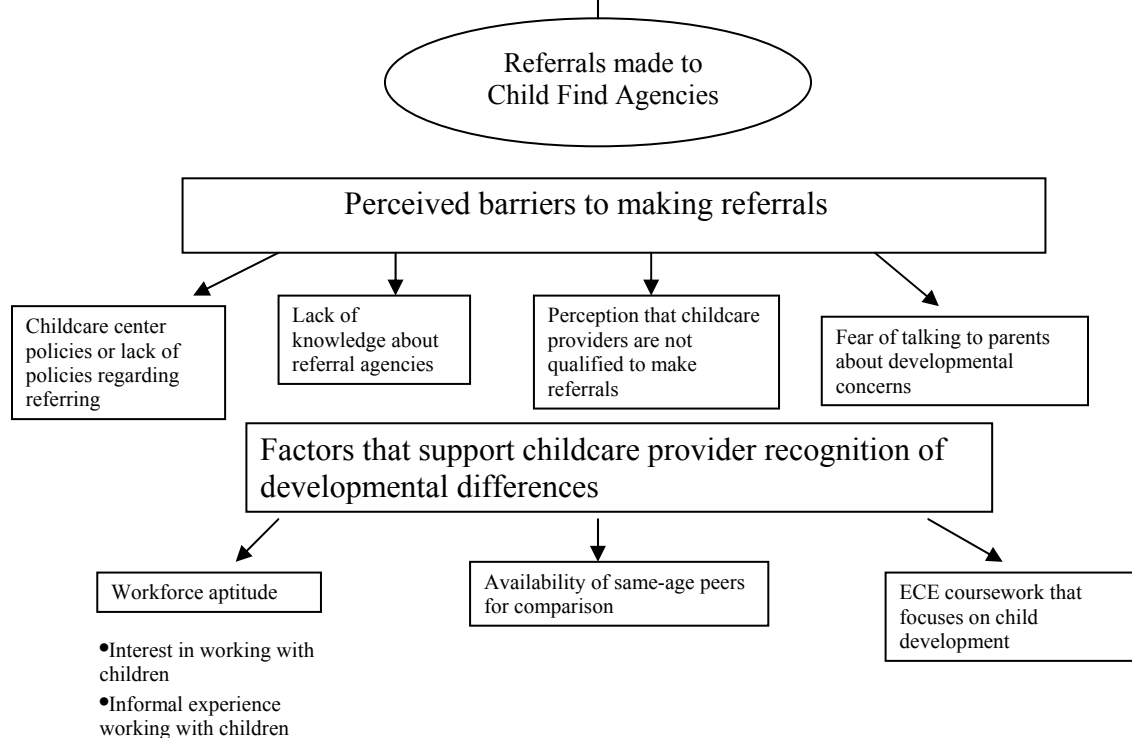


Figure 4. Conceptual framework describing the supports and barriers to early identification

The first theme centered upon factors that supported childcare providers in recognizing children at risk for developmental delays. Included in this theme were issues of workforce aptitude, availability of same-age peers, and ECE coursework that focuses on child development.

Workforce aptitude. There was a wide range of reported years of formal childcare experience for participants in the total study, and yet formal experience did not predict which providers would have high or low agreement between the CPDI and ASQ.

Interview responses indicated that both high-and low-agreement providers participated in

informal experiences working with children prior to becoming employed in a childcare center. Jenna stated:

I've been working with children pretty much my whole life. My mom ran a family childcare when I was growing up so I would help her out during the summers and stuff and when I was older. And then when we moved to Nevada I started with a family daycare and then after my twins were born, I opened up a preschool.

Four out of the 9 providers also mentioned a long-standing interest in working with children. When Julia was asked how she got started in the childcare field, she responded, "Oh, my goodness. I don't know. I guess because I've always loved kids."

None of the factors that had been hypothesized as making a difference in the accuracy of childcare providers' developmental assessment ability (giving the ASQ first, age of the provider, years of experience, or level of education) had been supported by quantitative data. Besides an aptitude for working with young children, responses from the qualitative interviews identified two additional factors that had not been investigated during the quantitative phase; the impact of having same-age peers available for making judgments about a child's development and specific ECE course content related to child development.

Availability of same-age peers. Using same-age peers to make judgments about an individual child's developmental skills was a strategy mentioned by every participant. Two of the participants, Brianna and Lizzie, are representative of the group. Brianna explained it this way, "Well, I mean, in a group like this, when there are so many kids to compare him to, you can just tell when he's sitting by himself and he doesn't want to play with other kids." Another childcare

provider, Lizzie, described how she made decisions as follows, “The rest of the group, the other 26 that I have they all seem to be able to communicate without the pointing and whining. So that is how I kind of gauge it.”

ECE coursework that focuses on child development. Two of the participants mentioned early childhood classes had helped them make decisions about the development of children in their classes. Julia remarked, “Oh, I think it’s basically just all the classes I’ve taken since I’ve been here,” and Jenna was even more specific when she said, “I’ve taken a lot of classes, so I know just the developmental stages of where children should be.”

The second major theme related to perceived barriers to childcare providers making referrals to Child find agencies. Four factors emerged from the interview data related to why childcare providers do not always make referrals: (a) concerns about parents’ feelings, (b) childcare center policies and procedures that act as barriers to making referrals, (c) feelings of not being qualified to make referrals, and (d) lack of knowledge about referral agencies.

Fear of talking to parents about developmental concerns. Five of the 9 participants interviewed mentioned concerns about parents’ affective response in being told that the childcare provider had concerns about their child’s development. Several childcare providers who are parents themselves mentioned concerns about making the parent feel sad or worried. Justine shared the following concerns:

Thinking through the emotions that go through a parent’s mind when they find out maybe their kid has a developmental delay of some sort or something like that. I think I would be nervous and I feel like in having that conversation,

maybe I'm putting that on a parent and that if it was unnecessary and, you know nothing was wrong, then I'd feel, I don't know, bad about causing fear, unnecessary fear. I know that if I found something out about Elie, that I would, that would be really hard I think. I mean I'd want to know as soon as possible, but I think that would still be really hard finding that out.

Two providers worried more about a parent getting angry if the childcare provider were to suggest that a parent seek further evaluation for their child. Kalie explained like this:

It was like, okay, you don't wanta. I didn't wanta never approach some parents cuz you do that and ask, you know, they need to get tested, they would all or some of them will get mad.

Childcare center policies and procedures. None of the centers had written policies and procedures regarding childcare providers talking to parents about developmental concerns; however, informal policies were identified as barriers to childcare providers referring children for further evaluation. In some cases the centers had an explicit verbal policy regarding teachers talking to parents about concerns. Lanie reported, "They've instructed me to go to the administration department and they can let me know whether they are aware of the problem. Then they will bring the three of them together – parent, the front office and the teacher." In 7 out of 9 interviews the childcare providers were not aware of an explicit policy regarding making referrals, but the childcare provider still understood that concerns about a child's development should be brought to the director's attention before any action was taken. Lizzie explained, "Not really a policy or procedure. We have a problem with one of the kids; we go and talk to Myra [the director]."

Perception that childcare providers are not qualified. Three of the providers described not feeling qualified to talk to parents about a child's

developmental concerns. For example, Brianna said, “I don’t feel like I’m really qualified to talk to them. I’m not qualified to say your child isn’t doing this or your child might have this wrong.” A different viewpoint was expressed by Libby regarding the issue of qualifications:

I would never go to a parent and say I think your child has ADHD, because I’m not a doctor. I’m not a professional, but I can say I’m worried about your child because when we sit in circle your child can’t sit still and listen to the story.

Related to the issue of qualifications for making referrals was the need for training on recognizing “red flags”. Monica described her need to learn more about developmental expectations, “I don’t know what’s appropriate for which age. I haven’t had training in that way.” Justine mentioned, “I think having a list of common symptoms of like, autism, things to look for. Something like that, something ‘cut and dry’ with the symptoms and things to watch out for, would be helpful.”

Lack of knowledge about referral sources. The final reason for not making referrals had to do with not knowing where to send parents to get a developmental evaluation for their child. Out of the 9 participants interviewed, only 2 providers were aware of Child find referral agencies, and both of those providers had taken a course at the local community college on working with children with disabilities. When Brittney was asked where she would tell a parent to go to get help for their child, her answer mirrored that of the 7 other providers when she answered, “I honestly have no idea.”

Summary of Qualitative Results

Semi-structured interviews with 9 childcare providers, 2 who had low-agreement between their CPDI and ASQ results and 7 who had high-agreement were used to extend and explain the results from the quantitative data analysis. Analysis of the qualitative data led to formulation of a conceptual framework that identified the supports and barriers that affect childcare providers' ability to play a role in the early identification of children at-risk for developmental delays. Factors supporting childcare providers' recognition of developmental differences included: (a) an aptitude for and interest in working with young children, (b) availability of same-age peers for comparing developmental milestones, and (c) ECE coursework that includes an emphasis on child development. Perceived barriers to making referrals to child find agencies included: (a) fear of talking to parents about developmental concerns, (b) childcare center policies or lack of policies regarding referring children, (c) perception that childcare providers are not qualified to make referrals, and (d) lack of knowledge about referral sources.

Summary of Quantitative and Qualitative Results

This chapter presented the results of both the quantitative (Phase I: logistic regression and chi-square analysis and Phase II: case selection) and qualitative (Phase III: interviews) aspects of this mixed methods research study. Results for the chi-square analysis indicated that the order the ASQ was given did not significantly effect childcare providers' agreement between the CPDI and ASQ. Both the experimental (ASQ-1st) and control group (ASQ 2nd) had high agreement between their developmental impression and the child's developmental status as verified by the results of the ASQ. In addition,

using the MSEL as the “gold standard” with 19% of the sample, childcare provider administration of the ASQ demonstrated adequate sensitivity, specificity and accuracy. Logistic regression results on the overall model of three childcare provider variables (age, experience and years of education) did not demonstrate a reliable method for predicting level of childcare provider agreement between the ASQ and CPDI. Results from the logistic regression did identify one child variable (age) as reliable in predicting which children would pass the ASQ.

Regression analysis was run on the childcare provider variables (age, experience and years of education) and child variables (age, gender and ethnicity) to determine if any other variables could predict the odds of a childcare provider referring a child for further evaluation. The regression results indicated that years of education was the only predictor that contributed significantly in classifying cases. The model correctly identified 87.1% of the cases. None of the child variables significantly contributed in classifying cases.

Chi-square analysis of referral rates indicated both the experimental and control group participants failed to refer a significant number of children who scored below the cut-off score on one or more areas of the ASQ and were subsequently referred by the researcher.

Chi-square analysis conducted to evaluate whether parental concern and childcare provider concern about a child’s development were independent demonstrated that these variables were not independent. Parents and childcare providers agreed about a child’s development, especially when both parties felt that the child was developing the same as other children the same age.

The qualitative phase of this study helped to explain some of the unexpected findings from the quantitative phase. Examples of informal experience and an aptitude for working with young children helped to explain why years of formal experience did not significantly predict which childcare providers would have high agreement between the CPDI and ASQ. Interview data indicating that childcare providers use same-age peers to compare each child's development helped to explain why using the ASQ did not make a significant difference in a childcare providers CPDI and ASQ agreement. Several themes related to why childcare providers are hesitant to make referrals helped to explain the discrepancy between childcare provider decision to refer or not refer and actual referral data from the study.

In the next chapter a summary and discussion of the results of this mixed methods study will be presented. Implications for childcare provider developmental screening practice will be outlined as well as suggestions for further research on this topic.

CHAPTER FIVE

Discussion

Summary, Interpretations of Results and Recommendations

The previous chapter presented the results of the quantitative and qualitative phases of the study. This section will integrate findings from all phases of the study using the following procedure. First, quantitative and qualitative results will be summarized, integrated and interpreted organized by the major quantitative questions. Next, study results will be discussed in detail using the early identification conceptual framework developed based on qualitative results. Interpretations will be augmented by citing related literature. Finally, recommendations and implications for practice and future research will be offered.

Summary, Integration, and Interpretation of Results

The purpose of this mixed methods research study was to determine the effect of using a standardized developmental screening tool on childcare providers' ability to recognize children at risk for developmental delays and to make appropriate referrals for further evaluation of children with whom they were concerned. An integration of the studies findings will be organized by quantitative research questions.

Question #1: Is order in which the Ages and Stages Questionnaire (ASQ) is completed related to whether or not a childcare provider's developmental impression agrees with the ASQ?

The order in which the ASQ was given was not a significant variable in determining agreement between childcare providers' developmental impression and ASQ results. Agreement was slightly higher for the experimental group where the ASQ was

given first (80.4%) as compared to the control group (75%), but the result was not statistically significant. In this dissertation study, childcare providers' developmental impression of individual children's development was accurate, in most cases, regardless of whether the ASQ was given prior to their making a judgment or after.

Qualitative results helped to explain why use of a standardized measure did not play a significant role in helping childcare providers recognize children who were developing differently from their peers. Each of the 9 childcare providers (100%) who were interviewed during the qualitative phase of the study reported that comparing children to their same-age peers helped them to recognize children at risk for developmental delays. In addition to the availability of same-age peers with whom to make side-by-side comparisons, childcare providers have the advantage of spending extended periods of time with children in their care. Moreover, based on the number of hours some children spend in out-of-home care, one could argue that childcare providers' knowledge of a child's developmental abilities is similar to that of a parent's. Rydz, Shevell, Majnemer, and Oskoui (2005) described the advantages of parent-completed developmental screening questionnaires as follows:

In the unfamiliar environment of the physician's office the infant might not behave in a similar fashion, being nervous, uncooperative, or distracted, and hence might not perform well on physician-administered screening tests. On the other hand, observant parents, comparing their child's skills with those of others, have a much better knowledge of their child's actual capabilities (p. 10).

Using a standardized screening tool. Childcare providers' impression about a child's development was accurate with or without the benefit of using a standardized developmental screening tool. This finding diverges from findings in the literature comparing pediatrician's opinion with standardized assessment results. Lavigne, Binns,

Christoffel, and colleagues (1993) compared pediatrician intuition against a complete standardized assessment for behavioral problems and found that pediatricians were able to detect behavioral and emotional problems less than 20% of the time based on their clinical opinion alone. Hix-Small, Marks, Squires, and Nickel (2007) compared pediatrician developmental impression (PDI) alone with use of the Ages and Stages Questionnaire at 12- and 24-month well-child visits. These researchers found that 37 out of a total 82 children who were referred to early intervention services and found to be eligible would have been missed if pediatrician developmental impression alone had been used. In addition, referral rates increased a total of 224% when the study years were compared to previous years illustrating that use of a standardized tool helped pediatricians identify more children with developmental delay.

Findings regarding the effect of using the ASQ on childcare providers' developmental assessment abilities diverged from previous research on the use of standardized screening tools where the use of a standardized screening tool significantly improved identification of children with possible developmental delays. The availability of same-age peers for comparison and the extended period of time spent observing children in a variety of routines and activities appears to have improved the childcare providers' ability to recognize children who are developing differently than other children the same age.

Question #2: Is there a difference between the number of children identified as needing further evaluation on the CPDI and the actual number of children referred by the researcher based on ASQ results?

There was a significant difference between the number of children who were referred for follow-up monitoring or further evaluation by the researcher based on ASQ results and those identified by childcare providers. Twenty-seven more children (25.7%) were recommended for follow-up, either monitoring or further evaluation, by the researcher than by childcare providers.

Qualitative results helped to shed light on why childcare providers were reluctant to refer children for further evaluation even when they recognized that the child was developing differently than his or her peers. Barriers identified by participants during the qualitative phase included: (a) fear of talking to parents about developmental concerns, (b) lack of knowledge about referral agencies, (c) perception that childcare providers are not qualified to make referrals and, (d) unclear or absent policies regarding making referrals.

Research on childcare provider referrals. The only study on childcare provider referral rates identified in the literature was Branson's (2007) unpublished survey study. The finding that childcare providers do not always refer children with whom they have developmental concerns converges with Branson's (2007) survey of childcare provider screening and referral practices. Results of this study of 155 childcare providers working in Nevada revealed that even when childcare providers had a concern about development, it resulted in a referral to the school district for children 3 years and older only 22% of the time and only 15% of the time for children who are younger than 3 years old; indicating that childcare providers were slightly more likely to refer a child over the age of 3 years. In the current study, age of the child was not a predictor of referral for further evaluation.

Research on pediatrician referrals. Many researchers have identified lack of use of standardized assessment tools as a factor in preventing pediatricians from identifying and referring children at risk for developmental delays (Halfon et al., 2004; Sices, 2007; Squires, Nickel, & Eisert, 1996). Other researchers have reported that even when pediatricians accurately screen children for behavioral or developmental problems, the children still might not be connected to appropriate services. Navon, Nelson, Pagano and Murphy (2001) found that less than one-third of children identified as having significant behavioral health problems using a standardized tool actually received needed services. Reasons included a shortage of existing services, inadequate follow-through by parents, and lack of physician awareness of mental health services.

Literature on reasons pediatricians do not always refer children for further evaluation converges with the reasons cited by childcare providers in the current study. Fine and Mayer (2006) reported that pediatricians in their study identified three levels of barriers to making referrals to child find agencies:

- Practice-based barriers - Lack of time, lack of familiarity with non-medical services, discomfort with a team approach, and organizational constraints.
- Service provider partnership barriers – Differences across disciplines regarding how children and families' needs were approached (e.g., asset-based vs. deficit-based), poor communication from the referral agency, and infrastructure issues for some community-based organizations (e.g., inadequate phone system).

- Community systems barriers – No mechanism to support linkages and coordination between pediatricians and referral agencies, and inadequate supply of developmental services, particularly for mental health services.

Two of the barriers identified by pediatricians – lack of familiarity with referral sources and discomfort with talking with parents in the Fine and Mayer (2006) study, were also identified by childcare providers in this current study. It is possible that other barriers could apply to childcare providers as well, even though they did not emerge from interviews in this current study.

Research on child welfare worker referrals. Several of the barriers identified by pediatricians and childcare providers were also reported by child welfare workers as barriers to making referrals. Robinson and Rosenberg (2004) identified lack of knowledge about how to make referrals the Part C system, insufficient Part C capacity to serve identified children, and problems with parental acceptance of Part C referrals as responsible for low rates of referral to Part C by child welfare workers.

Results of this study provide support for findings of previous studies regarding both referral source factors (e.g., discomfort talking to parents about concerns) and system level factors (e.g., insufficient capacity to serve identified children, poor coordination with referral sources) that interfere with referral practices.

Question #3: Do certain childcare provider characteristics, child characteristics, or a combination of characteristics increase the probability of ASQ-CPDI agreement about a child's development and/or decisions about referring a child for further evaluation?

Logistic regression results indicated that childcare provider's age, education level, and years of experience did not predict which childcare providers would have high-

agreement between their developmental impression, as represented on the CPDI, and ASQ results. Further examination of the data provides potential explanation for this unexpected result. One confounding factor could be attributed to the small variance within the dependent variable (i.e., agreement between the CPDI and ASQ). Examination of childcare provider average agreement revealed that 79 out of 89 childcare providers had more cases of agreement between their CPDI and ASQ results which averaged to “1” (Agree) while only 10 out of 89 childcare provider’s had more cases of disagreement which averaged to “0” (Disagree). In addition, one independent variable provided by childcare providers - years of education, also had very little variance. The majority of childcare providers (64%) reported having taken some college courses compared to 25.8% who indicated High school only and 6.7% who reported having a Bachelor’s Degree. These percentages are in alignment with national data. Bellum and Whitebook (2006) reported that 80% of teachers working in center-based early care and education settings have some college education.

Analysis of qualitative participant’s demographic data also provided an explanation for why age, education level, and years of experience did not predict level of agreement between the CPDI and ASQ. Ages of qualitative participants ranged from 21-60 years, educational level ranged from High school only to Bachelor’s degree, and years of experience ranged from 1 to 14 years. Yet, every childcare provider interviewed in the qualitative phase (regardless of age, years of experience, or education level) indicated that the primary method she used to recognize a child at risk for developmental delay was comparison of that child’s development to same-age peers.

Additionally, while years of experience was reported as years of formal experience working in a childcare setting, 7 out of 9 of the qualitative participants reported one or more examples of informal experience working with children prior to employment in the field (e.g., babysitting, teaching Sunday school).

Research on pediatrician characteristics. Survey research conducted by Sand, Silverstien, Glascoe, Gupta, Tonniges, and Connor (2005) on characteristics of pediatricians who did and those who did not conduct standardized universal screening in their pediatric practices did not find significant differences in screening practices associated with age of the pediatrician or years in medical practice. The only significant difference between the two groups was that pediatricians with a higher proportion of Medicaid patients (60% vs. 48%) reported a higher (>10 %) rate of identification of developmental problems among their 0- to 3-year old patients (26% vs. 15%). Hix-Small, Marks, Squires & Nickel (2007) investigated whether certain physician characteristics increased the probability of Physician Developmental Impression (PDI) and ASQ results agreement in their study. These researchers found that female gender and total monthly number of hours worked were positively related to PDI-ASQ agreement measured by physician referrals. Years of experience in medical practice was not related to PDI-ASQ agreement.

Findings that pediatricians' age and years of experience were not significant factors in the use of standardized developmental screening instruments, or in pediatrician developmental impression agreement with ASQ results are consistent with quantitative results showing that age and years experience did not predict CPDI-ASQ agreement or childcare providers' decision to refer a child for further evaluation. Factors that were

found to be significant in the studies described above; gender, hours worked per week, and proportion of children receiving Medicaid were either not applicable (e.g., gender – all participants were female) or the information was not solicited.

Research on childcare provider characteristics. This is the first study to look at childcare provider characteristics as predictors of agreement between developmental impression and standardized developmental screening results and childcare providers' decisions to refer a child for further evaluation. There have been studies; however, on the influence of specific childcare provider characteristics (e.g., education level, training, and years of experience) on other aspects of childcare such as quality of care, teachers' use of developmentally appropriate practices, teacher-child interactions, and inclusion of children with disabilities.

Linkages have been found between formal education level and observed childcare classroom quality in some studies (Howes, 1997; Howes, Whitebrook, & Phillips, 1992), while other studies have found that specific training is more effective than overall level of education in determining childcare classroom quality (Arnett, 1989) and inclusion of children with disabilities (Essa et al., 2008; Mulvihill, Shearer, & Van Horn, 2002).

Further research is needed to determine if certain childcare provider characteristics are associated with accurate recognition of children at risk for developmental delays.

Question #4: Can childcare providers administer the ASQ with acceptable accuracy and validity?

Comparison of childcare provider administered ASQ results and MSEL administered by an independent evaluator blind to the ASQ results demonstrated that

childcare providers were able to administer the ASQ with acceptable sensitivity, specificity, and accuracy. Qualitative data did not apply directly to this question; however, ease with which childcare providers completed the ASQ provides indirect explanation regarding accuracy of administration. Eight of the 9 qualitative participants reported finding the ASQ easy to administer during childcare routines and daily activities. One participant reported needing to read questions several times to understand what she was supposed to do. Reading level of the ASQ is estimated to be at the 4th-6th grade level (Squires et al., 1999) and pictures are added to the administration items to help comprehension. Therefore, it is expected that most childcare providers with at least a High school education would be able to administer the ASQ with good fidelity.

This is the first study to investigate results of the ASQ administered by childcare providers with the results of a professionally administered standardized test, so it is not possible to compare the ASQ-MSEL results directly with other studies. Concurrent validity of parent-completed ASQs has been studied extensively, however, as part of gathering psychometric data on the ASQ. Squires and colleagues (1999) measured concurrent validity of parent-completed ASQs with the classification of the child's performance on a professionally administered standardized test given within 29 days. Children received different standardized tests according to their ages; Infants up to 30-months received the Bayley Scales of Infant Development (Bayley, 1969) and the Gesell (Knobloch, Stevens, & Malone, 1980). Children between 3- and -4-years old received the Stanford-Binet Intelligence Scale (Thorndike, Hagen, & Sarttler, 1985) and the McCarthy Scales of Children's Abilities (McCarthy, 1972). The Battelle Developmental Inventory [BDI] (Newborg, Stock, Guidubaldi, & Svinicki, 1984) was given to children 60 months

old. Concurrent validity of the parent-completed ASQs as reported in percent agreement between ASQ and standardized assessments ranged from 76% to 84% for overall agreement (See Squires, Potter, & Bricker, 1999 for a more detailed explanation).

The agreement between the childcare provider-completed ASQs and the Mullen Early Learning Scales (MSEL), the standardized test used in this study, provides evidence that childcare providers can administer the ASQ with comparable validity to parents as reported in the Squires et al. (1999) study.

Question #5: What is the agreement between parents' reported impression of a child's development and childcare providers' impression?

Chi-square analysis of parent and childcare provider impression regarding a child's development indicated that in general, childcare providers and parents agreed about children's developmental status. There was higher agreement when both the parent and the childcare provider felt the child was developing the same as other peers than when there was a concern about a child's development. When there was a disagreement about a child's development, childcare providers were more often the ones concerned rather than the child's parent.

Qualitative results reinforced the notion that when there was a difference between parents and childcare providers regarding how a child was developing it usually was the childcare provider who was concerned about the child's development, rather than the parent. The barrier cited most often by qualitative participants regarding referring a child for further evaluation was fear of talking to the child's parent about the childcare providers' developmental concern for the child.

Research on pediatrician and parent agreement about development. Studies have demonstrated that parents are accurate reporters of their children's current developmental skills (Bodnarchuk & Eaton, 2004; Dinnebeil & Rule, 1994; Glascoe, 1997), but few studies have compared pediatrician and parent developmental impressions. One study conducted by Nicol (2006) compared medical students' developmental impression with parents' developmental impression and found that medical students and parents only agreed 70% of the time and when there was a disagreement regarding the child's development, the ASQ results supported the parent's impression over the students in "many, but not all of the cases" (p.6).

The previous section presented an integration of the quantitative and qualitative results organized by the guiding quantitative research questions. In the next section, implications of study findings will be discussed as framed by the Early Identification conceptual framework developed based on qualitative results. The conceptual framework identifies two main thematic categories: (a) factors which support childcare providers' recognition of developmental differences, and (b) barriers which prevent childcare providers from making appropriate referrals to child find agencies.

Factors that Support Childcare Providers' Recognition of Developmental Differences

The first step in early identification of children at risk for developmental delays is a recognition that the child is developing differently than other children the same age. Three factors were identified that support childcare provider recognition of developmental differences in childcare settings: (a) workforce aptitude for working with children, (b) availability of same-age peers for comparison, and (c) ECE coursework that focuses on child development.

Aptitude. Qualitative participants all described early experience working with children, and in 4 of 9 cases, a long-standing love of working with children. These types of motivation for working with children were also reported in the 2001 large-scale Midwest Child Care Research Study (Raikes et al., 2006) where 61% of the childcare providers who responded to the survey indicated that working with children was a “personal calling.”

Interest in working with children and informal experience could explain why childcare providers were able to accurately recognize children who were developing differently than other children based on intuition. This is contrasted with pediatricians who enter medical school with backgrounds in the sciences and minimal training or experience in child development (Pinto-Martin, Dunkle, Earls, Fliedner, & Landes, 2005).

Comparison. Qualitative participants universally reported using comparison of same-age peers when making decisions about children’s developmental status. This finding helped to explain why use of a standardized screening tool did not significantly impact childcare providers’ developmental assessment ability, a finding that diverged from other studies.

Brunswik’s (1955) *Social Judgment Theory* which led to the development of the Lens Model can help explain this finding. In the present study, childcare providers were asked to make a judgment about a child’s development as either “Of Concern” or “No Concern”, and to decide if the child should or should not be referred for further evaluation. A variety of cues were available in the childcare environment for childcare providers to use to make this judgment (e.g., child’s age, comparing the child to other

children, and child's performance on the ASQ if the childcare provider was in the experimental group). The childcare providers' judgment as measured by responses on the CPDI was compared to the actual judgment about the child's developmental status as measured by ASQ results. Figure 5 illustrates this Lens Model conceptualization. The left side of the model represents the true state (i.e., the child's developmental status as judged by ASQ performance), known as the judgment ecology. A variety of pieces of information – known as cues – are illustrated in the middle of the model. The right side of the model shows the decision that is made by the participant. The legend shows the cues that were identified by childcare providers during the qualitative phase of the study. Regression modeling techniques have been used in other studies to quantify the relative weight of each cue in making a judgment (see for example Thompson, Foster, Cole & Dowding, 2005). That process was outside the scope of the current study.

One of the factors that contribute to the “uncertainty” Brunswik (1955) referred to when describing Social Judgment Theory as applied to the Lens Model is the fact that different people may apply different weights (importance) to cues when making judgments. Based on prior research on pediatrician's clinical judgment compared to using a standardized screening tool, it was hypothesized that the child's performance on the ASQ would be the most important cue that childcare providers would use to base their judgment about a child's developmental status and need for further evaluation. The current study results indicate, however, that the cue childcare providers considered most important was the child's development as compared to same-age peers. Based on the high-agreement between childcare providers' developmental impression and ASQ results, one cannot argue with the relevance of this cue. Rather than discourage childcare

providers from utilizing same-age peers to judge a child's developmental status, training should be provided to help childcare providers use a standardized developmental screening tool to confirm and to add credibility to their judgments.

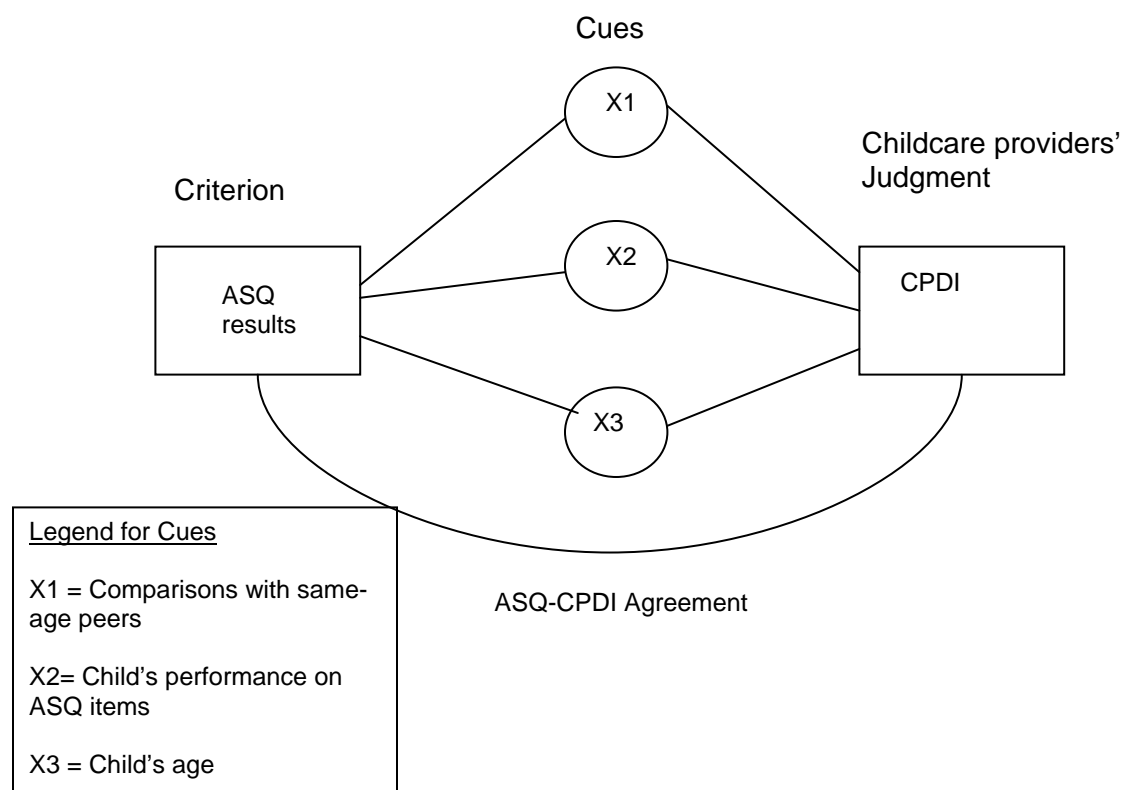


Figure 5. *The Lens Model conceptualization of childcare provider judgment process*

Early Childhood Education coursework. In the current study, 57% of the total

sample reported attending some college courses. Although, childcare providers in the total sample were not asked to specify if the courses were in the early childhood education field, 3 out of 9 of the qualitative participants mentioned ECE coursework focusing on child development was helpful in assisting them to recognize children with developmental differences. As stated earlier, studies differ on the relative benefits of formal education as compared to focused training for childcare providers. ECE

coursework has the advantage of having the rigor of formal education while being focused on the information and skills that childcare providers need to apply in their work settings (Kneader, Ferguson, & Lawrence, 2005). Furthermore, taking courses in early childhood education that focus on typical sequences of child development creates an awareness of prerequisite skills to major milestones. The Committee on Children with Disabilities (2001) described the importance of understanding child development as follows:

Early recognition of delays requires in-depth knowledge of the precursors to the skills as well as clinical judgment. Waiting until a young child misses a major milestone, such as walking or talking, may result in later rather than early recognition (p. 193).

Pediatricians typically take only one child development course during their medical training (ACGME, 2004). Limited training in child development may account for the noted tendency of pediatricians to identify children who have a diagnosed medical condition (e.g., Down syndrome) or children who demonstrate markedly delayed development earlier than children with milder developmental delays (Bailey, Hebbeler, Scarborough, Spiker, & Mallik, 2004).

Several factors which support childcare providers in recognizing children at risk for developmental delays surfaced in this study: (a) childcare providers have an aptitude for working with young children; (b) the childcare environment has relevant cues, including same-age peers, which can be used to aid in recognition of children at risk for developmental delays; and (c) early childhood education classes provide valuable information about the developmental sequences that children typically progress potentially aiding childcare providers in recognizing children who are missing precursors

to major milestones. Unfortunately, several barriers were also identified that interfere with childcare providers acting on their recognition of a child at risk for a developmental delay by making an appropriate referral to a child find agency.

Perceived Barriers to Making Referrals

Efforts to improve early identification of children at risk for developmental delays have primarily focused on improving the use of standardized developmental screening tools based on the rationale that lack of recognition of developmental differences was responsible for later identification of children with developmental delays (American Academy of Pediatrics, 2006; Gilliam, Meisels, & Mayes, 2005; Glascoe, 2005). Childcare providers in this dissertation study were able to recognize children who were at risk for developmental delays both with and without the benefit of a standardized developmental screening tool; yet, reported decisions to refer children for further evaluation were lower than expected based on ASQ results.

Interviews with participants during the qualitative phase of the study identified four barriers that interfered with referral practices. Identified barriers included: (a) inconsistent or vague childcare center policies and procedures regarding making referrals, (b) lack of knowledge about referral agencies, (c) perceptions that childcare providers lack qualifications to make referrals, and (d) discomfort talking to parents.

Childcare center policies. Lack of clearly articulated policies regarding referring children for further evaluation was a frequently cited barrier. It is not surprising that none of the childcare centers in this study had written policies regarding making referrals, because none of the centers had written policies about conducting developmental screenings in place either. The American Academy of Pediatrics (AAP) has issued a

number of policy statements and specific guidelines related to developmental surveillance, screening, and management of children with specific disabilities (American Academy of Pediatrics, 2006; American Academy of Pediatrics Committee on Children with Disabilities, 2001). These guidelines have been moderately helpful in improving the developmental screening practices of pediatricians (Sand, Silverstein, Glascoe, Tonniges et al., 2005). Policies and guidelines are even more important in childcare settings where there is poor compensation and a high rate of staff turn-over (Whitebrook, Sakai, Gerber, & Howes, 2001).

Gillian, Meisels, and Mayers (2005) recommend three mechanisms for conducting policy changes by which developmental screening and referral systems might be embedded in childcare settings: (a) childcare licensure laws, (b) federal quality set-aside money distributed by the Child Care and Development Fund, and (c) the influence of the state pre-kindergarten systems. The National Academy for State Health Policy goes further and calls for state policies which support linkages between the health sector and other sectors which support young children's health and development, such as early intervention, early learning, and family support sectors (Rosenthal, Hanlon, & Hess, 2008).

Childcare licensing laws regulate the delivery of childcare for children in out-of-family childcare settings. The purpose of licensing is to “insure that the care provided is good enough to do no harm to children – that the building is safe and sanitary and that adequate developmental and caring relationships are provided to children” (Azer, LeMoine, Morgan, Clifford, & Crawford, 2002 p. 1). In addition to basic health and safety issues, regulations also dictate minimum training requirements for teachers and

directors. Recently, some states, including Nevada (State of Nevada, 2009), have added regulations requiring childcare centers to assess a child's development upon enrollment. Nevada regulations do not specify that a standardized developmental screening tool be used at this point, but this is an important step in the right direction.

Policies that require developmental screening in childcare settings that receive Child Care Development Fund (CCDF) funding to serve children from low-income families and in state funded pre-kindergarten programs are becoming more prevalent. For example, Florida requires all children who participate in subsidized childcare programs, including Voluntary Pre-Kindergarten to receive a developmental assessment at time of enrollment and exit from the program (Allen, 2007).

Early Head Start and Head Start have performance standards that require all children to receive a developmental screening within 45 days of enrollment. In addition to the written performance standards to address developmental screening, many Head Start programs have received SpecialQuest training to improve their developmental screening and referral process. SpecialQuest, also known as the Hilton/EHS training Program is an initiative sponsored by the Conrad Hilton Foundation in partnership with the Head Start Bureau to improve coordination between EHS and Part C agencies. SpecialQuest trains community teams to develop systems to identify, refer, and serve children with special needs within a specific community context (SpecialQuest, 2009).

The examples cited above demonstrate that state and federal policies are in place that could facilitate developmental screening and appropriate referrals of children in childcare settings. There appears to be a “disconnect,” however, between state and federal policies and implementation at the local childcare center level, at least based on

interview responses during the qualitative phase of this dissertation study. The reasons for the “disconnect” were outside the scope of this study.

Referral agencies. Only 2 out of the 9 qualitative participants were able to identify the appropriate referral agencies for children birth to 2-years and 3- to 5-years of age, and both of those participants had taken an ECE class that covered screening and referral information. The other participants either indicated that they had no idea or they made an inaccurate guess (e.g., the Children’s Cabinet). Lack of knowledge about existing resources and how to access those resources for families were also barriers cited by pediatricians for making referrals (Sices, 2007). Other barriers to making referrals cited in the literature include confusing eligibility policies and procedures, poor communication between the child find agency and the referral source, and lack of capacity to serve identified children (Fine & Mayer, 2006).

Childcare provider qualifications. Poor compensation for work and minimal training requirements are recognized as factors that can contribute to childcare providers feeling unqualified (Gilliam, Meisels, & Mayes, 2005; Whitebrook, Sakai, Gerber, & Howes, 2001). The National Association for the Education of Young Children (NAEYC) understands the importance of helping early childhood educators to develop a professional identity that allows them to recognize their work as valuable (NAEYC, 2003). Several promising initiatives have been launched to contribute to changing the level of professionalism in childcare programs across the country and in Nevada. Promising initiatives described on the Nevada Division of Welfare website (2009) include:

1. Accreditation of the associate degree in early childhood education at the community college level – NAEYC provides a rigorous process for community college early childhood education Associate Degree programs to demonstrate that the program meets standards established by the NAEYC association.
2. T.E.A.C.H. was introduced in Nevada in 2005. T.E.A.C.H. is an acronym for Teacher Education and Compensation Helps. T.E.A.C.H. Early Childhood ® Nevada is part of Nevada’s early childhood educational development system designed to address the lack of early childhood specialization, inadequate compensation, high turn-over rate, and lack of recognition for early care providers in Nevada. T.E.A.C.H. provides scholarships, stipends, and paid release time from work, as well as bonuses or increased wages from employers for completion of continuing education classes.
3. Nevada Registry is a statewide system of career development and recognition for those working in the field of early care and education. The Nevada registry is also a training approval system designed to promote high quality training opportunities.
4. Accreditation of childcare centers and family daycares is a voluntary process that gives programs an opportunity to compare their programs to national standards in order to evaluate what they do well and to identify areas that need improvement.
5. Tiered Reimbursement refers to a system for acknowledging higher quality childcare programs by increasing the amount of subsidy dollars the center receives from the Child Care Block Grant. Nevada currently has 38 accredited childcare centers at Tier 4 receiving 15% increase in subsidy dollars.

Improvements in childcare provider quality and their perception of being qualified will be dependent on building an infrastructure. Hyson and Biggar (2006) offered the following suggestion, “Improvements will not be possible without attention to public policies at the state and federal levels. Policy makers must help the field build a professional preparation infrastructure to attract, educate, retain, and continuously train early childhood professionals” (p.302).

Talking to parents. Referrals for further evaluation can not be made directly by childcare providers to referral agencies. Childcare providers must talk to parents and encourage parents to call the referral agency to make an appointment. Reasons childcare providers gave for not wanting to talk to parents included: (a) concern with the parent either becoming upset or angry when told their child needed further evaluation, and (b) feeling that the parent would not consider the childcare provider’s concern to be credible. Interestingly, some of the same concerns voiced by childcare providers regarding talking to parents in this study were also described by Pinto-Martin, Dunkle, Earls, Fliedner and Landes (2005) as reasons pediatric providers hesitated in talking to parents about developmental concerns:

After developing a relationship with a family, the discomfort of giving bad news to a parent arises. Conversely, providers may worry that over-referring a false-positive screen, will cause unnecessary family distress and anxiety. Many physicians believe, often incorrectly, that follow-up services are not available. Also, few physicians have the background, skills, or time to help families navigate the fragmented and confusing network of services a child might need (p. 1929).

This section has summarized and integrated the results of the quantitative and qualitative data analysis for this dissertation study. Study results were organized first by guiding quantitative questions and then by the conceptual framework developed based on

an analysis of the qualitative data. Study results provided support for the efficacy of childcare providers screening child development in childcare centers. While study results indicated that it was feasible for childcare providers to conduct developmental screenings in order to recognize children at risk for developmental delays, several significant barriers were identified which interfered with childcare providers referring children for further evaluation. The next section will discuss the implications of the study.

Implications for Practice

This study has provided insight into some of the issues related to childcare providers recognizing children at risk for developmental delays and making appropriate referrals to referral agencies. While study results support relying on childcare providers as another referral source for early intervention and early childhood special education agencies, significant barriers were also identified which should be addressed.

Specifically, implications of this study include:

1. Explicit childcare center policies and procedures for universal developmental screening for children in childcare settings need to be developed and disseminated to childcare staff and parents of children enrolled in the childcare center. Figure 6 illustrates a universal developmental monitoring system modeled after the AAP guidelines (Branson, 2007) that could be implemented in childcare settings.

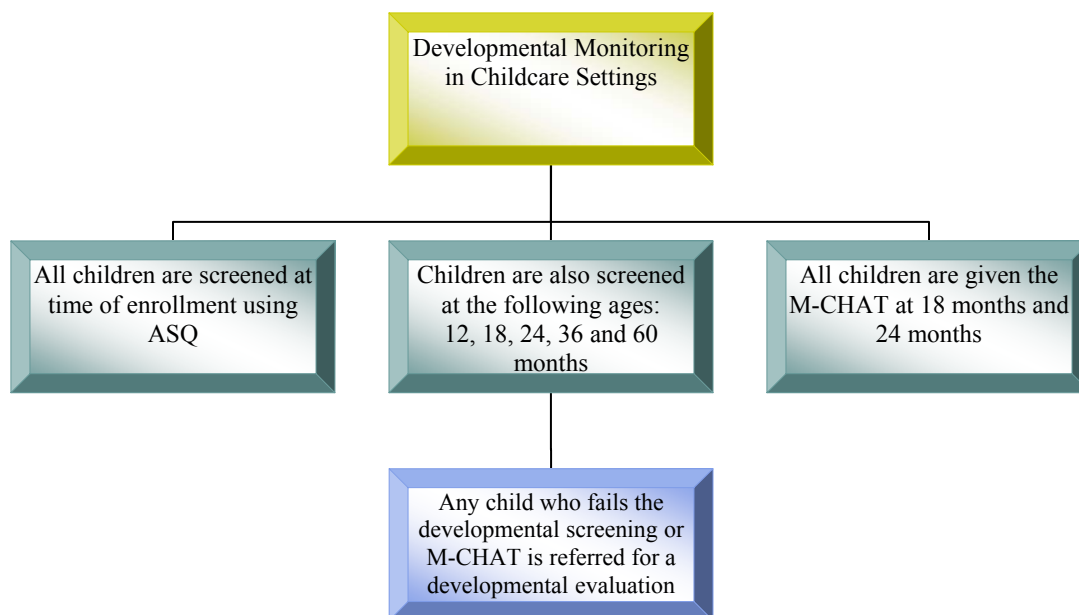


Figure 6. Flow Chart for Developmental Surveillance in Childcare Settings

2. Referral agencies need to improve their linkages with potential referral sources in the community. Rather than relying on ineffective child find activities, such as print material advertising child find services or “one shot” community health screenings, referral agencies should consider more comprehensive efforts, such as building relationships with primary referral sources (Dunst & Clow, 2007).
3. Rather than jumping from developmental screening to assessment for eligibility, referral agencies may want to consider applying a *Recognition & Response* model (Coleman, Buysee & Neitzel, 2006) in childcare settings. Recognition and Response is modeled after *Response to Intervention* (RTI) which emphasizes prereferral prevention and intervention for school-age children who are at risk for learning disabilities. Children identified through universal screening could receive targeted supports and services in the childcare setting to improve their meaningful participation in early learning experiences. Progress monitoring could be used to

determine if and when children needed additional interventions (VanDerHeyden & Synder, 2006). This kind of a model would require increased collaboration with referral agency staff, but the model could ultimately improve the efficiency and effectiveness of early identification and early intervention processes.

4. Early care and education initiatives designed to improve recruitment and retention of highly qualified childcare providers need to be expanded in order to reduce staff turnover and to improve overall quality in childcare settings. Head Start has required the majority of teachers to hold associates or bachelor's degrees in early childhood education since 1998 (Brandon and Martinez-Beck, 2006). It is time that these educational requirements and the associated pay are applied to all early childhood education providers. These kinds of initiatives are important to quality childcare in general and they are needed to ensure the viability of depending on childcare providers to assist with early identification of children at risk for developmental delays.

Significance of the study

While studies have been conducted on the developmental screening practices of pediatricians, there was no identified research on the effects of using a standardized developmental screening instrument on childcare providers' developmental assessment abilities. This study provided support for the efficacy of childcare providers conducting developmental screenings in childcare centers. The approach to early identification of children with disabilities has been narrowly focused on pediatricians in the past. The results of this study can be used to encourage those working to promote early

identification and early intervention of children at risk for developmental delays to more fully include childcare providers in their efforts.

Results from this study provide evidence of the benefits of using a mixed methods research design when looking at developmental screening practices. Qualitative research results were instrumental in explaining the unexpected, divergent study results. Without follow-up interviews that identified the weight that childcare providers placed on the cues regarding developmental levels provided by same-age peers, it might have been easy to dismiss the results outright.

Limitations of the study

This study generates information about the effect of using a standardized developmental screening tool has on childcare providers' screening and referral practices. Although random sampling was used to attempt to ensure that a representative sample of childcare providers was selected for the quantitative phase of the study, a potential limitation was the exclusion of family daycare providers and teachers working in Early Head Start and Head Start. One Early Head Start program was initially selected through random sampling, but then excluded because the program was already using the Ages and Stages Questionnaires with children. A decision was made to limit participants to childcare providers working in licensed childcare centers, thus excluding family daycare providers. Demographic statistics of Nevada Child Care Providers reported by Essa (2002) indicate that family daycare providers have more experience, but less education than childcare providers working in center-based programs, thus findings based on center-based childcare providers may not generalize to family daycare providers. It will be important to include family daycare providers in future studies, however, because they

care for our youngest children. According to The National Household Education Survey (2001), children ages 0 to 2 years are more likely than older children (3 to 6 years) to receive nonparental home-based care and less likely to receive care in licensed childcare centers.

A final limitation was the lack of data regarding the outcome of referrals made by the researcher. Parental consent was not solicited for the researcher to contact the referral agencies to investigate whether or not parents followed through with referral recommendations. Assumptions have been made that low numbers of children enrolled in early intervention services are due to lack of identification and referrals. Gathering data from either parents or the referral agencies regarding parent follow-through may have identified other equally important factors.

Implications for further research

Findings from this dissertation study suggest topics for future research related to the barriers to making referrals cited by childcare providers. Future research should focus on strategies to reduce barriers and thus improve referrals between each of the stakeholder groups; parents, childcare providers, and referral agencies. Research studies should be designed to answer the following questions for each stakeholder group:

Parents

1. Does educating parents about the importance of early identification and early intervention and use of a formal screening instrument improve childcare provider-parent communication and referrals?
2. What factors contribute to parents contacting the referral agency and obtaining an evaluation when they are referred by their child's childcare provider? For

example, are parents more likely to follow through if the evaluation and intervention could take place at the childcare center?

3. What cues in their environment do parents consider relevant when they make judgments about their child's development? Are the cues the same or different from cues used by childcare providers?

Childcare providers

1. Do written policies and procedures regarding conducting developmental screening and making referrals improve childcare provider-parent communication?
2. What is the effect of delivering training focused on recognizing children at risk for developmental delays and making informed referrals on childcare providers' perception of themselves as qualified to make judgments about children's development?
3. What is the effect of instituting a *Recognition and Response* model in childcare settings on recognition and referral of children at risk for developmental delays?

Referral agencies

1. Which agency factors (e.g., availability of services, effective communication with referral sources) predict parental follow through with referrals made by childcare providers?
2. What is the effect of having a representative from the early intervention agency/school district visit childcare centers monthly to answer questions and serve as a liaison between childcare centers and referral agencies on number of referrals made by childcare providers?

3. What are the cost-benefit ratios when comparing a *Response to Intervention* model to traditional service delivery models?

Summary

The major contribution of this study is that it is the first identified study to investigate childcare providers' developmental assessment abilities. The use of mixed methods design for this study, which combined quantitative and qualitative data collection and analysis, added more depth to the study results and interpretations.

Study findings indicate that childcare providers are capable of recognizing children at risk for developmental delays using intuitive judgment. Childcare providers were also able to administer the ASQ with good fidelity, and qualitative participants understood the benefits of using a standardized assessment tool to make decisions. Lack of referrals was found to be related more closely to system-level barriers, than to problems with childcare providers' developmental assessment abilities.

The importance of early brain development makes it critical that we expand the number of professionals working with young children who can recognize children at risk for developmental delays and who can make appropriate referrals. The transactional model of development (Sameroff & Fiese, 2000) reminds us that it is particularly important to work with childcare providers on early identification and early intervention with children with developmental delays, since along with parents, childcare providers will be responsible for creating positive reciprocal interactions with children in their care

References

- ACGME. (2004). American Counsel on Graduate Medical Education policy proceedings. Retrieved July 2, 2007, from http://www.acgme.org/acWebsite/about/ab_ACGMEpolicyProceed07_05.pdf
- Allen, K., & Cowdery, G. (2005). *The exceptional child: Inclusion in early childhood education* (5th ed.). Clifton Park, NY: Thomson Delmar Learning.
- Allen, S. (2007). Assessing the development of young children in child care: A survey of formal assessment practices in one state. *Early Childhood Education Journal*, 34, 455-465.
- Als, H. (1997). Earliest intervention for preterm infants in the newborn intensive care unit. In M. Guralinick (Ed.), *The effectiveness of early intervention* (pp. 47-76). Baltimore: Brookes Publishing.
- Als, H., Lawhorn, G., Duffy, F., McAnulty, G., Gibes-Grossman, R., & Blickman, J. (1994). Individualized developmental care for the very low-birth-weight preterm infant. *Journal of American Medical Association*, 272, 853-859.
- American Academy of Pediatrics. (2006). Identifying infants and young children with developmental disorders in the medical home: An algorithm for developmental surveillance and screening. *Pediatrics*, 118, 405-456.
- American Academy of Pediatrics Committee on Children with Disabilities. (2001). Developmental surveillance and screening of infants and young children. *Pediatrics*, 108, 192-196.

- Anderson, L., Shinn, C., & Fullilove, M. (2003). The effectiveness of early childhood development programs. A systematic review. *American Journal of Preventative Medicine, 24*(3), 32-46.
- Arkes, H., & Hammond, K. (Eds.). (1986). *Judgment and decision making*. Cambridge: Cambridge University Press.
- Arnett, J. (1989). Caregivers in day-care centers: Does training matter? *Journal of Applied Developmental Psychology, 10*, 541-552.
- Azer, S., LeMoine, S., Morgan, G., Clifford, R., & Crawford, G. (2002). Regulation of child care [Electronic Version]. *Early childhood research & policy briefs, 2*, 1-6. Retrieved March 3, 2009 from www.ncedl.org.
- Bailey, A., Hebbeler, K., Scarborough, A., Spiker, D., & Mallik, S. (2004). First experiences with early intervention: A national perspective. *Pediatrics, 113*, 887-896.
- Bayley, N. (1969). *Bayley Scales of Infant Development*. San Antonio, TX: The Psychological Corporation.
- Barbouth, D., & Brosco, J. (2002). Screening, evaluation, and management of a child with developmental delay. *Pediatric Case Review, 2*(1), 33-45.
- Barnett, W., & Yarosz, D. (2007). Who goes to preschool and why does it matter? Retrieved November 30, 2007, from <http://www.nieer.org>
- Beckstead, J., & Stamp, K. (2007). Understanding how nurse practitioners estimate patients' risk for coronary heart disease: A judgment analysis. *Journal of Advanced Nursing, 60*, 436-446.

- Bellum, D. & Whitebrook, M. (2006) Roots of decline: How government policy has de-educated teachers of young children. Center for the study of child care employment. Berkeley, CA: Institute of Industrial Relations, University of California at Berkeley. Found in Burton et al. (2002) *Early Childhood Research & Practice [online]*, 4. Retrieved February 11, 2009, from <http://ecrp.uiuc.edu/v4n1/saluja.html>.
- Blair, C., & Ramey, C. (1997). Early intervention for low-birth-weight infants and the path to second-generation research. In M. Guralinick (Ed.). *The effectiveness of early intervention*. (pp. 77-98). Baltimore: Brookes Publishing.
- Bodnarchuk, J., & Eaton, W. (2004). Can parent reports be trusted? Validity of daily checklists of gross motor milestone attainment. *Journal of Applied Developmental Psychology*, 25, 481-490.
- Bogden, R., & Biklen, S. (1998). *Qualitative research for education: An introduction to theories and methods*. (3rd ed.). Boston: Allyn and Bacon.
- Boyle, C., Decoufle, P., & Yeargin-Allsopp, M. (1994). Prevalence and health impact of developmental disabilities in US children. *Pediatrics*, 93, 399-403.
- Brannen, A., Godfrey, L., & Goetter, W. (1989). Prediction of outcome from critical illness: A comparison of clinical judgment with a prediction rule. *Archives of Internal Medicine*, 149, 1083-1086.
- Branson. (2007). [Child care provider practices regarding screening, referral and inclusion of children with autism]. *Unpublished raw data*.

- Bredekamp, S., & Copple, C. (1997). *Developmentally appropriate practice in early childhood programs* (Revised ed.). Washington, DC: National Association for the Education of Young Children.
- Bricker, D., & Squires, J. (1999). *Ages and Stages Questionnaires: A parent-completed, child monitoring system*. Baltimore: Brookes Publishing.
- Bronfenbrenner, U. (1979). *The ecology of human development: Experiments by nature and design*. Cambridge: Harvard University Press.
- Bronfenbrenner, U., & Evans, G. (2000). Developmental science in the 21st century: Emerging questions, theoretical models, research designs and empirical findings. *Social Development, 9*, 119-125.
- Brooks-Gunn, J., Gross, J., Kraemer, H., Spiker, D., & Shapiro, S. (1992). Enhancing the cognitive outcomes of low birth weight, premature infants: For whom is early intervention most effective? *Pediatrics, 89*, 1209-1215.
- Brunswik, E. (1955). Representative design and probabilistic theory in a functional psychology. *Psychological Review, 62*, 193-217.
- Bryant, D., & Maxwell, K. (1997). The effectiveness of early intervention for disadvantaged children. In M. Guralinick (Ed.), *The effectiveness of early intervention*. (pp. 23-46), Baltimore: Brookes Publishing.
- Campbell, F., & Ramey, C. (1995). Cognitive and school outcomes for high-risk African-American students at middle adolescents: Positive effects of early intervention. *American Educational Research Journal 32*, 743-772.

- CDC. (2007). CDC releases new data on autism spectrum disorders (ASDs) from multiple communities in the United States. Retrieved February 8, from <http://www.cdc.gov/od/oc/media/pressrel/2007/r070208.htm>
- Cicchetti, D. (2002). The impact of social experience on neurobiological systems: Illustration from a constructivist view of child maltreatment. *Cognitive Development, 17*, 1407-1428.
- Cicchetti, D., & Stroufe, L. (2000). The past as a prologue to the future: The times they've been a-changing'. *Development & Psychopathology, 12*, 255-264.
- Coleman, M., Buysse, V., & Neitzel, J. (2006). Detecting warning signs in children at risk for learning disabilities. Retrieved March 17, 2009 from the Recognition and Response Web Site: http://www.recognitionandresponse.org/images/downloads/resources/randrsnaps_hot.pdf.
- Cooksey, R., Freebody, P., & Davidson, G. (1986). Social judgment theory: Teacher expectations concerning children's early reading potential. In H. Arkes & K. Hammond (Eds.), *Judgment and decision making* (pp. 523-546). Cambridge: Cambridge University Press.
- Cooksey, R. (1996). *Judgment analysis: Theory, methods, and applications*. San Diego: Academic Press.
- Cooksey, R., Freebody, P., & Wyatt-Smith, C. (2007). Assessment as judgment-in-context: Analyzing how teachers evaluate students' writing. *Educational Research and Evaluation, 13*, 401-434.

- Creswell, J. (2003). *Research design: Qualitative, quantitative, and mixed methods approaches* (2nd ed.). Thousand Oaks, CA: Sage.
- Creswell, J., & Plano Clark, V. (2007). *Designing and conducting mixed methods research*. Thousand Oaks, CA: Sage Publications, Inc.
- Dawson, G., Hessel, D., & Frey, K. (1994). Social influences on early developing biological and behavioral systems related to risk for affective disorder. *Development and Psychopathology, 6*, 759-779.
- Dawson, G., & Osterling, J. (1997). *Early intervention in autism*. Baltimore: Brookes Publishing.
- Dinnebeil, L., & Rule, S. (1994). Congruence between parents' and professionals' judgments about the development of young children with disabilities: A review of the literature. *Topics in Early Childhood Special Education, 14*, 1-25.
- Dosreis, S., Weiner, C., Johnson, L., & Newschaffer, C. (2006). Autism spectrum disorder screening and management practices among general pediatric providers. *Developmental and Behavioral Pediatrics, 27*(2), S88-S94.
- Dunst, C., & Clow, P. (2007). Public awareness and child find activities in Part C early intervention programs. [Electronic Version]. *Cornerstones, 3*, 1-7. Retrieved March 30 from http://tracecenter.info/cornerstones/cornerstones_vol3_no1.pdf.
- Dworkin, P. (1989). British and American recommendations for developmental monitoring: The role of surveillance. *Pediatrics, 84*, 1000-1010.
- Education for All Handicapped Children Act of 1975, P.L. 94-142, 20 U.S.C. 1400 *et seq.*

- Erenberg, A., Lemmons, J., Sia, C., Trunkel, D., & Ziring, P. (1999). Newborn and infant hearing loss: detection and intervention. *Pediatrics, 103*, 527-530.
- Essa, E. (2002). *Who cares for Nevada's children: A profile of the demographic, economic, and quality aspects of child care in Nevada.*: University of Nevada, Reno.
- Essa, E., Bennett, P., Burnham, M., Martin, S., Bingham, A., & Allred, K. (2008). Do variables associated with quality child care programs predict inclusion of children with disabilities? *Topics in Early Childhood Special Education, 28*, 171-180.
- Filipek, P., Accardo, P., Ashwal, S., Baranek, G., Cook, E., Dawson, G. (2000). Practice parameters: Screening and diagnosis of autism. *American Academy of Neurology and the Child Neurology Society, 55*, 468-479.
- Filipek, P., Accardo, P., Baranek, G., Cook, E., Dawson, G., Gordon, B., et al. (1999). The screening and diagnosis of autistic spectrum disorders. *Journal of Autism & Developmental Disorders, 29*, 439-484.
- Fine, M., & Mayer, R. (2006). Beyond referral: Pediatric care linkages to improve developmental health. Retrieved February 22, 2009 from www.commonwealthfund.org.
- Fombonne, E. (2005). Epidemiological studies of pervasive developmental disorders. In F. Volkmar, R. Paul, A. Klin & D. Cohen (Eds.), *Handbook of autism and pervasive developmental disorders. Volume One: Diagnosis, development, neurobiology, and behavior.* (Vol. 1, pp. 42-69). Hoboken: John Wiley & Sons, Inc.

- Fosnot, C. (1996). Constructivism: A psychological theory of learning. In C. Fosnot (Ed.), *Constructivism: Theory, perspectives, and practice* (pp. 8-33). New York: Teacher's College.
- Friedman, D. (2006). What science is telling us: How neurobiology and developmental psychology are changing the way policymakers and communities think about the developing child. *National Scientific Council on the Developing Child: Perspectives*. Retrieved March 7, 2007, from <http://www.developingchild.net>
- Fuerst, J., & Fuerst, D. (1993). Chicago experience with an early education program: The special case of the child parent center program. *Urban Education, 28*, 69-96.
- Gallaher, M., Christakis, D., & Connell, F. (2002). Health care use by children diagnosed as having a developmental delay. *Archives of Pediatrics and Adolescent Medicine, 156*, 246-251.
- Gay, L., Mills, G., & Airasian, P. (2006). *Educational research: Competencies for analysis and applications*. Upper Saddle River, NJ: Pearson Prentice Hall.
- Gilliam, W., & Mayes, L. (2004). Integrating clinical and psychometric approaches: Developmental assessment and infant mental health evaluation. In R. Delcarmen-Wiggins & A. Carter (Eds.), *Handbook of infant, toddler, and preschool mental health assessment* (pp. 185-203). New York: Oxford University Press.
- Gilliam, W., Meisels, S., & Mayes, L. (2005). Screening and surveillance in early intervention systems. In M. Guralinick (Ed.), *The Developmental systems approach to early intervention* (pp. 73-98). Baltimore: Brookes Publishing.
- Glascoc, F. (1997). Parents' concerns about children's development: prescreening technique or screening test? *Pediatrics, 99*, 830-837.

- Glascoc, F. (2005). Screening for developmental and behavioral problems. *Mental Retardation and Developmental Disabilities Research Reviews, 11*, 173-179.
- Goldberg-Hamblin, S., Singer, J., Singer, G., & Denney, M. (2007). Early intervention in neonatal nurseries: The promising practice of developmental care. *Infants & Young Children, 20*, 163-171.
- Greenough, W., Black, J., & Wallace, C. (1987). Experience and brain development. *Child Development, 58*, 539-559.
- Greenspan, S., & Wieder, S. (1997). Developmental patterns and outcomes in infants and children with disorders in relating and communicating: A chart review of 200 cases of children with autistic spectrum diagnosis. *Journal of Developmental and Learning Disorders, 1*, 87-141.
- Guba, E. (1981). Criteria of assessing the trustworthiness of naturalistic inquiries. *Educational Communication and Technology, 29*, 75-91.
- Guralnick, M. (2005). Inclusion as a core principle in the early intervention system. In M. Guralnick (Ed.), *The developmental systems approach to early intervention* (pp.59-72). Baltimore: Brookes Publishing.
- Guralnick, M. (1997). *The effectiveness of early intervention*. Baltimore: Brookes Publishing.
- Halfon, N., Regalado, M., Sareen, H., Inkelas, M., Peck Reuland, C. H., Glascoe, F. P., et al. (2004). Assessing Development in the Pediatric Office. *Pediatrics, 113*, 1926-1933.

- Hamilton, S. (2006). Screening for developmental delay: Reliable, easy-to-use-tools: Win-win solutions for children at risk and busy practitioners. *The Journal of Family Practice, 55*, 415-422.
- Hammond, K., Hursch, C., & Todd, F. (1964). Analyzing the components of clinical inference. *Psychological Review, 71*, 438-456.
- Hanson, M. (2003). Twenty-five years after early intervention: A follow-up of children with Down syndrome and their families. *Infants & Young Children, 16*, 354-365.
- Hanson, Creswell, J., Plano Clark, V., Petska, K., & Creswell, D. (2005). Mixed methods research designs in counseling psychology. *Journal of Counseling Psychology, 52*, 224-235.
- Hart, B., & Risley, T. (1995). *Meaningful differences in the everyday experiences of young American children*. Baltimore: Brookes Publishing.
- Hawley, T. (2000). Starting smart: How early experiences affect brain development. *Zero to Three* (2nd ed.). Retrieved March 10, 2007, from <http://www.zerotothree.org/site/DocServer/Startingsmart.pdf?docID=2422>
- Head-Start. (1996). *Head Start performance standards*. Retrieved. from <http://www.head-start.lane.or.us/administration/regulations/45CFR130x.index.html>.
- Hix-Small, H., Marks, K., Squires, J., & Nickel, R. (2007). Impact of implementing developmental screening at 12 and 24 months in a pediatric practice. *Pediatrics, 120*, 381-389.
- Honeycutt, A., Grosse, L., & Dunlap, L. (2003). Economic costs of mental retardation, cerebral palsy, hearing loss, and vision impairment. In B. Altman, S. Barnett, G.

- Hendershot & S. Larson (Eds.), *Using survey data to study disability: Results from the National Health Interview Survey on Disability* (Vol. 3, pp. 207-228). Amsterdam: Elsevier.
- Howes, C. (1997). Children's experiences in center-based child care as a function of teacher background and adult:child ratio. *Merrill-Palmer Quarterly*, *43*, 404-425.
- Howes, C., Whitebrook, M., & Phillips, D. (1992). Teacher characteristics and effective teaching in child care: Findings from the National Child Care Staffing Study. *Child & Youth Care Forum*, *21*, 399-414.
- Huttenlocher, P., & Dabholkar, A. (1997). Regional differences in synaptogenesis in human cerebral cortex. *The Journal of Comparative Neurology*, *387*, 167-178.
- Hyson, M., & Biggar, H. (2006). NAEYC's standards for early childhood professional preparation: Getting there from here. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical issues in early childhood professional development* (pp. 283-308). Baltimore: Brookes Publishing.
- Individuals with Disabilities with Disabilities Education Act (IDEA) Amendments of 1997, PL 105-17, 20 U.S.C. §§ 1400 *et seq.*
- Individuals with Disabilities Education Improvement Act (IDEA) of 2004, PL 108-446, 20 U.S.C. §§ 1400 *et seq.*
- Iovannone, R., Dunlap, G., Huber, H., & Kinkaid, D. (2003). Effective educational practices for students with autism spectrum disorders. *Focus on Autism and Other Developmental Disabilities*, *18*, 150-165.
- Itard, J. (1962) *The wild boy of Aveyron*. New York: Appleton-Century-Croft.

- Johnson, C., Myers, S., & Council on Children with Disabilities. (2007). Identification and evaluation of children with autism spectrum disorders. *Pediatrics*, *120*, 1183-1215.
- Kaiser, A. P., Hester, P. P., & McDuffie, A. S. (2001). Supporting communication in young children with developmental disabilities. *Mental Retardation & Developmental Disabilities Research Reviews*, *7*, 143-150.
- Kneader, J., Ferguson, D., & Lawrence, S. (2005) *Impact of training and education for caregivers of infants and toddlers*. Retrieved January 30, 2009, from http://www.childcareresearch.org/researchtopolicyconnections_3.pdf.
- Knobloch, H., Stevens, F., & Malone, A. (1980). *Manual of developmental diagnosis: The administration and interpretation of the Revised Gesell and Amatruda Developmental and Neurological Examination*. New York: Harper & Row.
- Knudsen, E. (2004). Sensitive periods in the development of the brain and behavior. *Journal of Cognitive Neuroscience*, *16*, 1412-1425.
- Koegel, L., Koegel, R., Harrower, J., & Carter, C. (1999). Pivotal response intervention I: Overview of approach. *Journal of the Association for the Severely Handicapped*, *24*, 186-198.
- Kuhl, P., Williams, K., Lacerda, F., Stevens, K., & Lindblom, B. (1992). Linguistic experience alters phonetic perception in infants by 6 months of age. *Science*, *255*, 606-608.
- Larner, M., Behrman, R., Young, M., & Reich, K. (2001). Caring for infants and toddlers: Analysis and recommendations. *The Future of Children*, *11*, 7-19.

- Lavigne, J., Binns, H., & Christoffel, K. (1993). Behavioral and emotional problems among preschool children in pediatric care: Prevalence and pediatricians' recognition. *Pediatrics*, 649-655.
- LeMoine, S. (2005). Center child care licensing regulations: Child:staff ratios and maximum group size requirements. Retrieved September 12, 2007 from <http://nccic.org/pubs/cclicensingreg/ratios/html>.
- Lord, C., & Luyster, R. (2005). Early diagnosis and screening of autism spectrum disorders. [Electronic Version]. *Medscape Psychiatry & Mental Health*, 10, 1-6. Retrieved April 6, 2006 from <http://www.medscape.com/viewarticle/518834>.
- Lovaas, O. (1987). Behavioral treatment and normal educational and intellectual functioning in young autistic children. *Journal of Autism and Developmental Disorders*, 55, 3-9.
- Mahoney, G. P., F. (2003). Using relationship-focused intervention to enhance the social-emotional functioning of young children with autism spectrum disorders. *Topics in Early Childhood Special Education*, 23, 77-89.
- McCarthy, D. (1972). *McCarthy Scales of Children's Abilities*. San Antonio, TX: The Psychological Corporation.
- McCormick, M., Brooks-Gunn, J., Buka, S., Goldman, J., & Salganik, M. (2006). Infant health and development programs at 18 years of age. *Pediatrics*, 117, 771-786.
- McGee, G., Morrier, M., & Daly, T. (1999). An incidental teaching approach to early intervention for toddlers with autism. *Journal of the Association for the Severely Handicapped*, 24, 133-146.

- McLean, M., & Synder-McLean, L. (1978). *A transactional approach to early language training*. Columbus, OH: Charles E. Merrill.
- Merrick, J., & Carmeli, E. (2004). A review on the prevalence of disabilities in children [Electronic Version]. *Journal of Pediatrics and Neonatology*, 4, 1-10. Retrieved February 18, 2009.
- Mertler, C., & Vannatta, R. (2005). *Advanced and multivariate statistical methods: Practical application and interpretation* (3rd ed.). Glendale, CA: Pyrczak Publishing.
- Miller, M., Mutton, C., & Williams, B. (1993). Collaborative experiences for NICU and early childhood education personnel. *Neonatal Network*, 12(7), 37-42.
- Mullen, E. (1995). *Mullen Scales of Early Learning*. Circle Pines, MN: American Guidance Service.
- Mulvihill, B., Shearer, D., & Van Horn, M. (2002). Training, experience, and child care providers' perception of inclusion. *Early Childhood Research Quarterly*, 17, 197 - 215.
- National Center for Education Statistics. (2001). *National Household Education Survey: Early childhood program participation*. Washington, D.C.: Institute of Education Sciences, U.S. Department of Education.
- National Research Council. (2002). *Scientific research in education*. Washington D.C.: National Academy Press.
- National Scientific Council on the Developing Child. (2007). The timing and quality of early experiences combine to shape brain architecture: Working paper #5. Retrieved February 1, 2008, from <http://www.developingchild.net>

- Navon, M., Nelson, D., Pagano, M., & Murphy, M. (2001). Use of the Pediatric Symptom Checklist in strategies to improve preventative behavioral health care. *Psychiatric Services, 52*, 788-804.
- NAEYC. (2003). Early childhood curriculum, assessment, and program evaluation: Building an effective, accountable system in programs for children birth through age 8. [Electronic Version]. *Position statement* from <http://www.naeyc.org/about/positions/pdf/CAPEexpand.pdf>.
- Nelson, C. (2000). Neural plasticity and human development: The role of early experience in sculpting memory. *Developmental Science, 3*(2), 115-136.
- Nevada Division of Welfare (2009) *Early Care and Education Office update*. Retrieved March 17, 2009, from http://dwss.nv.gov/index.php?option=com_content&do_pdf.
- Newborg, J., Stock, J., Guidubaldi, J., & Svinicki, J. (1984). *Battelle Developmental Inventory*. Chicago: Riverside.
- Newport, E., Bavelier, D., & Neville, H. (2001). *Critical thinking about critical periods: Perspectives on a critical period for language acquisition*. Cambridge, MA: MIT Press.
- Nichol, P. (2006). Using the Ages and Stages Questionnaire to teach medical students developmental assessment: A descriptive analysis [Electronic Version]. *Biomedical Central, 6*, 1-8. Retrieved February 25, 2009.
- Odom, S., & Wolery, M. (2003). A unified theory of practices in early intervention/early childhood special education: Evidence-based practices. *The Journal of Special Education, 37*(3), 164-173.

- Onwuegbuzie, A., & Teddlie, C. (2003). *A framework for analyzing data in mixed methods research*. Thousand Oaks, CA: Sage.
- Pianta, R. C., & Cox, M. (1999). *Introduction: An ecological approach to kindergarten transition*. Baltimore: Brookes Publishing.
- Pinto-Martin, J., Dunkle, M., Earls, M., Fliedner, D., & Landes, C. (2005). Developmental stages of developmental screening: Steps to implementation of a successful program. *American Journal of Public Health, 95*(11).
- Raikes, H., Torquati, J., Hegland, S., Raikes, H., Scott, J., Messner, L., et al. (2006). Studying the culture of quality early education and care: A cumulative approach to measuring characteristics of the workforce and relations to quality of four Midwestern states. In M. Zaslow & I. Martinez-Beck (Eds.), *Critical issues in early childhood professional development*. Baltimore: Brookes Publishing.
- Ramey, C., & Ramey, S. (1998). Early intervention and early experience. *American Psychologist, 53*, 109-120.
- Rassafiani, M., Ziviani, J., & Rodger, S. (2008). Perceived level of disability: Factors influencing therapists' judgment for clients with cerebral palsy. *Hong Kong Journal of Occupational Therapy, 18*, 12-19.
- Rauh, V., Achenbach, T., Nurcombe, B., Howell, C., & Teti, D. (1988). Minimizing adverse effects of low birth weight: Four-year results of an early intervention program. *Child Development, 59*, 544-553.
- Robinson, C., & Rosenberg, S. (2004). Child welfare referrals to Part C. *Journal of Early Intervention, 26*, 284-291.

- Roizen, N. (1997). Down syndrome. In M. Batshaw (Ed.), *Children with disabilities* (4th ed., pp. 361-376). Baltimore: Brookes Publishing.
- Rosenthal, J., Hanlon, C., & Hess, C. (2008). *The role of state health policy in multi-sector system and service linkage for young children*. Washington, D.C.: The National Academy for State Health Policy.
- Rutter, M., Andersen-Wood, L., Beckett, C., Berendenkamp, D., Castle, J., Groothues, C., et al. (1999). Quasi-autistic patterns following severe early global privation. *Journal of Child Psychology and Psychiatry*, *40*, 537-549.
- Rydz, D., Shevell, M., Majnemer, A., & Oskoui, M. (2005). Developmental screening. *Journal of Child Neurology*, *20*, 4-21.
- Sameroff, A., & Chandler, M. (1975). Reproductive risk and the continuum of caretaking casualty. In F. Horowitz, M. Hetherington, S. Scarr-Salapatek & G. Siegel (Eds.), *Review of child development research* (Vol. 4, pp. 187-244). Chicago: University of Chicago Press.
- Sameroff, A. & Fiese, B. (1990). Transactional regulation and early intervention. In J. Shonkoff & S. Meisels (Eds.) *Handbook of early childhood intervention* (pp.119-149). New York: Cambridge University Press.
- Sameroff, A., & Fiese, B. (2000). Transactional regulation: The developmental ecology of early intervention. In J. Shonkoff & S. Meisels (Eds.), *Handbook of early childhood intervention* (2nd ed., pp. 135-159). Cambridge: Cambridge University Press.

- Sand, N., Silverstein, M., Glascoe, F., Tonniges, T., Gupta, B., & O'Connor, K. (2005). Pediatricians' reported practices regarding developmental screening: Do guidelines work? Do they help? *Pediatrics*, *116*, 174-179.
- Saxon, T., Colombo, J., Robinson, E., & Frick, J. (2000). Dyadic interaction profiles in infancy and preschool intelligence. *Journal of School Psychology*, *38*, 9-25.
- Scarborough, A., Spiker, D., Mallik, S., Hebbeler, K., Bailey, D., & Simeonsson, R. (2004). A national look at children and families entering early intervention. *Exceptional Children*, *70*, 469-483.
- Schweinhart, L., Berrueta-Clement, J., Barnett, W., Epstein, A., & Weikart, D. (1985). Effects of the Perry Preschool Program on youths through age 19: A summary. *Topics in Early Childhood Special Education*, *5*, 26-35.
- Sharp, L., Pantell, R., Murphy, L., & Lewis, C. (1992). Psychosocial problems during child health supervision visits: Eliciting, then what? *Pediatrics*, *89*, 619-623.
- Shonkoff, J., & Hauser-Cram, P. (1987). Early intervention for disabled infants and their families: A quantitative analysis. *Pediatrics*, *80*, 650-658.
- Shonkoff, J., & Phillips, D. (2000). *From neurons to neighborhoods: The science of early childhood development*. Washington, D.C.: National Academy Press.
- Sices, L. (2007). *Developmental screening in primary care: The effectiveness of current practice and recommendations for improvement*. Boston: The Commonwealth Fund.
- Sices, L., Feudtner, C., & McLaughlin, J. (2003). How do primary care physicians identify young children with developmental delays? *Journal of Developmental and Behavioral Pediatrics*, *24*, 409-417.

- SpecialQuest. (2009). About SpecialQuest Birth - Five. Retrieved March 2, 2009, from <http://www.specialquest.org/about.html>
- Squires, J., Nickel, R., & Eisert, D. (1996). Early detection of developmental problems: Strategies for monitoring young children in the practice setting. *Journal of Developmental and Behavioral Pediatrics, 17*, 420-427.
- Squires, J., Potter, L., & Bricker, D. (1999). *ASQ user's guide*. Baltimore: Brookes Publishing.
- Squires, J., Potter, L., Bricker, D., & Lamorey, S. (1998). Parent-completed developmental questionnaires: Effectiveness with low and middle income parents. *Early Childhood Research Quarterly, 13*, 534-554.
- State of Nevada. (2009). *Child care proposed regulation changes*. Retrieved March 29, 2009 from http://www.dcf.state.nv.us/DCFS_childcare_proregdocs.htm.
- Stebbins, H., & Knitzer, J. (2007). *State early childhood policies: Improving the odds*: National Center for Children Living in Poverty.
- Stern, D. (1985). *The interpersonal world of the infant*. New York, New York: Basic Books.
- Strain, P., McConnell, S., Carta, J., Fowler, S., Neisworth, J., & Wolery, M. (1992). Behaviorism in early intervention. *Topics in Early Childhood Special Education, 12*, 121-142.
- Tashakkori, A., & Teddlie, C. (1998). *Mixed-methodology: Combining qualitative and quantitative approaches*. Thousand Oaks, CA: Sage.

- Thompson, C., Foster, A., Cole, I. & Dowding, D. (2005). Using social judgment theory to model nurses' use of clinical information in critical care education. *Nurse Education Today*, 25, 68-77.
- Thorndike, R., Hagen, E., & Sarttler, J. (1985). *Stanford-Binet Intelligence Scale* (4th ed.). Chicago: Riverside.
- USGAO. (2001). *Medicaid: Stronger efforts needed to ensure children's access to health screening services*. Washington, DC: U.S. General Accounting Office.
- VanDerHeyden, A., & Synder, P. (2006). Integrating frameworks from early childhood intervention and school psychology to accelerate growth for all young children. *School Psychology Review*, 35, 519-534.
- Warren, S., Beredin-Oja, S., Fairchild, M., Finestack, L., Fey, M., & Brady, N. (2006). Responsivity education/prelinguistic milieu teaching. In R. McCauley & M. Fey (Eds.), *Treatment of language disorders in children* (pp.47-76). Baltimore: Brookes Publishing.
- Wetherby, A., Prizant, B., & Schuler, A. (2000). Understanding the nature of the communication and language impairments. In A. Wetherby & B. Prizant (Eds.), *Autism spectrum disorders: A transactional developmental perspective* (pp. 109-141). Baltimore: Brookes Publishing
- Whitebrook, M., Sakai, L., Gerber, E., & Howes, C. (2001). *Then & now: Changes in child care staffing. 1994-2000*. Washington, D.C.: Center for Child Care Workforce.

- Williams, J., Klinepeter, K., Palmes, G., Pulley, A., & Foy, J. (2004). Diagnosis and treatment of behavioral health disorders in pediatric practice. *Pediatrics, 114*, 601-606.
- Yoder, P., Davies, B., & Bishop, K. (1994). Reciprocal sequential relations in conversations between parents and children with developmental delays. *Journal of Early Intervention, 18*, 362-379.
- Yoder, P., & McDuffie, A. (2006). Treatment of responding to and initiating joint attention. In T. Charman & W. Stone (Eds.), *Social and communication development in autism spectrum disorders: Early identification, diagnosis & intervention* (pp. 117-143). New York: The Guildford Press.
- Yoder, P., & Warren, S. (1998). Maternal responsivity predicts the prelinguistic communication intervention that facilitates generalized intentional communication. *Journal of Speech, Language & Hearing Research, 41*, 1207-1219.
- Yoshinaga-Itano, C. (2003). Early intervention after universal neonatal hearing screening: Impact on outcomes. *Mental Retardation & Developmental Disabilities Research Reviews, 9*, 252-266.
- Yoshinaga-Itano, C., Coulter, D., & Thomson, V. (2000). The Colorado Newborn Hearing Screening Project: Effects on speech and language development for children with hearing loss. *Journal of Perinatology, 20*, S132-S137.

Appendix A

Permission to use Childcare Center as a Performance Site

UNR Office of Human Research Protection

UNR OHRP 205 Ross Hall/331

University of Nevada, Reno

Reno, Nevada 89557

To whom it may concern,

I am writing this letter to verify that Ann Bingham, principal researcher and Diane Branson, co-investigator have my permission to conduct the study entitled: *Effect of Using the Ages and Stages Questionnaires on Childcare Providers' Developmental Assessment Ability* at _____ childcare center from today's date for a period of two years. I understand that permission may be terminated in writing at any time.

Sincerely,

Childcare Center Director

Appendix B

Childcare Provider Information Form

1. ID#:

2. Current Place of Employment: _____

3. Age of the children in your care: Infants Toddlers Preschool

4. Your age: _____

5. Years in the field: _____

6. Highest level of education: High school only some college AA or CDA
degree BA degree MA degree

7. Have you participated in any of the following Office of Early Care and Education programs? Apprenticeship program TEACH Nevada Registry

8. Gender: Female Male

9. Ethnicity (please choose one):

Hispanic Native American or Alaskan Native Asian
 Black White Pacific Islander Multi-racial
Specify _____

Appendix D

Childcare Provider Developmental Impression Form

Childcare Provider Information

Childcare Provider ID#:

Childcare center: _____

Child's Developmental Status

Child's ID#: _____

Child's chronological age: _____

1. How would you rate this child's development as compared to other children the same age?

No concern Of concern

2. If you rated this child's development as *of concern*, what developmental area(s) are of concern? Check as many as apply.

Gross Motor Fine Motor Communication Problem-solving Personal-social

3. Would you recommend that this child be referred to Nevada Early Intervention Services for further evaluation?

Yes No

Appendix E

Semi-Structured Interview Questions

1. How do you identify children who are not developing the same as other children in your class?

(Probing questions might include: Do you use a formal developmental screening instrument?)

2. Tell me about a time when you were concerned about a child's development.

(Probing questions might include: How old was the child? What was different about this child that caused your concern? Who did you talk to about your concern?)

3. What typically happens when you are concerned about a child's development?

(Probing questions might include: Tell me about the policies and procedures in place at your childcare center regarding referring children for developmental assessment.)

4. How do you talk to a child's parent when you are concerned about a child's development?

(Probing questions might include: When do you talk to the child's parents? Do you schedule a parent-caregiver conference?)

5. What could be done to help you identify children who might have delayed development?

(Probing questions might include: What kind of training would help you identify children with developmental delays? Are there any resources that you need to help you identify children?)

Appendix F

Study Information Letter

Dear Parents,

Researchers at the University of Nevada, Reno are conducting a study examining the effects of childcare providers' use of the Ages and Stages Questionnaire on their ability to assess children's developmental skills. Your child's childcare provider has agreed to participate in this study, but each parent will be given the opportunity to give permission for their child's participation in the study.

Participation in the Study

If you choose to participate you will be given a research packet which includes consent to participate form, a copy of the Ages and Stages Questionnaire appropriate for your child, and a parent and child information form.

Risks

Participation in this study poses little risk to participants. No personal identifying information will be collected.

Benefits

Participating in this study will give you information about your child's developmental skills.

Confidentiality

Your identity and your child's identity will be protected to the full extent of the law. You will not be personally identified in any reports or publications that result from this study.

Questions

If you have any questions, please contact Diane Branson, M.A., at 775-772-3557 or Ann Bingham, PhD at 775- 682-7863.

If you choose to participate in this study, please complete the family information form, sign the consent form and return both to your child's childcare provider.

Appendix G

Training Protocol

Using the Ages and Stages Questionnaires In Community Childcare Settings



Agenda

<u>Topic</u>	<u>Estimated Time</u>
Purpose of developmental screening	10 minutes
Introduction to the Ages and Stages Questionnaires (ASQ)	10 minutes
ASQ video	10 minutes
Using the ASQ in childcare settings	15 minutes
Study procedures/following the research Protocol	10 minutes
Questions and wrap-up	5 minutes

Appendix H

Fidelity of Training Measure

Directions: Observe the one hour training session and rate each of the training components listed below on a 3-point scale:

3= Excellent, 2=Adequate, 1=Needs improvement

Training component	Rating
1. Rationale for conducting developmental screening in childcare settings.	
2. Description of study procedures.	
3. Description of ASQ administration.	
4. Trainer's response to participant questions.	
5. Trainer's evaluation of participant understanding of study procedures.	
6. Trainer's evaluation of participant understanding of ASQ administration.	
Comments:	

Training location

Observer

Appendix I

Ages & Stages Training Evaluation Form

Childcare Center:**Date of Training:****Directions:**

The rating scale below is being used to ensure that the training provided through this research study prepares childcare providers to follow the research protocol accurately and to administer the Ages & Stages Questionnaires correctly. Statements 1 – 6 relate to the how well the training met your expectations. Rate the following statements according to the degree with which you agree with the statement by placing an X in the corresponding box:

1-*Strongly Agree*, 2- *Somewhat Agree*, 3- *Agree*, 4- *Disagree*, 5-*Strongly Disagree* 6-*No Opinion*



Statement:	1	2	3	4	5	6
	☺				☹	
1. Overall, the trainer was effective.						
2. The trainer was knowledgeable about the topic.						
3. The trainer was able to answer the questions from the participants satisfactorily.						
4. The training provided opportunities for discussion and interaction.						
5. I have gained new resources and materials about this topic from this training that I can use.						
6. This training added to my knowledge about the topic.						

Help us rate your understanding of the ASQ study procedures by answering either True or False to the following statements:

Statement:	True	False
1. I can complete the ASQ on all children in my class, even if I don't have parent permission.		
2. It doesn't matter which order I do the ASQ and the Childcare Provider Developmental Inventory (CPDI).		
3. I should have the child try a particular skill if I haven't ever seen the child do it before.		
4. I can do all of the scoring myself and tell each child's parents about the results before the study is over.		