LEVELS OF STRESS AS REPORTED BY PARENTS AND ITS RELATIONSHIP TO THEIR CHILD'S COGNITIVE ABILITIES

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DEDICATION

To my family,
thank you for all your
love and encouragement.

To my husband, Loren,
thank you for your support.

To my three beautiful children,
Cannon, Brandon, and Kristen,
thank you for your inspiration and motivation.

Together we learned from this journey
and now together we celebrate
this milestone.

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ABSTRACT

CHRISTINE WOODBURY

LEVELS OF STRESS AS REPORTED BY PARENTS AND ITS RELATIONSHIP TO THEIR CHILD'S COGNITIVE ABILITIES

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The purpose of this study was to examine if any relationship exists between *Parenting Stress Index* factors and child's cognitive abilities (Cattell-Horn-Carroll Theory of general intelligence). The participant population consisted of 16 mothers and 16 children. The cognitive abilities were measured by using one of the following measures: (1) *Kauffman Assessment Battery for Children –Second Edition,* KABC-II, (Kaufman & Kaufman, 2004), (2) *Wechsler Intelligence Scale for Children,* WISC-IV, (Wechsler 2003), and/or (3) *Woodcock Johnson III Test of Cognitive Abilities,* WJ III COG, (Woodcock, McGrew, & Mather, 2001). The results from the *Parenting Stress Index,* (Abidin, 1995) factors had both positive and negative influences on cognitive processes. The results indicated negative effects of distractibility, demandingness, and mood on long term retrieval, processing speed, auditory processing, and fluid intelligence. Conversely, distractibility, adaptability, and demandingness seemed to improve the cognitive processes of auditory processing, crystallized intelligence, and short term memory. Thus, distractibility and demandingness had both positive and negative influences on the cognitive processes.

Keywords: PSI, CHC Theory, parenting stress factors, cognitive abilities, and children temperaments

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CHAPTER I

INTRODUCTION

To meet the needs of every child, educators could use a holistic approach to evaluate the child. A close examination of the "whole child" will give better insight into a child's strengths and weaknesses. By examining a child from a bioecological systems approach, the delivery of comprehensive school services can be attained (Bronfenbrenner, 1986). Since children's development is affected by social systems in which families participate, educators need to be aware of the relationships among systems as they affect the child. During the evaluation process when children are removed from the environment (home) in which they live and viewed exclusively in another setting (school), which is, at best, a fragmented part of their experience and devoid of people, things, and other influences central to their lives, only a partial picture is gained (Berliner, 2009).

A bioecological systems approach incorporates important characteristics of the family, school, and community in determining a child's interaction within the total system (Bronfenbrenner, 1979, 1986, 1994, 2005; Bronfenbrenner & Evans, 2000). Federal laws such as *No Child Left Behind* (NCLB, 2001) and *Individuals with Disabilities Education Improvement Act* (IDEIA, 2004) have mandated that school systems involve parents directly in an individualized educational program which would best meet the needs of their child (Wright & Wright, 2009; Individuals with Disability

Education Improvement Act, 2004; & No Child Left Behind Act, 2001). By considering the relationship of the child to both home and school, a more holistic view of the child is gained, allowing educators a more accurate evaluation of the child.

Statement of the Problem

"Stressed" is the answer one usually receives when asked by an adult: *How are you?*. When these adults are parents, the stress they manage may impact their children. What are the implications of this parental stress for their children and their children's ability to learn? Abidin (1990, 1995) defined parenting stress as the relative magnitude of stress in the parent-child system. Bell and Chapman (1986) reported that children and parents reciprocally influence each other in such a way that child development may be affected by parental behavior, which is subject to child effects on parents. Parenting stress in the form of depression may be disruptive to families and the potential risks for negative child outcomes have been documented (Ahern, 2003; Webster-Stratton & Hammond, 1988). Bendell, Stone, Field, and Goldstein (1989) reported a circular relationship between family stress and negative child outcomes. These authors reported that children's spelling achievement, self esteem, and conduct were significantly and adversely affected by parenting stress. Similarly, impaired academic achievement, dysfunctional interactions, and child behavior problems have been identified as correlates of parenting stress (Bramlett, Rowell, & Mandenberg, 2000). Furthermore, the home environment, including physical surroundings and parent-child interactions, is thought to

substantially contribute to cognitive functioning and performance of children (Ashbury, Wachs, & Plomin, 2005).

While parenting stress and child achievement have been identified as correlates of school performance, the relative importance of assessing parenting stress for predicting later school success need closer examination (Crinc, Gaze, & Hoffman, 2005). For example, does the knowledge of the stress that parents have help identify which children are more likely to be at-risk for school performance? Furthermore, how can this information be used to assist educators in developing early interventions? Does parenting stress negatively or positively affect the seven cognitive processes identified in the Cattell-Horn-Carroll (CHC) Theory? Educators are interested in identifying the key predictors of school success; therefore, it is essential to examine family variables that affect important child outcomes.

World Book Dictionary (1991) defined stress as internal forces interacting within a person caused by external forces. Kinman and Jones (2005) indicated that stress can be described in several ways. These authors defined stress as "a stimulus from the environment, as a response to environmental stimuli, and as a stimulus-response relationship. Stress is an imbalance between appraisals of environmental demands and individual resources" (Kinman & Jones, 2005, p. 102).

Bronfenbrenner's (1979, 1986, 1994, 2005) Bioecological Systems Theory serves as a framework for examining and hypothesizing about the effects of parenting stress by depicting several variables that influence developmental processes, cognitions, and

behaviors. This theory suggests that persons develop and are embedded in an ecological context of multiple systems (microsystem, mesosystem, exosystem, macrosystem and chronosystem), each of which influences the person. Therefore, characteristics of the child, parent, and environment predict and moderate the magnitude of parenting stress, how the stress is perceived and projected, and how children adapt to and are affected by parenting stress.

The multiple environmental systems of microsystem, mesosystem, exosystem, macrosystem, and chronosystem as developed by Bronfenbrenner (1979, 1986, 2005) are summarized below: The microsystem is the interrelations within immediate settings. This involves people or objects a person interacts with on a face-to-face basis. The mesosystem consists of the social networks or informal structures, such as family, peer groups and friends. These social networks operate in different settings and are not independent of each other. These informal structures may be limited by sex, age, ethnicity, or socioeconomic status and may cut across all settings. The mesosystem can affect a child's progress in school and vice versa. The exosystem involves environments in which children seldom enter and do not spend their time; rather these are settings where parents spend time such as at work. These environments are external to the developing person. The macrosystem is the interconnected systems of microsystem, mesosystem, and exosystem linking between settings. The chronosystem focuses on life transitions. These changes happen over time and not only within the person, but also in the environment. Two types of transitions include normative, such as school entry and

puberty, and nonnormative, such as death or divorce. These transitions occur throughout the life span and often serve as a direct influence on developmental change (Bronfenbrenner, 1996). Thus, looking at a child and his or her achievement from an ecological system standpoint puts emphasis on reciprocal interactions.

Bandura 's (1978) Social Learning Theory supports the principle of the Bioecological Theory and supports a theoretical basis for it. According to Bandura, human behavior results from the reciprocal interaction between environmental circumstances and personality traits. Consequently, "behavior, internal personal factors, and environmental influences all operate as interlocking determinants of each other" (Bandura, 1978, p. 346). The child and the parent bring dispositions into interactions that are reciprocal in nature and may impact cognitive development. The relationship between parent and child characteristics is important in understanding the impact on children's cognitive abilities.

According to Bandura (1978, p. 344), "The environment thus becomes an autonomous force that automatically shapes, orchestrates, and controls behavior." From his viewpoint, the history of the environment in which a child is reared in terms of his or her experiences in that environment are extremely important in fashioning the way he or she will be able to think, behave, and interact (Bandura, 1978). These experiences are exhibited throughout a person's life. Given this information, children who live in stressful environments may be at-risk for academic under performance. However, limited attention has been directed towards the assessment of the family.

Purpose of the Study

The purpose of this study is to examine the relationship between the parent's ability to cope with stress in the parent-child relationship and their child's cognitive functioning. The relationship will be measured using the *Parenting Stress Index, 3rd edition* (PSI) Child Domain and selected subscales from *Kaufman Assessment Battery for Children* (KABC), *Wechsler Intelligence Scale for Children* (WISC-IV), and *Woodcock Johnson III Test of Cognitive Abilities* (WJ III COG) based on the Cattell-Horn-Carroll Model. There is a paucity of research that directly examines the relationship between parental stress and children's cognitive abilities, and contribution to parenting stress. In general, limited research has shown that positive parent-child relationships are related to positive academic outcomes for children (Christenson, Rounds, & Garney, 1992). Furthermore, these authors stated "Parental discipline characterized by setting clear standards enforcing rules, and encouraging discussion, negotiation, and independence is associated with positive academic outcomes" (Christenson, Rounds, and Garney, 1992, p. 190). Conversely, family stress, particularly parenting stress, may negatively affect academic functioning. For example, children who have experienced marital dissolution tend to have behavioral and academic achievement problems (Allison & Furstenberg, 1989). Furthermore, parenting stress may be related to other educational outcomes such as school readiness (Bramlett, Rowell, & Mandenberg, 2000).

Specifically, this study proposes to investigate if parenting stress characteristics are related to the cognitive abilities of their children. The knowledge of an association

between these factors may significantly help design appropriate intervention responses for successful academic learning. There is evidence that biological contributors, such as, child temperaments influence child behavior, and the task of researchers is to determine how child-person orientation affects adult-child and parent-child interaction (Bell & Chapman, 1986).

Significance of the Study

To achieve the objectives of the "whole child" philosophy and to align with IDEIA (2004), which supports the assessment of both family and child variables in determining children's special needs, a bioecological view of the child needs to be examined. This federal guideline mandates parent involvement in all aspects of the evaluation process (Wright & Wright, 2009; Individuals with Disability Education Improvement Act, 2004). A multidisciplinary team evaluation which includes parent involvement is appropriate.

The family has the first important influence on children (Calkins, Hungerford, & Dedmon, 2004). When parents rate themselves as high on stress, as self-reported on the PSI, this could indicate a relationship between perceived parent stress and a child's academic difficulties. This research could help educators identify a relationship between the specific areas of cognitive difficulties a child experiences from parenting stress. Christenson, Rounds, and Garney (1992) has suggested that the more family involvement in their child's education yields better results in school. Results of the Christenson, Rounds and Garney study revealed that some children clearly have a better opportunity to

learn when their total learning environment at home and school is favorable. The match between home and school is identified as a critical factor for children's academic success (Downey, vonHippel, & Broh, 2004). There is a need to focus on the significance of the parent child relation, not just for infants and toddlers, but throughout the school years. Educators as a whole have been slow to recognize their responsibilities for the total well being of the child. They have isolated the child and his or her mental capacities and then wondered why the student did not learn (Alexander, Entwisle, & Olson, 2001).

This current study may serve to illuminate the reciprocal relationships that exist between children and their parents, and the impact of parenting stress on cognitive processes. Due to NCLB's (2001) accountability requirements, there is a need to determine and concentrate on the family characteristics such as stress that are related to acquisition of academic achievement (Downey, von Hippel, & Broh, 2004). Through an integration of Bioecological Theory, Bronfennbrenner (2005) and Social Learning Theory, Bandura (1978), and examining parenting stress and children's cognitive abilities, it may be possible to become more cognizant of the extent of the reciprocal relationships that exist between cognitive abilities and parenting stress. When the relationships between the parenting stress and the child's cognitive abilities are predictive of negative school performance, then intervention programs could become a priority for educators.

The goal of NCLB and IDEIA is to make all educators accountable for all children to learn and make progress (Wright & Wright, 2009; Individuals with

Disabilities Education Improvement Act, 2004; & No Child Left Behind Act 2001). The data from this study could assist educators' identify and at-risk students with better understanding of their strengths and weaknesses. The use of appropriate interventions would lead a child to making progress and achieving in school. The effect of the home environment on student learning can no longer be ignored in assessment and intervention practices in the field of education.

Definition of Terms

Parent's perception of the child's contribution to stress according to the *Parent Stress Index*-Child Domain (Abidin, 1995):

- Adaptability (AD): "...child inability to adjust to changes in his or her physical or social environment" (p. 8).
- Demandingness (DE): "... parent experiences the child as placing many demands upon him or her" (p. 8).
- Mood (MO): "Children are unhappy and depressed, frequently cry, and do not display signs of happiness" (p. 9).
- Distractibility (DI): " The behavioral symptoms are overactivity, restlessness, distractibility, short attention span, does not seem to listen, fails to finish things he or she starts, and difficulty concentrating on homework assignments" (p. 8).

Cattell-Horn-Carroll (CHC) Theory (Flanagan, Ortiz, & Alfonso, 2007) empirically supported model of cognitive abilities.

- Fluid Intelligence (*Gf*): "...mental operations may include forming and recognizing

concepts, perceiving relationships among patterns, drawing inferences, comprehending implications, problem solving, extrapolating, and recognizing or transforming information" (p. 279).

- Crystallized Intelligence (*Gc*): "...breadth and depth of a person's acquired knowledge of a culture and the effective application of this knowledge" (p. 280).
- Short Term Memory (*Gsm*): "...ability to apprehend and hold information in immediate awareness and then use it within a few seconds" (p. 284).
- Long Term Storage and Retrieval (*Glr*): "...ability to store information in and fluently retrieve new or previously acquired information" (p. 289).
- Visual Processing (*Gv*): "...ability to perceive, analyze, synthesize, store, retrieve, manipulate, transform, and think with visual patterns and stimuli" (p. 286).
- Auditory Processing (*Ga*): "...ability to perceive, analyze, and synthesize patterns among auditory stimuli, and to discriminate subtle nuances in patterns of sound and speech" (p. 287).
- Processing Speed (*Gs*): "...ability to fluently and automatically perform cognitive tasks, especially when under pressure to maintain focused attention and concentration" (p. 291).

Research Question

What is the relationship between a child's cognitive abilities (Cattell-Horn-Carroll Theory of general intelligence) and the parents' perception of their child's characteristics from the Child Domain subtest in the *Parenting Stress Index*?

Cognitive Abilities (Processes)

- Gc (crystallized intelligence)
- Gf (fluid intelligence)
- Glr (long term retrieval)
- Gs (processing speed)
- Gsm (short term memory)
- Gv (visual memory)
- Ga (auditory processing)

Child Domain

- AD (Adaptability)
- DE (Demandingness)
- DI (Distractibility)
- MO (Mood)

CHAPTER II

REVIEW OF LITERATURE

The purpose for this chapter is to summarize and analyze existing literature related to parenting stress and its effects on their child's cognitive abilities. This chapter will be presented in four parts: (a) general background literature review of Bronfenbrenner's Bioecological Theory, (2005); (b) general background literature review of Cattell-Horn-Carroll Theory, (2007); (c) studies on the relationship of child temperament and its effect on their parents; and (d) studies on the relationship between parenting stress and child cognitive functioning in the areas of language, academic achievement, and behavior. The studies are not limited to any specific age range, gender, socioeconomic status, or race. For the purpose of this literature review, results only pertinent to this current study are reviewed.

The United States has set a national goal of narrowing the achievement gap among all students. The key purpose of the federal law, *No Child Left Behind (2001)* (NCLB) relies primarily on assessments to measure that goal. However, out of school factors play a powerful role in adversely affecting academics, and if these factors are not attended to with equal vitality, our national goal will be dissatisfied (Berliner, 2009).

Recently, Berliner (2009) expressed concern about out of school factors which influence students' achievement. Because of the difficulties in producing sizable

achievement gains among children, as expected by NCLB, it is necessary to examine out of school factors such as parenting stress.

School children in the United States spend about 1,150 waking hours a year in school versus about 4,700 more waking hours per year in their families (Downey, von Hippel, & Broh, 2004). The quality of children's non-school environment can vary. The out of school factor of parenting stress can exert a powerful influence on student's behavior, cognitive abilities, and academic performance (Alexander, Entwisle, & Olson, 2001).

Bronfenbrenner's Bioecological Theory

The aim of Bronfenbrenner's studies was to fulfill two objectives:

1. Develop alternative hypotheses and associated experimentation to yield more valid scientific knowledge; 2. Provide "scientific bases for the design of effective social policies and programs that can counteract newly emerging developmentally disruptive influences" (Bronfenbrenner, 2005 p. 4). Bronfenbrenner's Bioecoloical Theory utilizes ideas of both Kurt Lewin and Jean Piaget. As cited by Bronfenbrenner, (2005), Lewin emphasizes a close connection between the structure of the person and of the situation as manifest in behavior, and emphasizes not just the process, such as learning rather what is being learned. Bronfenbrenner adds the dimension of time to Lewin's Model by asserting that development rather than the behavior as a joint function of person and environment (Bronfenbrenner, 2005). The term development does not refer to the phenomenon of development but to the result at a particular point in time. "The

characteristics of the person at a given time in his or her life are a joint function of the characteristics of the person and the environment over the course of the person's life up to that time" (Bronfenbrenner, 2005, p. 108).

Bronfenbrenner utilizes Piaget's theory of four stages of mental development in his bioecological theory. Piaget stated that children pass through four stages of mental development Darragh (2010): (1) sensory motor period when basic knowledge is gained through senses, (2) pre-operational period when skills such as language and drawing ability are developed, (3) period of concrete operation when a child begins to think logically, and (4) period of formal operations when a child begins to reason realistically and grasp abstractions.

Bronfenbrenner hypothesized that the development process continues over lifetime and is embedded in an ecological context of multiple systems (microsystem, mesosystem, exosystem, macrosystem and chronosystem), each of which influences the person. Bronfenbrenner defined the cornerstone of the theoretical structure of his Bioecological Theory as follows:

> "The ecology of human development is the scientific study of the progressive, mutual accommodation, throughout the life course, between an active, growing human being and the changing properties of the immediate settings in which the developing person lives, as this process is affected by the relations between these settings, and by the larger contexts in which the settings are embedded" (Bronfenbrenner, 2005, p. 107).

The first important concept about Bronfenbrenner's Theory (1979, 1986) is that family functioning is a major influence on their child's development. Children who live with single parents or in poor families may be at risk (Allison & Furstenberg, 1989; Noel, Peterson & Jesso, 2008). However, it is not these factors alone that determine whether or not a child develops his or her potential. These factors make it more difficult or less likely for a child to get the experiences he or she needs. It is the actual experiences that count. It is what actually happens within the settings, like the family, that will influence the child's development (Bronfenbrenner, 2005).

One such factor that may particularly influence child development in the family is parenting stress (Hughes, Deater-Deckard, & Cutting, 1999). One way to measure parenting stress is by examining how the parent views their child's temperament (Abidin, 1995). The child temperament as measured by their parents has been found to directly affect parenting style (Hastings, 2002; Jones & Passey, 2005). A family setting in which the child spends most of the time can have significant emotional influence on the child (Christenson, Rounds, & Gorney, 1992).

The second important concept in this theory is that it acknowledges the importance of the connections between the settings on the child's development (Bronfenbrenner & Evans, 2000). To quote Bronfenbrenner and Evans (2000, p. 118), "The concept *proximal process* involves a transfer of energy between the developing human being and the person, objects, and symbols in the immediate environment." The way one develops may depend on proximal processes. Other important settings may

include the extended family, early care and educational programs, health care settings, and other community learning sites such as neighborhoods, libraries and playgrounds.

The third concept was that the environments where the child does not spend time can also have an effect on the influence of the child, such as, parent's workplace or federal laws (Bronfenbrenner, 1986). Such environments where the developing child does not spend time may have influence on family processes. The study by Hyde, Else-Quest, Goldsmith, and Bieanz (2004), indicated that the child's difficult temperament was significantly associated with mother's work outcomes. The difficult child temperament was associated with worse work outcomes for the mother.

The research of Stolzer (2005), utilized Bronfenbrenner's Bioecological Theory to explore attention deficit hyperactivity disorder (ADHD). Stolzer addressed the linkages between the bioecological factors and ADHD. "Over the course of the last century, Americans have dramatically altered their parenting practices" (Stolzer, 2005, p. 66). She lists parenting changes, such as long-term breastfeeding, child led weaning, co-sleeping, and staying with ones offspring throughout early childhood as possible contributors to the increase of ADHD diagnosis. For example, the process of breastfeeding and weaning has been considered an important relationship between mother and child. Stolzer hypothesized that the disruption in this mother-child relationship might have altered psychological, biological, cognitive, and social process in the mother and child, and such changes in the microsystem could contribute to the increase of ADHD diagnosis.

Stolzer (2005, p. 69) writes, "Never in the history of humankind have we relegated our parental responsibilities to uninvested, unrelated strangers." Children spending vast majority of their time away from their parents during their formative years is a form of altering the mesosystem. A child's development may be determined by what he or she experiences in these settings. The experiences that a child has with the people and objects in multiple settings are the primary engines of human development (Bronfenbrenner, 1979). Children cannot be away from their parents for the majority of their day during the formative years and not have some form of consequence on the child and parent (Stolzer, 2005).

The exosystem may be altered because the pharmaceutical industry has a vested interest in promoting the incidences of ADHD. Since pharmaceutical industries promote the belief that ADHD is a "brain disorder" (Stolzer, 2005, p. 71), they encourage the use of psychotropic medications. In addition, for economic benefits, the medical community and the pharmaceutical industries have joined together regarding treatment of ADHD. There seems to be an economic incentive to label children with ADHD. Finally, Stolzer (2005) suggested that we can no longer believe that the ADHD problem lies within the child.

The macrosystem consists of beliefs, views, or ideas in a given culture. The macrosystem has greatly changed over the last generation (Stolzer, 2005). "Our collective perceptions of childhood behavior have changed, and what were once regarded as normal-range child behaviors are now defined as 'disorders of the brain" (Stolzer,

2005, p. 72). Bronfenbrenner and Evans (2000) postulated that an alteration within one system had the potential to affect every level of the bioecological system.

Seginer (2006) reviewed research that examined parental involvement by utilizing Bronfenbrenner's Bioecological Theory. The author observed that parent involvement was positively related to educational outcomes. However, Seginer indicated that there was a scarcity of research involving various aspects of Bronfenbrenner Theroy.

Epstein (2001) reported a positive relationship between parental involvement, consisting of discussing school and playing learning games, and reading achievement; however, there was no improvement in math scores. Similarly, Epstein and Sheldon (2002) observed that family and community involvement improved student attendance. The schools utilized a comprehensive approach by: (a) involving students, families, and the community, (b) providing positive reinforcement, and (c) maintaining these strategies over time. Also, VanVoorhis (2003) observed a positive relationship between parental involvement through interactive homework, and completed homework assignments and higher science report card grades. The students' interests peaked by sharing ideas and receiving support from parents on a regular basis. Furthermore, the positive achievement effects were found within a study period of only 18 weeks. Similarly, the literature review by Hoover-Dempsey et at. (2001) indicated that parents' homework involvement influenced students' attitude about homework, perception about personal competence, and self-regulatory skills. Also, parents' involvement and behaviors were influenced by students' skills, attitudes and behaviors.

Three features of parenting have been acknowledged to promote positive outcomes in children: sensitivity, cognitive stimulation, and warmth (Tamis-LeMonda, Shannon, Cabera, & Lamb, 2004).

> "Parent sensitivity refers to parents' attunement to their children's cues, emotions, interests, and capabilities in ways that balance children's needs for support with their needs for autonomy. Cognitive stimulation refers to parents' didactic efforts to enrich their children's cognitive and language development by engaging children in activities that promote learning and by offering language-rich environments to their children. Parents' warmth refers to parents' expressions of affection and respect toward their children and is thought to support skills for learning such as mastery, security, autonomy, and self-efficacy." (Lugo-Gil & Tamis-LeMonda, 2008, p.1066).

Longitudinal research by Bell (1968) and Sameroff and MacKenzie (2003) shed light on reciprocal child environmental influences that effect children's developing abilities. Approximately 40 years ago, Bell argued against the dominant view in psychology that socialization was a parent-to-child process. Sameroff and MacKenzie's research from human and animal studies indicated that characteristics of offspring (ranging from physical appearance to skills and behaviors) evoked different responses in parents, which influenced the development of their offspring. Their research further emphasized the reciprocity in parent-child relationships. They concluded that developmental outcomes are the product of continuous, dynamic interactions between children and their environments. In line with Brenfenbrenner's Theroy, measures of

children's development should affect later measures of parenting just as parenting affects later measures of children's development.

Downey, von Hippel, and Broh (2004), examined the effects of inequality, such as poor learning opportunities, in cognitive skills of children. Data were collected from the Early Childhood Longitudinal Study-Kindergarten Cohort of 1998-99. Twenty thousand children from 1,000 schools were involved in the study when they entered kindergarten in the fall of 1998. The students were tested in reading and math skills on four occasions: the spring and fall of kindergarten, and the fall and spring of first grade. These four tests of progress monitoring provided enough data to estimate three learning rates: (1) the kindergarten learning rate, (2) the summer learning rate and (3) the first grade learning rate. Children's reading and math test scores were examined. On the reading test, the skills measured were (1) knowing upper- and lowercase letters of the alphabet by name, (2) knowing the sounds of letters at the beginnings of words, (3) knowing the sounds of letters at the ends of words, (4) recognizing common words by sight, and (5) reading words in context. The math test also measured five levels of proficiency: (1) identifying one-digit numerals, (2) recognizing a sequence of patterns, (3) predicting the next number in a sequence, (4) solving simple addition and subtraction problems, and (5) solving simple multiplication and division problems and recognizing more complex number patterns.

Downey, von Hipple, and Broh results suggested that inequality of poor learning opportunities was much smaller when school was in session than when it was not. The

average learning rates were faster when school was in session than when it was not. The authors used a 92-point scale, children gained an average of 1.65 points per month for kindergarten and 2.40 points per month for first grade. However, during the summer vacation they gained nothing at all. The kindergarten and first grade learning rates averaged 2.09 points per month faster than the summer learning rate, suggesting that schools accelerated learning.

In addition to increased average learning rates, schools reduced inequality in learning rates. Downey, von Hipple, and Broh suggested that the non-school environment encouraged advantaged children to pull ahead, but the school environment helped disadvantaged children to catch up. The results indicated that learning rates were more equal during the school year than during summer vacation. The initial advantage of children entering kindergarten grew more slowly during the school year than during summer vacation. Although advantaged students had more gains all year round, the results suggested those students would make more gains even if it were not for schools.

Furthermore, this study indicated, in controlled experiments for socioeconomic status, race, and gender, that gaps were already present before school began. However, after adjusting for differences in exposure, the researchers found that those dimensions accounted for only 1-8 percent of the inequality in learning rates. The remaining 92-99 percent is "unexplained" inequality among students of the same race, gender, and socioeconomic status. Therefore, to reduce inequality, future research must examine unexplained out of school factors such as parenting stress.

Cattell-Horn-Carroll Theory

The Cattell-Horn-Carroll (CHC) Theory is an empirically supported model of cognitive abilities. CHC Theory utilizes the research from Raymond Cattell, John Horn, and John Carroll. It is the most comprehensive psychometric theory developed to assist in the measurement of cognitive and academic abilities used as the foundation for selecting, organizing, and interpreting intelligence batteries (Flanagan, Ortiz & Alfonso, 2007).

In 1941, Cattell postulated the broad abilities of fluid (*Gf*) and crystallized intelligence (*Gc*) theory of cognitive abilities. In the 1960's, Horn and Cattell expanded the model to include visual processing (*Gv*), short-term memory (*Gsm*), long-term storage and retrieval (*G*lr), and speed of processing (*Gs*) (Tusing & Ford, 2004). In 1968, Horn added auditory processing ability (*Ga*). The quantitative ability (*Gq*), reading-writing ability (*Grw*) and tactile abilities (*Gh*) were added subsequently (Newton & McGrew, 2010). Carroll differentiated factors or abilities into three strata according to the "relative variety and diversity of variables" Flanagan, Ortiz and Alfonso (2007). Carroll identified eight broad cognitive abilities: fluid intelligence (*Gf*), crystallized intelligence (*Gc*), general memory and learning (*Gy*), broad visual perception (*Gv*), broad auditory perception (*Gu*), broad retrieval ability (*Gr*), broad cognitive speediness (*Gs*), and decision-reaction time-speed (*Gt*). According to Carroll, the general intelligence (*g*) is at the apex of his three stratum theory, and the strength of relationships between '*g*' and various abilities is reflected by their distance from '*g*'. He believed that the single

cognitive ability of general intelligence to be involved in complex higher-order cognitive processes. Although there are differences between Cattell-Horn and Carroll models in their inclusion of '*g*' at stratum III, there are a great deal of similarities which can be used to classify the individual test of cognitive ability and academic achievement (MrGrew & Flanagan, 1997). Flanagan, McGrew & Ortiz (2000) presented a model which became known as Cattell-Horn-Carroll Theory. The support for the CHC theory has been derived from structural, developmental, achievement, heritability, and neurological data (McGrew, 2009).

Evans, Floyd, McGrew and Leforgee (2001) examined the relationship between CHC theory of cognitive abilities and reading achievement during childhood and adolescence. The CHC cognitive abilities were obtained from the *Woodcock Johnson III Cognitive Abilities* and reading achievement was obtained from the *Woodcock Johnson III Basic Reading Skills and Reading Comprehension* clusters. Crystallized intelligence (*Gc)* had the strongest and most consistent relationship with both basic reading and reading comprehension. Short-term memory (*Gsm)* had a moderate relationship with basic reading. Auditory processing (*Ga*), long-term retrieval (*Glr*), and processing speed (*Gs*) had consistent patterns of relationships with basic reading and reading comprehension during the formative years of reading. The two CHC factors that did not demonstrate a significant relationship for reading achievement were fluid reasoning (*Gf*) and visual-spatial thinking (*Gv*).

Floyd, Evans, and McGrew (2003) examined the relationship between CHC theory of cognitive abilities and mathematics achievement across all school-age years. The CHC cognitive abilities were obtained from the *Woodcock Johnson III Cognitive Abilities* and mathematics achievement was obtained from the *Woodcock Johnson III Tests of Achievement.* Crystallized intelligence (*Gc*) and auditory processing (*Ga*) demonstrated moderate relations with Math Calculation Skills, and *Gc* moderate to strong relations with Math Reasoning. Fluid reasoning (*Gf*), short-term memory (*Gsm*), and long-term retrieval (Glr) indicated moderate relations with the mathematic clusters. Processing speed (*Gs*) demonstrated moderate relations with Math Reasoning during the early elementary school years, and moderated to strong relations with Math Calculations Skills. However, visual spatial thinking (*Gv*) demonstrated nonsignificant relations with mathematics clusters.

Tusing and Ford (2004) utilized seven models: (1) one-factor g model, (2) two-factor (verbal/nonverbal) model, (3) three factor verbal-Gy-nonverbal model, (4) four factor Gc-Ga-Gy-nonverbal model, (5) and (6) five factor Gc-Ga-Gsm-Glr-nonverbal model and (7) seven factor Gc-Ga-Gsm-Glr-Gf-Gv-Gq model to compare the alternative theoretical models about the relations between cognitive ability measures for young children. They reported that CHC was best supported by the data.

Child's Temperament and its Effect on Parenting

This section of the review of literature examines child temperament and how it affects parenting and how parenting affects child development outcomes. The assessment of

family ecologies is important since the identification of family systems has an impact upon parent-child functioning (Webster-Strattron & Hammond, 1988). Specific family variables such as parenting stress, may be directly associated with the provisions of learning experiences by parents. Parenting stress is important to study because it is directly or indirectly related to (a) experiences that are provided to children and specific parenting behaviors, (b) the quality of environment that is created and maintained over long periods, and (c) the need for interventions (Lugo-Gil & Tamis-LeMonda, 2008). In addition, parenting stress is critical in relation to young children's emotional and behavioral development (Abidin, 1995).

According to the conceptualization of the Parenting Stress Index (PSI) Abidin (1995, p 1) wrote, "There are three major domains of stressors: (a) child characteristics; (b) parent characteristics; and, (c) situational/demographic life stress." The Child Domain of the PSI focuses on the child's behavior and temperament, as well as the effects of those behaviors on the parent (Abidin, 1995). This subscale assesses the stress, or difficulty a parent experiences in fulfilling his/her role in relation to his/ her child. The temperament characteristics assessed include: (a) over activity, attention problems and other ADHD-type behaviors (distractibility/hyperactivity); (b) difficulty adjusting to changes, avoidance of strange situations and people (adaptability); (c) negative interactions between parent and child, feelings of rejection from the child (reinforces parent); (d) constant crying and clinginess and multiple demands on parent (demandingness); (e) a child with dysfunctional affect, or a child who is unhappy or

depressed (mood); and (f) a child who does not have intellectual, emotional, or physical characteristics that meet parent expectations (acceptability) (Abidin, 2005). It is the combination of these temperament characteristics and parents' perception that will be examined in this study.

The term temperamental risk factors was intended to encompass any potentially troublesome temperament characteristics predisposing a child to a poor fit (incompatible relationship) with his/her environment, to excessive interactional stress and conflict with caretakers, and to secondary clinical problems in the child's physical health, development or behavior (Bronfenbrenner, 1996). Furthermore, children's temperament reflects the interaction of inborn traits and experience, particularly the interaction between a child's temperament and his/ her parents' behavior (Bronfenbrenner, 1986).

Research has documented that children with temperamental risk factors, such as difficult temperament were related to parent and child linked stress as reported by their parents (Gelfand, Teti, & Fox, 1992). Children with difficult temperament, who also exhibited behavior problems, placed a strain on parental function by facilitating negative emotions, depression, and poor child management skills that might lead to negative parent-child interaction (Lindhout, Markus, Hoogendijk, & Boer, 2009).

Children who have been described as temperamentally difficult exhibit more behavioral and emotional problems and interpersonal difficulties (Sheeber & Johnson, 1992). Lindhout, Markus, Hoogendijk, and Boer (2009) reported temperament and parental child-rearing style were associated with childhood anxiety disorders. This study

investigated the contribution of not only temperament but also parental child-rearing to clinical childhood anxiety disorders. Fifty children were included in the study. Child-rearing and the child's temperament were assessed by means of a parental questionnaire. Results indicated that anxiety-disordered children scored significantly higher on the temperamental characteristics emotionality and shyness than non-clinical control children. Also, temperament and child-rearing style accounted for a high score regarding anxiety disorders.

The validity of the construct of stress has been extensively established through a number of studies. Examples of stress include parents of children with behavior problems (Jones & Passey, 2005), developmental disabilities (Plant & Sanders, 2007), and distractibility (Finzi-Dottan, Manor, & Tyano, 2006). These studies support the theory that temperament may be a predisposing factor that makes a child more vulnerable to environment factors, such as parental depression or parental stress.

Researchers Farah and Hurt (2008) investigated if poverty was potentially responsible for impairing specific cognitive skills, such as memory and language. The participants were one hundred ten children who were evaluated with a battery of cognitive tests. The children's homes were visited and assessed for the number of visible books, the number of times the parents scolded their children, asked parents about the frequency of trips to museums, and inquired how often parents ate with their children. These qualitative observations and questions were used to judge how intellectually stimulating the environment was and how nurturing the parents were.

The authors reported that particular cognitive skills appeared to match with certain aspects of the environment. Children with poor language abilities were more likely to come from homes lacking intellectual stimulation, no matter how much nurturing their parents provided. In contrast, increased memory skills corresponded to the nurturing levels in the home. In addition, to follow up on cognitive tests, the researchers performed MRI scans of the children. They found that subjects raised in more nurturing environments generally had bigger hippocampi, the portion of the brain associated with forming and retrieving memories.

Infant temperament has been reported as a significant stressor through its association with maternal feelings of parental competence and overall well-being. Infants described as fussy and difficult to soothe, created stress for both parents (Gutteling, et al., 2006). Difficult infants may negatively affect a mother's sense of competence as a parent and intensify the child's mood. Early infant temperament is of importance because of its potential to possibly affect personality, cognitive, and socioemotioinal development (Rothbart, Ahaadi, & Evans, 2000). In particular, early temperament characterized by irritability, unpredictability, and lack of adaptability has been an early indicator of behavioral problems and disruptions to parent-child interaction (Pauli-Pott, Becker, Mertesacker, & Beckmann, 2000).

Atella, DiPietro, Smith, and St James-Roberts (2003) examined correspondence among maternal and paternal ratings of infant temperament, parental psychological functioning, and infant behavior. Participants were 120 families. When the infants were

6 weeks old, mothers and fathers completed the *Infant Characteristics Questionnaire* (ICQ) and reported on their own levels of anxiety, depressive symptoms, and parenting stress. They also completed a 3-day diary of their infants' behavior. Infant irritability was also assessed in a laboratory situation. The results indicated that fathers rated their infants' temperament somewhat more negatively. There was a significant correspondence between maternal and paternal ratings on the temperament factors of fussiness, inadaptability, dullness, and difficultness composite. Higher infant difficultness was consistently associated with parenting stress. Infant behavioral fussiness, as measured by the 3-day diaries, was significantly correlated with temperament ratings by both parents and with irritability observed in the laboratory setting.

The authors concluded that mothers and fathers were influenced by somewhat different factors in perceiving their babies' temperaments, but both maternal and paternal reports have a basis in laboratory and diary based behaviors. The results indicated a strong contributing influence of infant irritability on the perception of difficult temperament and support the validity of parental reports of infant irritability in the first 6 weeks of life.

Maxted et al. (2005) examined the impact of infant colic and maternal depression on infant, parent, and family difficulties. The purpose of the study was to determine if the combination of infant cry problems and maternal depression was associated with infant, parent, and family difficulties. The sample included 93 patients from the Colic Clinic. Infants were approximately 2 months of age. Questionnaires completed by the

mother prior to treatment onset were used to measure depressive symptoms in the mothers, infant cry, sleep and temperament, characteristics, parenting stress, maternal self-esteem, social support, and family function. Moderate to severe depressive symptoms were reported by 45.2% of the mothers. More severe depressive symptoms in the mothers were related to fussy/difficult infant temperament, more parenting stress, lower parental self-esteem, and more family-functioning problems.

Lester, Boukydis, Garcie-Coll, Hole, and Peucker (1992) used a self-referred sample of mothers. The most severely depressed mothers had less optimal communication with their colicky infants during videotaped interactions. The decreased communication altered the way mothers perceived and responded to infant cry signals. This might cause a disruption in the mother-child relationship formation, which brought additional burden to the relationship and effect infant development outcomes (Maxted et al., 2005).

Maxted et al. study found the high depression parents displayed more fussy/difficult temperament characteristics than infants in the low or moderate depression groups. Mothers reported more parenting stress, both in terms of the frequency of stress and intensity of stress, in the high depression group as compared to mothers in the moderate or low depression group. Parental self-esteem was lowest in the high depression group followed by the moderate depression group, with the highest self-esteem in the low depression group. There were more family-functioning problems in the high and moderate depression groups than in the low depression group. In addition,

when mothers had high scores of depression, they rated their children as having difficult temperaments. Likewise, children identified as having problems with crying during infancy were more likely to be perceived as vulnerable and to have behavior problems at 3 ½ years of age (Forsyth & Canny, 1991).

Noel, Peterson, and Jesso (2008), proposed to explore the factors of child temperament and parenting stress and how they related to language skills. The study consisted of 56 preschoolers and their mothers from low SES backgrounds. The preschoolers ranged in age from 2 years, 8 months through 4 years, 8 months with a mean of 4 years. The participants were 33 girls and 25 boys. All children had English as their first language, resided in urban setting and were Caucasian.

The authors measured parenting stress using the *Parenting Stress Index-short form* (PSI-SF) third edition (1995) and child temperament was measured using the *EAS Temperament Survey*. Language skills were measured using the *Peabody Picture Vocabulary Test* (PPVT) third edition (1997) and *Expressive Vocabulary Test* (EVT) first edition (1997). The PPVT assesses receptive language and the EVT assesses expressive vocabulary. The assessments were administered in the home of each preschooler.

The mean expressive vocabulary score from the EVT was 99.55, corresponding to an age equivalent of 3 years, 11 months. The children's average receptive vocabulary score on the PPVT of 98.65, corresponding to an age equivalent of 3 years, 10 months. The PSI-SF total stress score across all mothers was 83.00, indicating that the average stress level experienced within the mothers' role as a parent fell within the 83rd

percentile. Parents did not rate their children as having extreme temperaments on the *EAS Temperament Survey*. The means for each temperament dimension was around 3, with low standard deviation. There was a high correlation between the EAS dimensions and the total PSI-SF score. Child temperament was significantly related to parenting stress. Parents who rated their children as being highly emotional also rated themselves experiencing higher levels of parenting stress (Noel, Peterson, & Jesso, 2008).

The bivariate correlations between the EAS temperament subscales and the PPVT and EVT measures indicated no relationship with expressive language ability, suggesting that children's ability to produce synonyms is not affected by how sociable, active or emotional they are. However, the children's receptive vocabulary was significantly related to emotionality. Children who were rated as being highly emotional were less likely to perform well on the PPVT. The bivariate correlations between the PSI-SF and PPVT and EVT measures showed children's expressive vocabulary was significantly related to their mother's reported parenting stress ($r = -0.29$, $p<0.05$). Likewise, children's receptive vocabularies were significantly related to their mother's reported parenting stress ($r = -0.32$, $p<0.05$). The children of mothers who rated themselves as having low levels of parenting stress performed better on measures of both expressive and receptive vocabulary (Noel, Peterson, & Jesso, 2008).

According to Crnic, Gaze, and Hoffman (2005) mother-child interactions were related to levels of parenting stress, and the quality of this dynamic had been reported to be the biggest predictor of children's cognitive development, over and above that of the

school environments. The cognitive development was measured from the child's vocabulary utilizing the *MacArthur Communicative Developer Inventory* (CDI). The rate of children's vocabulary development was related to how their mothers talked to them (Hoff & Naigles, 2002). If mother-child interactions were impaired because of parenting stress, it was highly likely that these stressed mothers did not have the kinds of conversations and interactions that fostered vocabulary.

Calkins, Hungerford, and Dedmon (2004) examined the associations between specific infant temperament characteristics of frustration and maternal behavior. The researchers hypothesized that mothers of easily frustrated infants would show less sensitivity, more intrusiveness, and lower levels of physical stimulation relative to mothers of less frustrated infants. Based from the temperament questionnaire called *Infant Behavior Questionnaire* (IBQ) and a standard battery assessment identifying infants with frustrated temperament, 162 healthy full-term infants and their mothers were selected for the study. Average maternal age for the sample at the time of the 6-month visit was 29 years. The majority of mothers who participated were married and were European American.

The focus of Calkins, Hungerford, and Dedmon's study was on the maternal interaction tasks. The tasks were interspersed with assessing attention, empathy, and the frustration tasks that were used to classify infants as easily frustrated and less frustrated. Mother-infant interaction was observed for a total of 12 to 14 minutes. The *Symptom Checklist 90-Revised* (SCL-90-R) measures commonly encountered adult

psychopathology symptoms. Mothers rated each item in terms of how much distress it caused them over the past week. The PSI was used to measure sources of stress from parent-child relationship. The child stress subscale portion was used because of its conceptual relevance to infant temperamental frustration.

The results of the analysis of frustration-group patterns indicated that there were clear differences between the mothers of the two types of infants: mothers of less frustrated infants displayed significantly less intrusive and more physically stimulating behaviors than did mother of easily frustrated infants. However, there was no significant difference with regards to insensitivity. Results of mothers with highly irritable infants did not differ from mothers of less irritable infants in responsiveness to fussing/crying or amount of stimulation during the infant's first 6 months. Mothers did provide lower levels of effective stimulation such as positive vocalizations, stimulation to play, and affectionate contact. The fact that easily frustrated infants showed less positive affect during mother-infant interaction was consistent with the idea that infant behavior might be the most direct trigger for the differences in maternal behavior observed between mothers of less frustrated and easily frustrated infants. The hypothesis that mothers of easily frustrated infants engaged in less effective stimulation was validated. The authors believed that additional research was needed to follow these infants and parents to measure developmental skills during the toddler years (Calkins, Hungerford, & Dedmon, 2004).

Ketelaar, Volman, Gorter, and Vermeer (2008) explored stress in parents of children with cerebral palsy. Parental stress was measured with the *Parenting Stress Index* (PSI). Children's functional skills were measured using the *Pediatric Evaluation Disability Inventory* (PEDI), and the child's behavior was measured with the *Vineland Adaptive Behavior Scale* (VABS). A hierarchical regression analysis on the different PSI parent domain subscales was applied with the PEDI and VABS. The authors reported that maladaptive behavior of the child significantly contributes to the stress parents' experienced in their parenting, while the child's functional skills were not related to parents' stress. "Child behavior problems were an important predictor of caregiver psychological well-being, both directly and indirectly through their effect on self-perception and family function" (Ketelaar, Volman, Gorter, & Vermeer, 2008, p. 827). The relation between a child's behavior difficulties and stress parents experience is important to consider when looking at bi-directional interaction.

Parenting Stress and Child Development

The literature regarding the developmental outcomes of a child from parenting stress will be broken down into the child's language acquisition, behavior, and academic achievement. After an extensive review of literature, studies were not found that used outcomes from the CHC Model of general intelligence as a correlation with parenting stress.

Parenting stress appeared to be an important factor in children's expressive and receptive language skills and in their later reading comprehension (Noel Peterson, & Jesso, 2008). "It is thought that temperament influences the development of joint

attention and its relationship to children's language" (Noel, Peterson, & Jesso, 2008, p. 827). A child's temperament, which creates parenting stress may have an effect on parent child interaction. Evans, Harrison, and Burke (1999) observed the interaction of fathers and mothers from 49 healthy preterm (defined as weighing at least 1500 grams and less than 8 days on a respirator) and 54 full-term children from the ages of birth to 4 years of age. During each infant's age of 3 and 12 months, the parents were assessed using the *Nursing Child Assessment Teaching Scale*. In addition, parents completed the PSI. At 18 months, the children were assessed using the *Bayley Scales of Infant Development, Sequenced Inventory of Communication Development-Revised*, and *MacArthur Communicative Development Inventory*. The preterm children scored significantly lower on the *Bayley Mental Scale* and on the number of words produced.

The reasons why some healthy preterm children did very well and others had delays were not clear. Medical status at birth was not the primary predictor of cognitive and/or language skills (Cohen, Parmelee, Sigman, & Beckwith, 1988). Sameroff and MacKenzie's (2003) transactional model of development may offer one possible explanation for the establishment of parent-child interaction patterns early in the child's life that do not optimize the child's development. Using the transactional model, Evans, Harrison, and Burke's (1999) studied the infant's interactions with their mother and father during early development. This study made important contributions regarding the father's, the mother's and the child's interactions as influences on child development.

The authors hypothesized that characteristics of mother-child and father-child interactions would predict the child's development. The prediction was supported in the area of receptive language skills. Higher receptive language scores were predicted by higher scores from parents in the *Nursing Child Assessment Teaching Scale*. Thus, the contributions of mother, father, and the child interactions were significant predictors. In the area of cognitive development the hypothesis received only partial support. When the mother was responsive in mother-child interactions, her child had a higher *Bayley Mental* age score. However, characteristics of the father's interaction and the child's contribution to the interaction were not significant predictors of mental development. For expressive language development, the hypothesis was not supported as none of the interaction variables was a significant predictor.

A child who is responsive and provides the parent with clear cues may be more rewarding and alters the interactive process by encouraging the parent to provide the kind of experiences that promote language development. However, parenting stress experienced by the parents could be intermittent and may not decrease their responsiveness to their child or affect their child's development in the area of language and cognitive development (Evans, Harrison, & Burke, 1999).

Evans, Harrison, and Burke (1999) recommended future research focusing on specific aspects of development within the domains of cognitive and language development. The additional research may detect subtle differences in the information

processing of children, and examine the link between parent-child interactions and specific subareas within cognitive and language functioning.

Evans and Harrison (2001) continued researching the parents and children from the above mentioned study. Additional data were collected from the children at the age of four. This study focused on the relationship of father-child and mother-child interactions, perceptions of parenting stress, socioeconomic status, and prematurity to development of 44 healthy preterm and 49 full-term Canadian children at 4 years of age. The primary objective of this study was to determine which variable in the child's early social environment was most predictive of the child's development. The measurements used to determine parent child interactions were the *Nursing Child Assessment Teaching Scale*, *Parenting Stress Index*, and *Dyadic Adjustment Scale*. The two assessments used to measure child development were the *McCarthy Scales of Children's Abilities* and the *Clinical Evaluation Language Fundamentals-Preschool*. The *McCarthy Scales of Children's Abilities* measured motor and cognitive development giving a general cognitive index in the sum of verbal, perceptual-performance, and quantitative scales. The *Clinical Evaluation Language Fundamentals-Preschool* measured linguistic concepts of receptive language and expressive language.

Because of the large sample size, linear regression analyses were conducted in two stages to reduce the number of variables. Prior to identifying significant predictors, a MANOVA for group (full-term and preterm) was conducted with the four outcome variables: general cognitive index, *McCarthy Motor Score*, receptive, and expressive

subscale. The preterm children scored significantly lower than the full-term children. The differences were significant for all four outcome variable (Evans and Harrison, 2001).

Father's stress in the Parent Domain, mothers' stress in the Child Domain, and father's Parent interaction score at 12 months were strong predictors of a low expressive language score for the children at the age of four (Evans & Harrison, 2001). The parents' perception of stress was also a significant predictor of receptive language irrespective of whether or not the child was born full-term or preterm. Only the descriptive variables of group, child sex, paternal age, and family socioeconomic status were significant predictors in the general cognitive index.

Likewise, the more responsive, sensitive father-child interactions at 12 months were associated with higher expressive language scores. The more responsive mother-child interactions at 12 months were associated with higher receptive scores. Evans and Harrison (2001) indicated that an additional extensive systematic study should be conducted to determine long-term effects of the parent interaction, parent stress, and socioeconomic status on facilitating child language development and cognitive abilities.

McIntire (1991) studied parenting stress and child cognitive outcomes with middle and lower class subjects. The mean age for this sample of boys was 8 years, 9 months, with a range from 7 to 13 years. One parent group consisted of 42 single mothers, a second group of 52 married mothers, whose husbands did not respond or refused to participate in the study, and a third group of 69 married mothers and their

husbands who agreed to be in the study. Measures used were *Conner's Teachers Rating Scale* (CTRS), *Peabody Picture Vocabulary Test-Revised* (PPVT-R), Wide *Range Achievement Test-Revised* (WRAT), *Parenting Stress Index* (PSI), *Parental Locus of Control Scale* (PLOC), *Knowledge of Behavioral Principles as Applied to Children* (KBPC), *Parenting Alliance Scale* (PAS), and the demographic variables of socioeconomic status, education, and family income.

McIntire (1991) hypothesized that parent psychological factors would have the most power, contextual factors would be secondary, and child characteristics would have the least amount of power for prediction of parenting stress. The regression analyses results generally supported this order, but in several cases the child characteristics were stronger predictors than the contextual factors. All measures of stress were negatively related to the child's IQ. The results suggested that parents of intelligent children experienced less stress in parenting. The teacher's perception of the child's adjustment was positively related to each stress measure indicating that children who were seen by their teachers as being deviant or poorly adjusted in the classroom in the direction of exhibiting hyperactivity, aggression, or defiance, had parents who were experiencing elevated levels of stress in coping with the child. Parenting stress in relation to child cognitive outcomes revealed an inverse pattern.

Carlson and Corcoran (2001) used data from the National Longitudinal Survey of Youth (NLSY) to examine the effect of various family structures on behavioral and cognitive outcome for children aged 7 to 10. The four possible variables that explored

family structure were economic resources, parental socialization, childhood stress, and maternal psychological functioning.

The sample included 1,809 children aged 7 to 10 who were living with their mothers at the time of the 1994 NLSY interview. When weighted, to address the racial disproportionality, the child sample represented a cross-section of children born to a nationally representative sample of women who were between the ages of 29 and 36. The children represented approximately 70% to 75% of all children that would be born to a typical cohort of American women. Researchers examined both dependent variables of behavioral and cognitive outcomes from the children for this study. The *Behavior Problems Index* (BPI) measured behavioral problems which were based entirely on the mothers' perceptions of their children. The cognitive ability was measured by using the math and reading recognition subtests from the *Peabody Individual Achievement Test* (PIAT).

The independent variable of mothers' psychological well-being was measured using the *Center for Epidemiologic Studies Depression Scale* (CES-D) and *Pearlin Scale*. The CES-D measured mothers' frequency of depression symptoms and the *Pearlin Scale* measured to what extent the mothers' felt her life was under her own control. The mothers' demographic characteristics including age at first birth, educational attainment, and aptitude were also used in regression analysis (Carlson & Corcoran, 2001).

The authors reported that children raised by mothers with depression, as measured by the CES-D, were more likely to have behavior problems. This finding was consistent

with the argument that the unfavorable psychological condition of mothers reduced parenting effectiveness by negatively affecting a mothers' psychological functioning. However, the cognitive outcome of the children in the sample did not show any significant relationship to the mothers' psychological well-being. The mothers' demographic were positively and significantly associated with math test scores. Maternal psychological well-being was shown to be an important mechanism for behavioral outcomes, but not cognitive ones. Carlson and Corcorn (2002) suggested future research to more explicitly examine various dimensions of family processes and parenting to determine more precisely whether and how parental socialization and family stress might affect children's outcomes.

Burchinal, Feinberg, Pianta, and Howes (2002) were interested in family beliefs and practices, and teacher-child relationships as predictors of pathways to academic competence for children from diverse social class and ethnic backgrounds. Specifically, the purpose of the study was to identify child, family, and classroom factors that predicted developmental levels or rates of change over time in academic skills from preschool to elementary school, in order to identify pathways to competence. The participants included 511 children who had at least 2 years of data in the Cost, Quality, and Outcomes Study (CQO) and ranged in age from preschool through second grade. Daycares were chosen if they were licensed full day, full year child care centers. A stratified random sample of 401 child care centers was chosen. Children in the study were randomly selected if (1) they were of an age to enter kindergarten in the fall of

1994; (2) they had been enrolled in the target classroom during the classroom observation data collection phase; (3) they were expected to attend the same center the following year; and (4) they spoke English and the primary language spoken in the child's home was English. Excluded from analyses were children without at least one measure of parental attitudes, one measure of parenting practices, teacher report of closeness, and maternal report of education and ethnicity, and child assessments.

Repeated assessments of the children's academic skills were collected at years 1, 2, 3, and 5 of the study. Children were individually assessed using standardized measures of receptive language measured by the *Peabody Picture Vocabulary Test-Revised* (PPVT-R) and academic skills measured by the *Woodcock-Johnson Tests of Achievement-Revised* (WJ-R) subscales of math and reading. In every data collection year, parents completed family survey forms including information on demographic and parenting beliefs and practices. The parents completed the *Rank Order of Parental Values, the Home Screen Questionnaire*, the *Family Routines Questionnaire*, the *Parenting Stress Index*, and the *Parenting Beliefs Scale* (Burchinal, Feinberg, Pianta, & Howes, 2002).

The researchers examined associations of developmental outcomes over time with the continuous family background, child, and parenting. The parenting reports of parenting beliefs and practices were modestly to moderately associate with receptive language and academic achievement over time. Overall, children tended to show more advanced receptive language when their mothers had post secondary education, and their

parents reported more progressive parenting beliefs and positive parenting practices. Children who scored higher on the math test tended to have mothers with post secondary education, European American descent, rated as more socially extroverted, and had parents who reported more positive parenting practices. Children who scored higher on the reading test had mothers who had more education. A number of studies indicated that family characteristics were the best predictors of children's outcomes (Bramlett, Rowell, & Mandenberg, 2000, Christenson, Rounds, & Garney, 1992, Evans & Harrison, 2001, Pianta & Egeland, 1990).

There were two limitations in the study. First, the PPVT-R measure had been criticized for being biased against African-American children and other children of color. Second, the assessments of language, reading, and math skills, although objective and standardized, might not have been as sensitive to classroom effects or growth as were observational measures or individualized criterion or curriculum referenced assessments.

Chang, et al. (2004) examined the extent to which a parents' cognitive readiness to parent, perceived difficult child temperament, observed parenting behaviors, and positive coping styles predicted parenting stress. The participants included 120 African-American, first-time mothers and their infants ranging in age from 10 days to 1 year with a mean of 5 months. The mothers learned of the study through the Early Head Start (EHS) program. The mothers were in their late teens or early 20's with a mean age of 19.0 years.

The perceived difficult child temperament was measured by observer-rated parenting behavior and parenting stress. The observer-rated parenting behavior was measured using the *Home Observation for Measurement of the Environment Scale* (HOME). Parenting stress was measured using the *Parent Stress Index* (PSI) and the *Rothbart Infant Behavior Questionnaire* (IBQ).

The authors reported a positive relation between the extent to which mothers perceived their children as difficult and their levels of parenting stress. Similarly, the research by Gelfand, Teti, and Fox (1992) indicated that the perception of difficult child temperament is associated with the experience of maternal stress. However, Chang et al., (2004) study did not find that difficult child temperament influenced parenting behaviors. Although these perceptions did not lead to undesirable parenting practices in the home, they did appear to be positively related to the experience of stress.

Deater-Deckard et al. (2009) tested the hypothesis that household chaos would be associated with lower child intelligence quotient (IQ), and more child conduct problems concurrently and longitudinally over two years while controlling for housing conditions, parent education/IQ, literacy environment, parental warmth/negativity, and stressful events. The purpose of the study was to test whether chaos would be associated with lower child IQ and higher levels of child conduct problems in cross sectional and longitudinal analyses after controlling for other related family environment factors.

The sample included 302 families with healthy same-sex twins in Kindergarten/1st grade at the first assessment. The children were 6 years, 10 months old on average.

Parents' and observers' ratings were collected over a two year period. Nearly all the families were two-parent households and the majority was European American.

Deater-Deckard et al. (2009) collected data from three annual in-home assessments. The semi-structured home visits allowed considerable time for interaction between the research assistants and the family, and for the research assistants to observe the home environment and parent-child interactions. Parent and child cognitive performance data were collected during a home visit. Parent verbal IQ was measured using the oral vocabulary sub-test of the *Stanford-Binet.* The home literacy environment was measured by parents completing the *Home Literacy Environment* questionnaire. Housing conditions were measured by the research assistants completing the *Post-Visit Inventory* (PVI). Chaos in the form of noise levels, crowding and trafficking, and lack of predictability and family routines were measured using the *Chaos Hubbub and Order Scale.* Stressful events were measured by the parents completing a brief stressful life events inventory. Child cognitive ability was assessed using the sum of area scores from the oral vocabulary, pattern analysis, digit span/memory for sentences, and quantitative reasoning sub-scales of the *Stanford-Binet.* Last, child conduct problems were measured by parents completing the Disruptive *Behavior Rating Scale* and the *Child Behavior Checklist.* Each child was tested separately and by a different research assistant from her or his co-twin. Parents completed questionnaires and returned them during the home visit. Upon completion of a home visit, the two research assistants completed independent ratings of their observations of the home environment.

Results of chaos and child outcomes correlated with child IQ and conduct. Higher child IQ was associated with higher parental education/IQ, home literacy environment, less parental stress, better housing conditions, and less chaos. Higher levels of child conduct problems were associated with more parental negativity and less warmth, more family stress, and more chaos. After controlling for other family factors, more chaos provided independent statistical prediction of lower IQ scores and higher conduct problem scores (Deater-Deckard et al., 2009).

Household chaos has been implicated in children's and adolescent's cognitive and social emotional development (Evans, 2006). Chaos is a key aspect of family functioning that is associated with children's developmental outcomes in important ways. Parent-reported chaos has been linked with multiple aspects of child development such as poorer cognitive performance and scholastic achievement, and more conduct problems (Ashbury, Wachs, & Plomin, 2005).

Deater-Deckard et al. (2009) concluded that family chaos was a predictor of children's lower IQ scores and conduct problems. Therefore, maintaining a non-chaotic home environment was important to children's healthy cognitive and social-emotional development. Parents' reports of chaos provided invaluable additional information about family processes that might be critical to understanding the etiology of problems in cognitive and social-emotional development.

Eyberg, Boggs, and Rodriguez (1992) hypothesized that parent and child domain scores from the PSI would be highly correlated with the *Eyberg Child Behavior Inventory*

(ECBI). The two purposes of this study were to examine the differential relationship between sources of parenting stress as rated on the PSI and disruptive child behaviors as rated on the ECBI, and to examine the differential relationship between the PSI total stress score and the ECBI Intensity and Problem Scales. Participants included one hundred sixty five children ages 2-10 years with the average age 5.5 years. The children were referred for a psychological evaluation.

The ECBI is a 36 item parent rating scale of conduct problem behaviors for children between the ages 2 years and 16 years old. Parents rate how often each behavior occurs on a 7-point frequency of occurrence scale. The PSI is a 101 item inventory designed to measure stress in the parent child system. It consists of 13 subscales that are grouped into a child domain and a parent domain.

The PSI child domain and parent domain scores were significantly correlated with the ECBI problem and intensity scores and as hypothesized; child domain were significantly more highly correlated with ECBI scores than were the parent domain scores. Results of this study indicated that disruptive behavior was significantly correlated with measures from both parent and child characteristics. However, the results also confirmed statistically a stronger relationship between disruptive child behaviors and stress arising from child characteristics measure on the PSI (Eyberg, Boggs, & Rodriguez, 1992).

Guajardo, Snyder, and Petersen (2009) examined the associations between parental stress and parental behaviors, and how these variables predicted emotional

understanding. They also examined associations between parental stress and parental behaviors and how it correlated with children's behavioral outcomes, internalizing and externalizing. The authors hypothesized that theory of mind (a child recognizing their perspective of ideas and people) and emotional understanding (understanding people different emotions) would be positively related to positive aspects of parent behavior designed to increase child socialization and compliance, and negatively correlated with those aspects of parent behavior that increased children's inappropriate and defiant behavior.

Eighty-three parents of the average age of 28 years participated with their 3 to 5 year old children in this study. The measures used were: (a) the Child Behavior Checklist (CBCL) and PSI for the parents, (b) the Test for the Auditory Comprehension of Language-Third edition for children's receptive language, (c) a battery composed by Wellman and Liu, (2004) for theory of mind, and (d) Cassidy, Parke, Butkovsky, and Braugart, (1992) project for emotional understanding tasks. The parent-child dyads participated in two 1 ½ -2 hour sessions at a university laboratory. While parents completed the questionnaires, the children completed tasks. During the second session parent-child interactions of free-play, parent-busy task, and a clean-up task were videotaped.

Guajardo, Snyder, and Petersen (2009) study indicated that parenting stress was related to aspects of both parenting and child behavior. Specifically, child-related parenting stress was associated with parental laxness (inconsistent and disengaged) and

over-activity (responsive parenting). This aspect of parenting stress also predicted child internalizing and externalizing behavior. There was an inverse relationship between parental commands and child compliance, such that parents who used more commands had children who were less compliant during the clean-up task. The factors of parental praise affected mind performance and parental criticism were positively related to child non-compliance. Parental praise predicted theory of mind performance and parental imitation predicted emotion understanding. Given the results in this study, lax and overactive parenting may affect changes in the trajectory of children's cognitive development.

Lugo-Gil and Tamis-LeMonda (2008) integrated the contributions of family income and parenting quality to children's cognitive development in the first 3 years. They used testing of parenting effects on children's development and children's effects on parenting ability above the influences of family resources and children's earlier abilities. The authors addressed the following in their study: (a) integrating comprehensive measures of parenting quality and family economic resources that were linked to children's ages in analyses of family influences on children's development, (b) testing for selection bias and considering influences of children's development outcomes on parenting quality, (c) focusing on children's developmental outcomes during the first 3 years, and (d) taking a dynamic, transactional approach to analyses by considering lagged, reciprocal influences between parenting quality and children's development outcomes.

Participants included 2,089 mothers and their children drawn from the Early Head Start (EHS) Research and Evaluation Study. Study participants were low-income families who had sought assistance from local EHS agencies. Baseline data on family characteristics and functioning, parenting and children's health, and cognitive outcomes were obtained when mothers applied to EHS. In addition, interviews, observation, and direct child assessments were made when the children were 14, 24, and 36 months.

The study measured child cognitive outcomes from the *Bayley Scale for Infant Development* (BSID), and parenting quality was measured from the HOME scale. The results indicated that parenting quality at each age consistently predicted children's Bayley scores. Parenting quality at each age had a positive direct effect on child cognitive outcomes. The effects of parenting quality on child outcomes were moderate, but still significant even when the strongest effects on child cognitive outcomes were included (family economic resources). In addition, lagged parenting quality was positively associated with child outcomes at 24 and 36 months, and lagged child outcomes had positive effects on parenting quality at 24 and 36 months. This result suggested the presence of reciprocal effects between children's abilities and subsequent parenting behaviors. Thus, children were active participants in the construction of their own experiences.

The results of Lugo-Gil and Tamis LeMonds (2008) study implied that programs aiming solely at supplementing family earnings might not have strong impact on child cognitive development. Programs that provide services designed to improve quality of

parenting might be more effective in promoting cognitive development outcomes. Strengthening the quality of parenting would also include services aimed at improving family literacy and education, reducing parental stress, and providing high quality child care. Of all measures, mothers' WJ scores were the strongest predictors of parenting, and mothers' education strongly predicted both parenting quality and children's Bayley scores.

Summary

In summary, difficulties associated with parenting stress include delay of infants' receptive language skills (Evans, Harrison, & Burke, 1999, Evan & Harrison, 2001), delay of young children's verbal cognitive functioning (McIntire, 1991, Pianta & Egeland, 1990), behavioral problems, conduct problems, disruptive behavior (Carlson & Corcoran, 2001, Deater-Deckard et al., 2009), lowered reading and math test scores (Burchinal, Feinberg, Pianta, & Howes, 2002), overall lower IQ scores (Deater-Deckard et al., 2009, Lugo-Gil & Tamis-LeMonda, 2008), and emotional understanding (internalizing and externalizing behaviors) (Guajardo, Snyder, & Petersen, 2009). All these studies raise serious concerns regarding the influence of parenting stress on their child's developmental outcome. It is because of these studies and the need to level the playing field for all learners that educators need additional research. This current research will identify if correlations exist between PSI and the seven cognitive processes measured from the CHC Theory. With this information, educators may be able to better

assist their students with appropriate interventions. Due to the implementation of NCLB there is need for more research that addresses the whole child.

The authors (Calklins, Hongerford, & Dedmon, 2004, Carlson & Corcoran, 2001, Evans & Harrison, 2001, and Evans, Harrison, & Burke, 1999) recommended future research focusing on specific aspects of development within the domains of cognitive functioning. This current research may detect differences in the information processing of children and examine the link between parenting stress and specific subareas within cognitive functioning. If educators embrace an ecological view of each child's development, they will be able to enhance the academic outcome and overall functioning of all children.

CHAPTER III

METHODOLOGY

Purpose of the Study

The purpose of this study was to examine the relationship between the parent's ability to cope with stress and the child's cognitive functioning. Specifically, the relationship between parenting stress characteristics and its effect on the cognitive abilities of their children was examined. This chapter will discuss the research method utilized in the following order: (a) research question, (b) participants, (c) instrumentation, (d) design, and (e) statistical analysis.

Research Question

What is the relationship between a child's cognitive ability (Cattell-Horn-Carroll Theory of general intelligence) and the parents' perception of their child's characteristics from the Child Domain subtest in the Parenting Stress Index?

Cognitive Abilities (Processes)

- Gc (crystallized intelligence)
- Gf (fluid intelligence)
- Glr (long term retrieval)
- Gs (processing speed)
- Gsm (working memory)
- Gv (visual spatial)
- Ga (auditory processing)

Child Domain

- AD (Adaptability)
- DE (Demandingness)
- MO (Mood)
- DI (Distractibility)

Participants

The participant population for this study consisted of 16 mothers and their 16 children from the North Central Texas area. Children participants were referred by their mothers who had concerns about their child's behavior and/or academic performance. The children ranged in age from 6 to 19 with the mean and median ages being 10 and 9 respectively. The mothers ranged in age from 37 to 52 with the mean and median ages being 43 and 43 respectively. Mother participants, who volunteered, requested the services from the Integrated Clinic of Behavior and Learning Evaluations (ICBLE). The ICBLE mission is to provide service to the citizens with regard to their children's poor academic and behavior performance, and as an educational center for students from the Family Services and Special Education at Texas Woman's University.

Participants in the study were volunteers and not randomized, rather, a sample of convenience. Approval for the study was obtained from the Institutional Research Board (Appendix A). Written consents were obtained from the parents prior to evaluation (Appendix B). Confidentiality of evaluation results were ensured by using a number coding system.

Instrumentation

Child Cognitive Functioning

Child cognitive functioning was measured by standardized cognitive assessment instruments with a mean of 100 and standard deviation of 15. The Cattell Horn Carroll (CHC) Theory is an empirically supported model, which allows researchers to reliably

measure cognitive abilities that are represented in intelligence tests. One of the following intelligence tests were utilized in this study: (1) *Kauffman Assessment Battery for Children –Second Edition* (KABC-II) (Kaufman & Kaufman, 2004), (2) *Wechsler Intelligence Scale for Children* (WISC-IV) (Wechsler 2003), and/or (3) *Woodcock Johnson III Test of Cognitive Abilities* (WJ III COG) (Woodcock, McGrew, & Mather, 2001).

The CHC Theory includes seven of the broad cognitive abilities as follows: (a) Fluid Reasoning (*Gf*), the cognitive functioning that involves the ability to reason and solve problems that often include unfamiliar information or procedures, (b) Crystallized Intelligence (*Gc*), the cognitive functioning ability that refers to an individual's breadth and depth of knowledge including verbal communication, general information, and reasoning with previously learned procedures, (c) Short Term Memory (*Gsm*), the cognitive ability to hold information in immediate awareness and then use it within a few seconds, (d) Long Term Memory (*Glr*), the cognitive ability defined as an individual's ability to store information efficiently and retrieve it later through association, (e) Visual Processing (*Gv*), the cognitive ability that includes spatial orientation and the ability to analyze and synthesize visual stimuli, and the ability to hold and manipulate mental images, (f) Auditory Processing (*Ga*), the cognitive ability to perceive, analyze, and synthesize patterns among auditory stimuli, and to discriminate subtle nuances in patterns of sound and speech, and (g) Processing Speed (*Gs*), the cognitive ability to fluently and

automatically perform cognitive tasks, especially when under pressure to maintain focused attention and concentration (Flanagan, Ortiz, & Alfonso, 2007).

The KABC-II, Kaufman and Kaufman, (2004) is an individually administered battery of cognitive and processing subtests designed for children ages 3 to 18 years. Administration requires about 25 to 50 minutes for preschool children and about 45 to 70 minutes for school-aged children. The KABC-II was standardized between 2001 and 2003 on 3,025 students selected to be representative of noninstitutionalized, English-proficient children living in the United States. The demographic characteristics used to obtain a stratified sample were age, sex, ethnicity, parental educational level, educational status, and geographic region.

The KABC-II is based on two theoretical models; the Lauria neuropsychological model which gives a Mental Processing Index score and the Cattell-Horn-Carroll (CHC) psychometric model which gives a Fluid-Crystallized Index score. However, only the CHC model was used for this study. The five scales have two names; the first name reflects the Lauria Model and the second name reflects the CHC model. Sequential Processing/Short-Term Memory measures the ability to apprehend and hold information in immediate memory, and then to use it in some way before it is forgotten. Simultaneous Processing/Visual Processing Scale measures the ability to interpret and organize visually perceived material and to generate and test hypotheses related to the solution of problems. Planning Ability/Fluid Reasoning Scale measures the ability to solve novel problem by applying inferences, understanding implications, and applying

inductive and deductive logic. Learning Ability/Long-Term Storage measures the ability to store information in long-term memory and to retrieve that information fluently and efficiently. Retrieval and Knowledge /Crystallized Ability measure the breadth and depth of acquired knowledge (Kaufman & Kaufman, 2004).

The KABC-II has18 subtests as follows: Number Recall, Word Order, Hand Movements, Block Counting, Conceptual Thinking, Face Recognition, Rover, Triangles, Gestalt Closure, Pattern Reasoning, Story Completion, Atlantis, Atlantis Delayed, Rebus, Rebus Delayed, Expressive Vocabulary, Riddles, and Verbal Knowledge. At each age level of the test, a subtest is designated as either a core or a supplemental subtest. Subtests designated as core subtests are used to compute the Mental Processing Index and the Fluid-Crystallized Index. Both core and supplemental subtests are used to compute the Nonverbal Index; these subtests can be administered in pantomime and responded to nonverbally (Sattler, 2008).

The stability of the KABC-II was assessed by having 205 individuals from three age groups (3 to 5, 7 to 12, and 13 to 18) retested after an interval ranging from 12 to 56 days (M = 28 days). For the three age groups, the stability coefficients were, .91, .92, and .92 for the Fluid-Crystallized Index; .87, .90, and .90 for the Mental Processing Index; and .77, .88, and .88 for the Nonverbal Index. Stability coefficients for the subtests ranged from a low of .56 for Conceptual Thinking at ages 3 to 5 and Hand Movements at ages 13 to 18 to a high of .90 for Riddles at ages 13 to 18. On average from the first to the second testing, the Mental Processing Index increased by 9.7 points, the Fluid-

Crystallized Index increased by 8.6 points, and the Nonverbal Index increased by 6.8 points. For the five Scales, increases ranged from .8 point for the Sequential Processing Scale to 11.5 points for the Learning Ability Scale. The construct and criterion-related validity was satisfactory. The median correlation with other measures of intelligence was .81 (Kaufman & Kaufman, 2004 & Sattler, 2008).

The WISC- IV (Weschler, 2003) is an individually administered assessment procedure designed to provide information about factors that may account for children between the ages of 6 to 16 years old intellectual performance. Administration requires approximately 40 to 80 minutes. The WISC-IV was standardized on 2,200 children who were selected to represent children in the United States. The demographic characteristics used to obtain a stratified sample were age, sex, ethnicity, geographic region, and parental education (Wecshler, 2003).

The WISC-IV contains 15 subtests. There are 10 core subtests as follows: Similarities, Vocabulary, Comprehension, Block Design, Picture Concepts, Matrix Reasoning, Digit Span, Letter-Number Sequencing, Coding Search, and Symbol Search. The 5 supplemental subtests are as follows: Information, Word Reasoning, Picture Completion, Arithmetic, and Cancellation. The subtests form four Composites: Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed. Verbal Comprehension measures verbal knowledge and understanding obtained through both informal and formal education and reflects the application of verbal skills to new situations. Perceptual Reasoning measures the ability to interpret and organize visually

perceived material and to generate and test hypotheses related to problem solving. Working Memory measures immediate memory and the ability to sustain attention, concentrate, and make use of mental control. Processing Speed measures the ability to process visually perceived nonverbal information quickly, with concentration and rapid eye-hand coordination (Weschler, 2003; Sattler, 2008).

The WISC-IV is considered to have reliability, Sattler (2008). Internal consistency reliability coefficients for the 11 age groups ranged from .91 to .95 for verbal comprehension, from .91 to .93 for perceptual reasoning, from .90 to .93 for working memory, from .81 to .90 for processing speed, and from .96 to .97 for full scale. The test-retest reliability of the WISC-IV was assessed by retesting 18 to 27 children from each of the 11 age groups in the standardization sample after 13 to 63 days. The stability coefficients for the four individual composites and the full scale in the five broad age groups ranged from .84 to .93 for verbal comprehension, from .81 to .87 for perceptual reasoning, from .81 to .87 for working memory, from .73 to .84 for processing speed and from .85 to .92 for full scale.

The WJ III COG (Woodcock, McGrew, and Mather, 2001) is an individually administered battery of cognitive tests designed for individuals' ages 2 to 90+ years. Administration requires approximately 40 to 120 minutes depending on whether standard or extended battery was administered. It was standardized on a sample selected to be representative of the population, based on U.S. Census projections for the year 2000.

There were 1,143 preschool children, 4,783 school-aged children and adolescents, 1,165 college and university students, and 1,843 adults.

The WJ III COG was developed using the CHC structure of intelligence. Subtests represent the CHC seven clusters as follows: comprehension knowledge, long-term retrieval, visual-spatial thinking, auditory processing, fluid reasoning, processing speed, and short memory. The WJ III COG has 20 subtests, with 10 in the standard battery and 10 in the extended battery. The standard battery consists of the following subtests: verbal comprehension, visual-auditory learning, spatial relations, sound blending, concept formation, visual matching, numbers reversed, incomplete words, auditory working memory, and visual-auditory learning-delayed. The extended battery has the following additional subtests: general information, retrieval fluency, picture recognition, auditory attention, analysis-synthesis, decision speed, memory for words, rapid picture naming, planning, and pair cancellation.

The WJ III COG reliability coefficients for the general intelligence ability (GIA) for the standard battery and extended is .97 and .98 respectively. The internal consistency reliability coefficients for the seven clusters associated with the CHC Model range from .81 to .95. The internal consistency reliability coefficients for the 20 subtests range from .76 to .97. The manual describes a test-retest study involving 1,196 individual in four age groups (ages 2 to 7, 8 to 18, 19 to 44, and 45 to 95) who were retested after three different retest intervals. The test-retest correlations, which cut across subjects of different developmental levels and retest intervals, support the reliability of

the reported measures across administrations at extended retest intervals (Woodcock, Schrank, & McGrew, 2007). "The failure to present stability coefficients for all of the WJ COG III subtests in the technical manual is unfortunate because there is no way of evaluating the stability of the scores in the standardization sample" (Sattler, 2008, p. 699).

Concurrent validity is indicated by correlations between the GIA and other measures of intelligence with a range of .62 to .76. Edwards and Oakland (2006) studied seven cognitive tests on the WJ III COG: concept formation, verbal comprehension, visual-auditory learning, numbers reversed, sound blending, visual matching, and spatial relations. They reported that the factor structure of the WJ III COG is similar for European American and African American children in kindergarten to twelfth grade who were in the standardization sample.

Parenting Stress Index

Parenting stress was measured utilizing the *Parenting Stress Index, 3rd edition* (PSI) by Abidin (1995). The PSI was standardized on 2,633 mothers recruited from well-child care centers, public school day care centers, private and public pediatric clinics, and health maintenance programs. Ninety-six percent of the sample came from the east coast of the United States, primarily Virginia. Ethnic composition of the sample was 76% European American, 11% African American, 10% Hispanic, and 2% Asian. Children who were the focus of the PSI ranged from 1 to 12 years of age. For about 4% of the sample, the target child was a clinical referral.

The PSI requires approximately 20 minutes to complete. Mothers are instructed to only think about the target child and not siblings. Mothers are instructed to choose answers which best describe their feelings. Examples from the Child Domain are: My child appears disorganized and is easily distracted, and When playing my child does not often giggle or laugh. Within the PSI, there is a subscale that measures the responding patterns of examinees. This subscale is called the Defensive Responding scale, which indicates whether an individual is responding in a defensive manner. Prior to interpreting the content scores of the PSI, an examination of the Defensive Responding score is conducted. The Defensive Responding score is based on the actual raw score of items marked by the mother. A Defensive Responding score of 24 or less indicates that the individual may be responding in a defensive manner, and caution is exercised in interpreting the remainder of the scores (Abidin, 1995).

The PSI uses a 101 item Likert-type (1- strongly disagree, 2 disagree, 3 not sure, 4 agree, or 5 strongly agree) self-report questionnaire designed for parents of children to assess stress in the parent-child relationship in Parent and Child Domains. Raw scores are converted to percentile ranks. The Child Domain measures temperamental characteristics of the child as well as interactive types of variables between parent and child, which negatively impact the personality and sense of self of the parent. Subscale scores above the 85th percentile are considered significant for the Child Domain. The Parent Domain measures personality and pathology of the parent that contributes to stress

in the parent-child relationship. Subscales scores above the 80th percentile are considered clinically significant for the Parent Domain (Abidin, 1995).

There are 13 factors in a six scale Child Domain and a seven scale Parent Domain. With regard to the child characteristics, the PSI assesses the temperamental variables of Adaptability, Demandingness, Mood, and Distractibility. The interactive variables are Acceptability and Child Reinforces Parent. Parent characteristics are related to the parent's personality and pathology, and derived from parent's Depression, Sense of Competence in the Parenting Role, and Parental Attachment. In addition, there are situational variables which are seen as significant contributors to the stress level in a parent-child relationship. These are the parent's Relationship with Spouse or Significant Other, Social Isolation, Parental Health, and Restrictions of the Parenting Role. A Total Stress Score is obtained by summing the raw scores obtained on the Child and Parent Domains (Abidin, 1995).

In the current study, although all 13 factor scores were obtained (six Child Domain and seven Parent Domain), scores from only the four temperamental variables of Adaptability, Demandingness, Mood, and Distractibility were used. The Adaptability scale measures whether parents view their parenting task as more difficult because of the child's inability to adjust to changes in his physical or social environment. The Demandingness scale measures whether the parents feel that the child is placing many demands on them. The Mood scale measures whether the child is unhappy or depressed and cries frequently. The Distractibility scale measures whether parents believe that their

child displays behavioral symptoms of over activity, restlessness, distractibility, short attention span, and does not seem to listen, fails to finish things, and has difficulty concentrating (Abidin, 1995).

In a cross cultural validation of the PSI, Hauenstein, Scarr, and Abidin (as cited in Abidin, 1995) reported that the alpha reliability coefficients indicated a high degree of internal consistency. The alpha coefficients were .91 for the Child Domain, .92 for the Parent Domain, and .95 for the Total stress.

The stability of the PSI scales was supported by the large test-retest reliability coefficients obtained from three different studies by Burke, Zakreski, and Hamilton, as reported in Abidin (1995). For example, a study utilizing data from 15 mothers, Burke reported correlation coefficients of .82 for the Child Domain and .71 for the Parent Domain. Similarly, Zakreski in a study of the relationship between parenting stress, marital stress, and infant development on a sample of 54 parents, reported correlation coefficients of .77 for the Child Domain, .69 for the Parent Domain, and .88 for Total stress score. In a study by Hamilton of the relationship of stress, coping, and support to the quality of mother-infant attachment, obtained reliability coefficients of .55 for the Child Domain, .70 for the Parent Domain, and .65 for the Total stress score.

The literature review revealed a number of studies where PSI was used to study relationships between environmental factors and children's psychological well being. Acton and During's (1992) study of aggression management programs; Beck, Young, and Tarnowski's (1990) research on Attention Deficit Disorder; also Barkley,

Anastopolous, Guevtemont, and Fletcher's (1992) research on Attention Deficit Disorder; and Webster-Stratton's (1998) study of maternal depression and child conduct problems determined that the PSI was a useful research tool. Similarly, Marsh and Johnston's (1983) study regarding hyperactivity, stress, and self esteem using behavioral observations provided strong concurrent validity data for the PSI.

Design

Existing data were used for this study. The data were collected from clients evaluated in the Integrated Clinic of Behavior and Learning Evaluations (ICBLE) between spring 2008 and fall 2010. The ICBLE mission is to provide service to the citizens with regard to their children's poor academic and behavior performance, and as an educational center for students from Family Services and Special Education at Texas Woman's University. All PSI screeners and cognitive evaluations were administered and scored under faculty supervision. A professor from the Family Services department administered and scored the PSI. Mothers completed the PSI while their children were evaluated.

PsychData was used to analyze and store data in a form of raw scores, standard scores, and/or percentiles by a graduate assistant. This program aided in the merging of numerous data files, automatic coding of files for Statistical Package for the Social Sciences 15 (SPSS) and created a clean data entry. In addition, since this was on ongoing project, the influx of data was easier to manage with this type of entry and storage.

Statistical Analysis

All data were entered and analyzed using SPSS to determine if the independent variable (perceived parenting stress due to child's temperament) and the dependent variable (child's cognitive ability) were significantly correlated. The data set included the child's seven broad cognitive abilities (Gc, Gf, Glr, Gs, Gsm, Gv, and Ga) as described from the CHC model and the child's four temperament characteristics (AD, DE. MO, and DI) as described from the PSI. A quantitative between subject correlations were used to determine if a relationship existed between the quantifiable variables.

Each of the cognitive factors was correlated with each of the child temperament variables as ratings from mothers, using Pearson's Product-Moment correlation analysis (Gay, Mills, & Airasian, 2009). A scatterplot was constructed for each of the bivariate relationships studied with the Pearson correlation. The p value was set at .05. Furthermore, each of the child temperament variables was separately regressed on the set of cognitive abilities in order that the researcher might detect a collection of abilities that related to a given temperament.

CHAPTER IV

RESULTS

This chapter presents the results as follows: (1) research question; (2) the source of data; (3) participants' demographics; (4) method of measuring the relationship between *Parent Stress Index* (PSI) and child's cognitive processes; (5) each PSI factor is reviewed for its relationship to cognitive processes; and (6) the summary of results.

Research Question

The purpose of this study was to address the research question: What is the relationship between a child's cognitive abilities (Cattell-Horn-Carroll Theory of general intelligence) and the parents' perception of their child's characteristics from the Child Domain subtest in the *Parenting Stress Index*?

Cognitive Abilities (Processes)

- Gc (crystallized intelligence)
- Gf (fluid intelligence)
- Glr (long term retrieval)
- Gs (processing speed)
- Gsm (short term memory)
- Gv (visual memory)
- Ga (auditory processing)

Child Domain

- AD (Adaptability)
- DE (Demandingness)
- DI (Distractibility)
- MO (Mood)

Source of Data

The cognitive evaluations representing the child's cognitive functioning, as measured by the Cattell-Horn-Carroll (CHC) Theory, were utilized. The scores were obtained from the following evaluations: *Woodcock Johnson III Test of Cognitive Abilities* (WJ-III COG), *Kaufman Assessment Battery for Children* (KABC- II), or *Wechsler Intelligence Scale for Children* (WISC- IV). The Child Domain portion of the Parenting Stress Index (PSI) screener, which measures child temperaments causing parenting stress, represented mothers' ratings of their children's temperaments. The above data were collected between spring 2008 and fall 2010 by the Integrated Clinic of Behavior and Learning Evaluations (ICBLE).

Variables such as gender, ethnicity, socio-economic status, and mother's characteristics were not analyzed in the study due to the limited sample size. The demographic information pertaining to the participants is presented in Tables 1 and 2 on the following page.

Demographic Description of Participants

Table 1

Mothers' Ethnicity, Marital Status and Age

Variable	Mothers n=16	Percentage
Ethnicity		
Caucasian	15	93.75
Hispanic	1	6.25
Marital Status		
Married	15	93.75
Single	1	6.25
Age		
Mean	43.4 years	
Median	43.5 years	
Range	37-52 (15 years)	

Table 2

Children's Age

Variable	Children n=16	Percentage
Gender		
Male	11	68.75
Female	5	31.25
Age		
Mean	10.6	
Median	8.5	
Range	6-19 (13 years)	

A total of 32 participants were in this study. There were 16 mothers and 16 children. The 93.75 % of the mothers were Caucasian and married, and had average and

median ages of 43.4 and 43.5 years respectively. The 68.75 % of children was male and the 31.25 % was female. The average and the median ages of the children were 10.6 and 8.5 years respectively.

Method of Measurement

There are a number of different methods of measuring the relationship between parental stress and its effect on child's cognitive processes. Since the scores obtained using PSI, WJ III COG, KABC-II, and WISC-IV are interval data, the Pearson *r* is an appropriate method to measure correlation coefficient. Furthermore, Pearson *r* results in the most precise estimate of correlation between variables, especially when the sample size is fewer than 30 (Gay, Mills, & Airasian, 2009). The use of Pearson r analysis, assumes that the relationship between the variables is linear.

Tables 3 through 6 contain the correlation coefficients for the four factors of distractibility, adaptability, demandingness, and mood correlated with the seven cognitive processes. The figures associated with significant and relevant correlation coefficients are included in this chapter, and the remaining are in Appendix C. The correlations were considered significant and relevant for *r* value larger than .30 for the size of sample utilized in this study (Cohen & Cohen, 1975). However, the results reported here are relevant to a purely descriptive inquiry about the relationships between parent and child's variables.

The discussion of results is organized by four measures of child temperament that cause parent stress and their correlations to the seven cognitive processes. The four

measures of child temperament (resultant behavior) are distractibility, adaptability, demandingness, and mood. The seven cognitive processes are fluid intelligence, crystallized intelligence, visual processing, short term memory, long term retrieval, auditory processing, and processing speed.

Distractibility and Cognitive Processes

Table 3

Correlations between Distractibility and Cognitive Processes

Variable	n	r	p
Crystal intelligence	16	-.153	.286
Long term retrieval	14	-.489*	.038
Visual-spatial	15	.158	.287
Auditory processing	10	.501*	.070
Fluid intelligence	15	-.027	.462
Processing speed	10	-.207	.283
Short term memory	16	.029	.457

Note. One-tailed significance tests were performed. * denotes significant relationship. p value of <.05.

The analysis indicated significant and relevant correlation between distractibility and long term retrieval and auditory processing with correlations coefficients of -0.489 and +0.501 respectively. The relationship was negative for long term retrieval (Figure 1) and positive for auditory processing (Figure 2). The mother's observation that the child was highly distractible suggested decreased a child's ability for long term retrieval. This finding suggests that distractibility may reduce the child's ability to store information efficiently and retrieve it later through association. However, distractibility increased

auditory processing, which suggests it increased the ability to perceive, analyze, and synthesize patterns among auditory stimuli, and to discriminate subtle nuances in patterns of sound and speech.

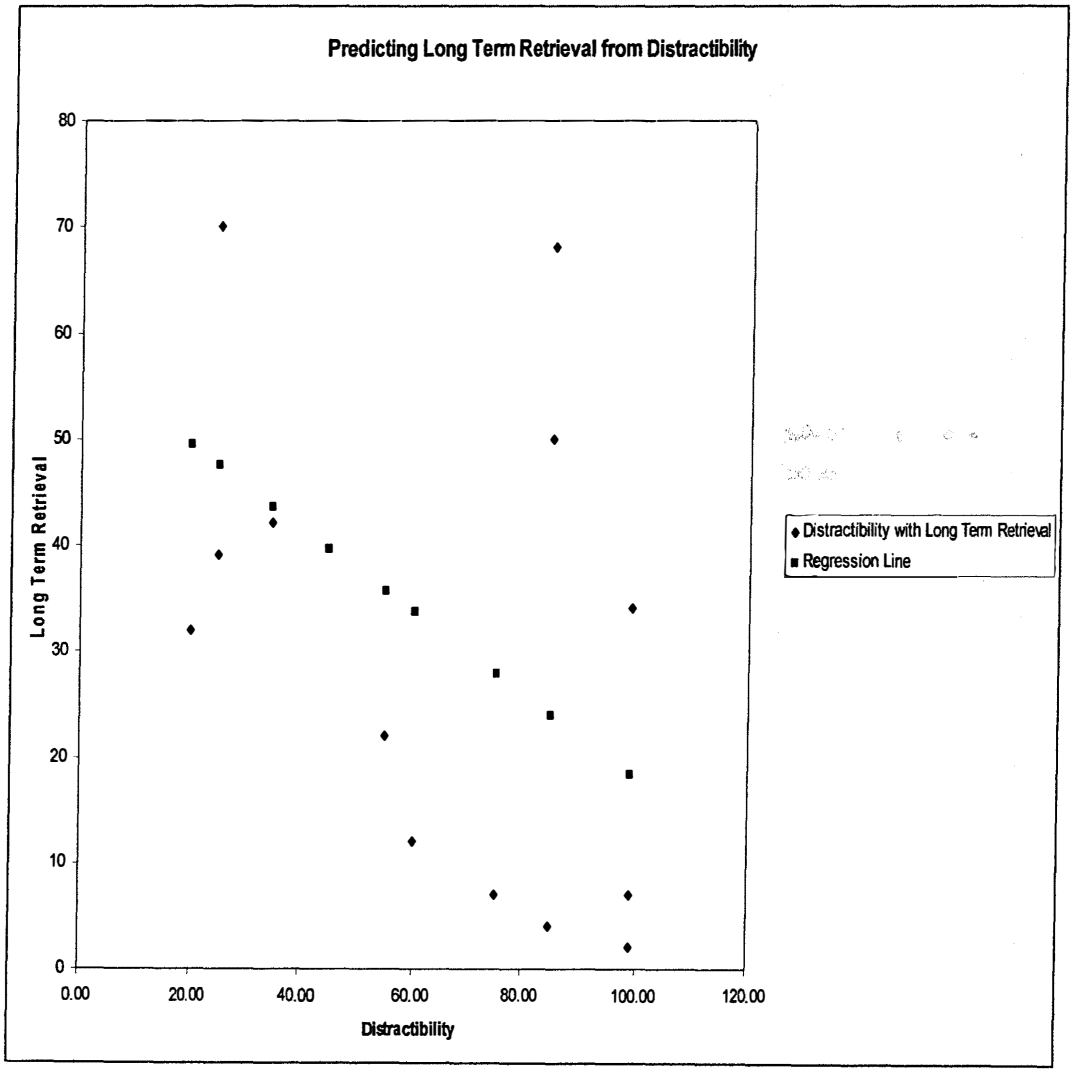

Figure 1. Distractibility and long term retrieval.

Figure 1 represents the degree of negative relationship between distractibility and long term retrieval.

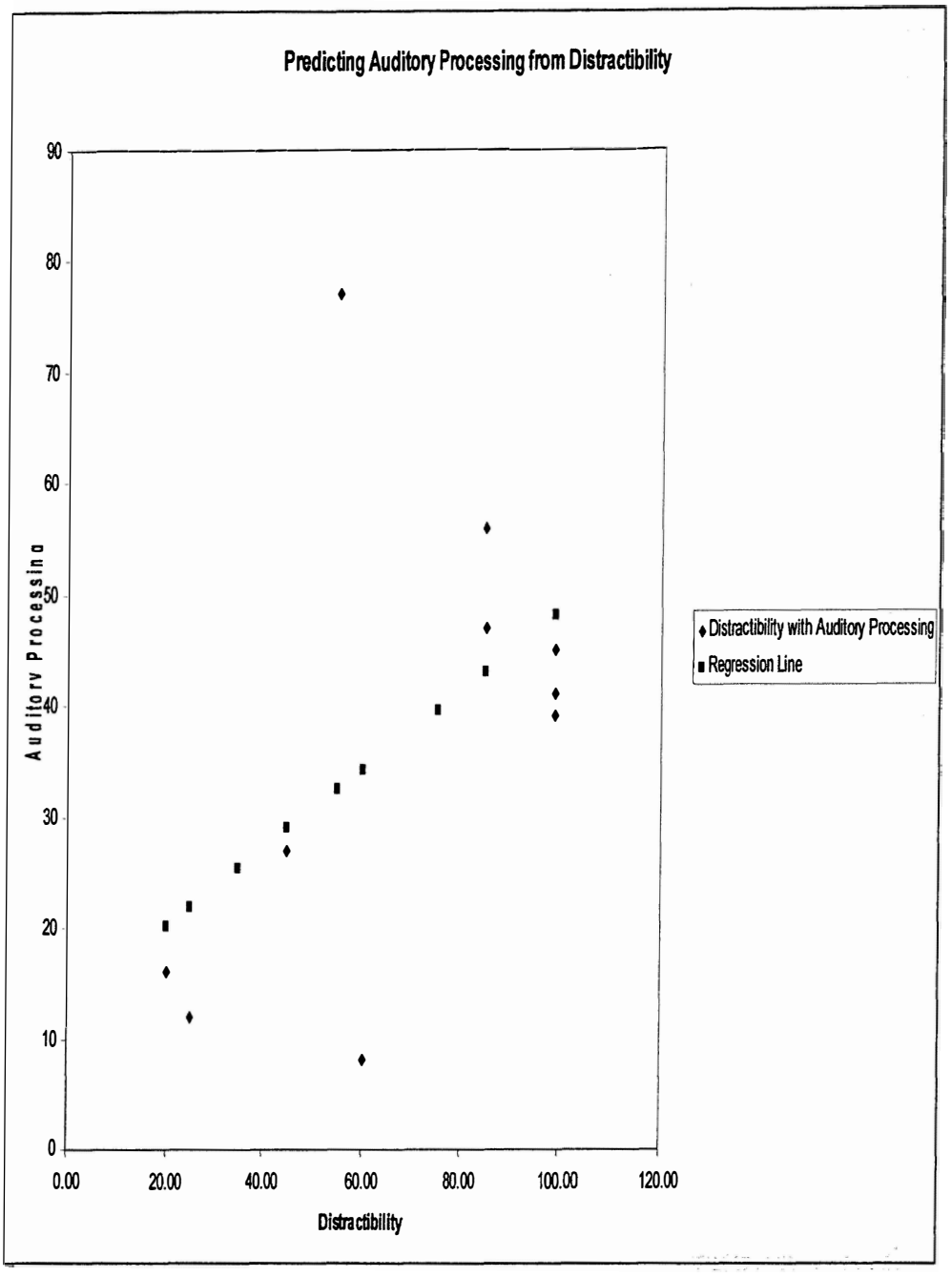

Figure 2. Distractibility and auditory processing.

Figure 2 represents the degree of positive relationship between distractibility and auditory processing.

Table 4

Correlations between Adaptability and Cognitive Processes

Variable	n	r	P
Crystal intelligence	16	.307*	.124
Long term retrieval	14	-.095	.374
Visual-spatial	15	.197	.241
Auditory processing	10	-.291	.208
Fluid intelligence	15	-.040	.444
Processing speed	10	-.154	.336
Short term memory	16	.462*	.036

Note. One-tailed significance tests were performed. *denotes significant relationship. p value of <.05.

The positive correlation coefficients between adaptability and crystallized intelligence and short term memory, +0.307 and +0.462 respectively, indicated a relationship. A high score on adaptability suggests the child's inability to adjust to changes in his/her physical environment or social environment. The positive relationship between adaptability and crystallized intelligence suggested a relationship of the child's breadth and depth of knowledge including verbal communication, general information, and reasoning with previously learned procedures. Likewise, the positive relationship between adaptability and short term memory suggested an increase in the child's cognitive ability of short term memory along with high adaptability. This suggested

higher the adaptability score the more a child could hold information in immediate awareness and then use it within a few seconds.

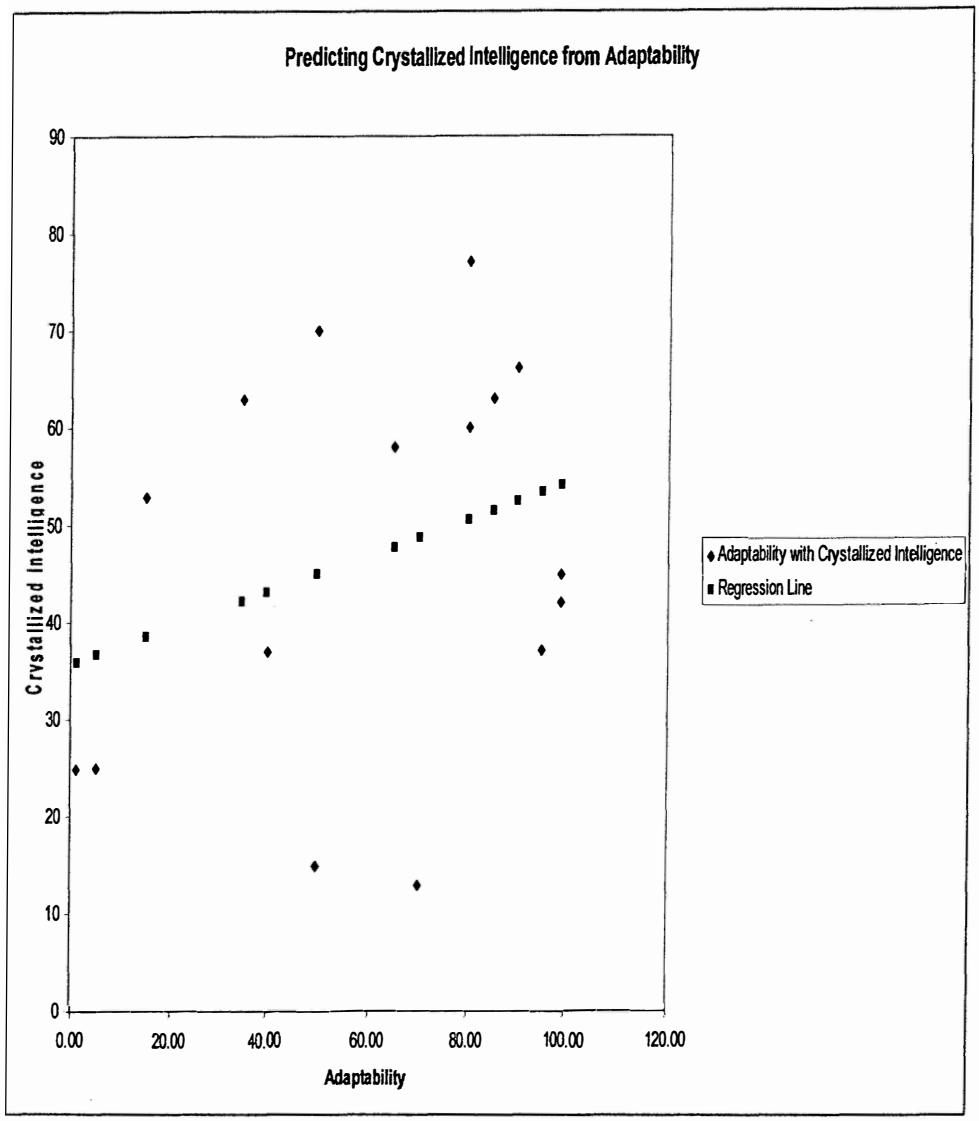

Figure 3. Adaptability and crystallized intelligence.

Figure 3 represents the degree of positive relationship between adaptability and crystallized intelligence.

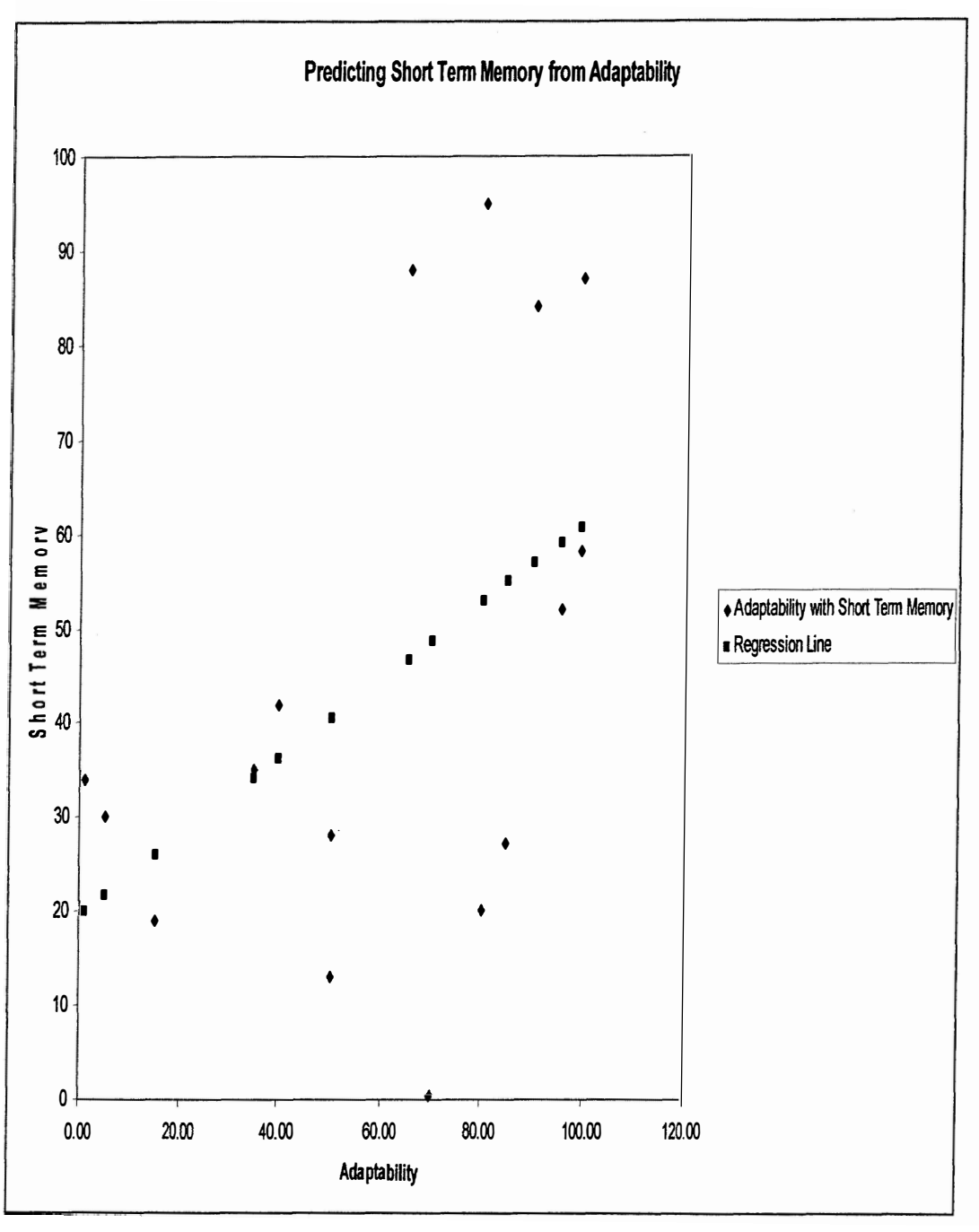

Figure 4. Adaptability and short term memory.

Figure 4 represents the degree of positive relationship between adaptability and short term memory.

Table 5

Correlations between Demandingness and Cognitive Processes

Variable	n	r	p
Crystal intelligence	16	.263	.163
Long term retrieval	14	-.280	.166
Visual-spatial	15	.051	.428
Auditory processing	10	-.220	.270
Fluid intelligence	15	-.241	.194
Processing speed	10	-.399*	.127
Short term memory	16	.397*	.064

Note. One-tailed significance tests were performed. * denotes significant relationship. p value of <.05.

The relationships between demandingness and processing speed and short term memory were significant and relevant as indicated by correlation coefficients of -0.399 and +0.397 respectively. A higher score for demandingness suggests that a child places many demands upon the parent. The relationship was negative for processing speed and positive for short term memory. The mother's perception that the child was demanding seemed to decrease a child's ability of processing speed. This relationship suggests a demanding child would have a reduced ability to fluently and automatically perform cognitive tasks, especially when under pressure to maintain focused attention and concentration. However, demandingness increased the short term memory, which

suggests the child's ability to hold information in immediate awareness and then use it within a few seconds.

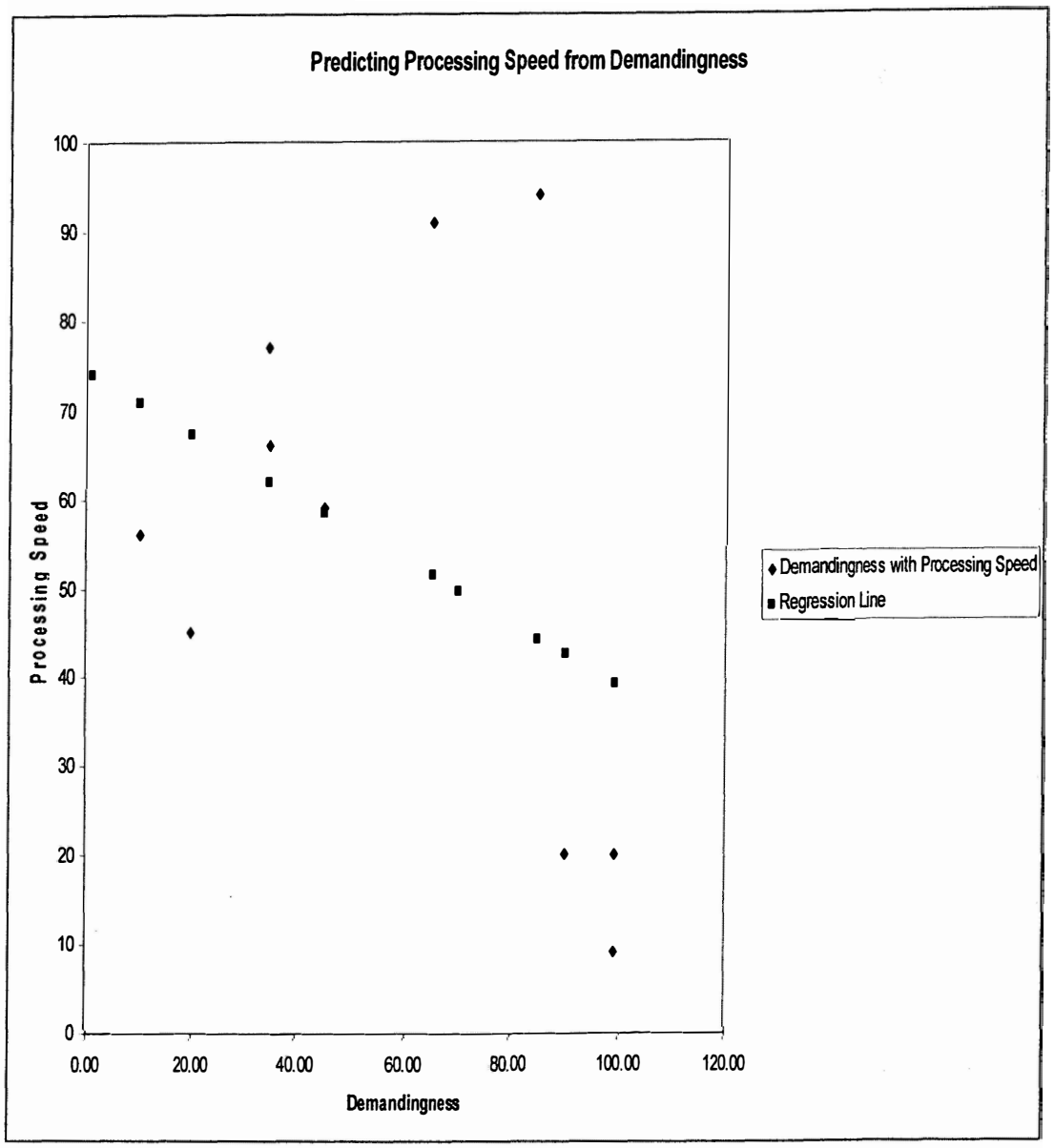

Figure 5. Demandingness and processing speed.

Figure 5 represents the degree of negative relationship between demandingness and processing speed

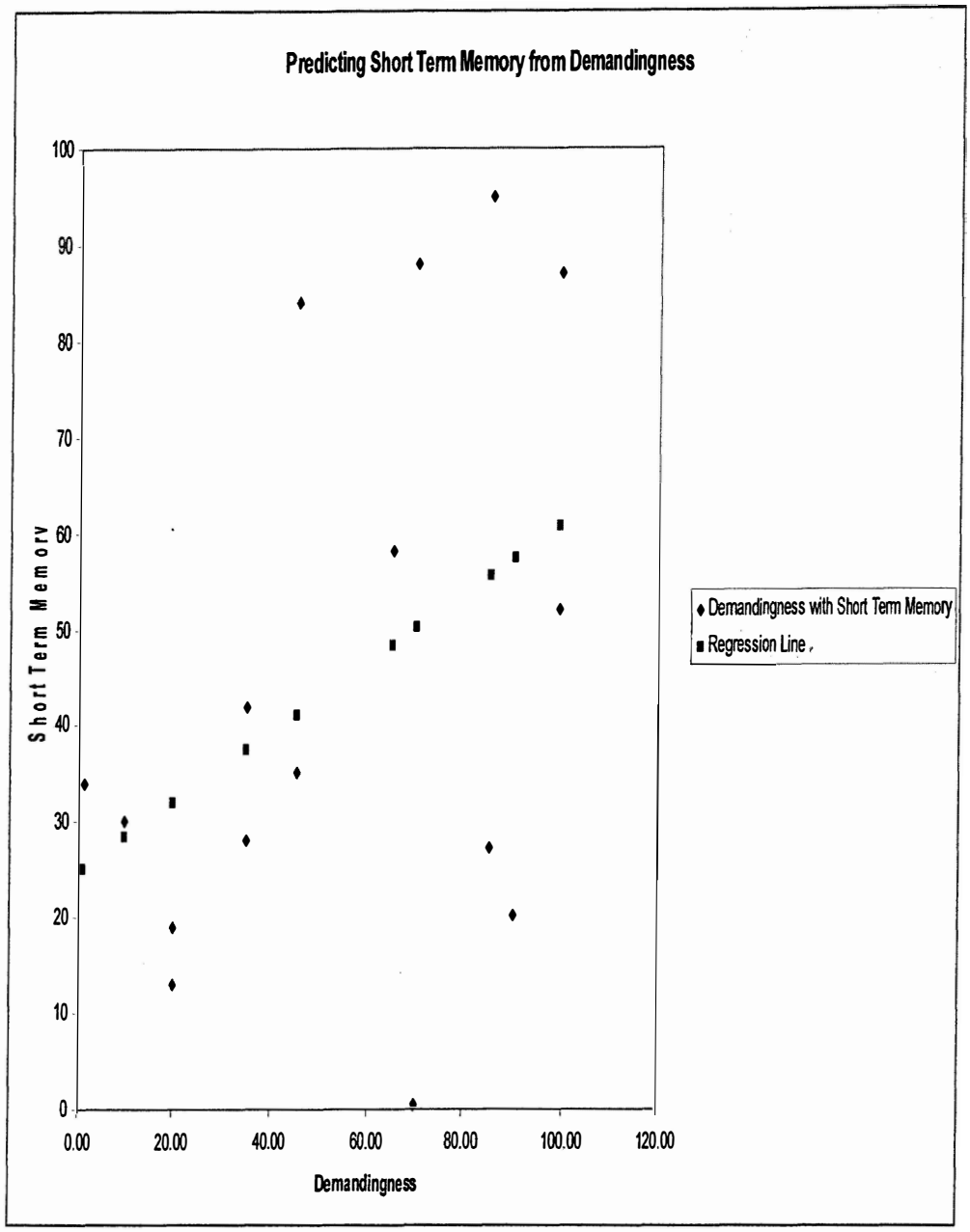

Figure 6. Demandingness and short term memory.

Figure 6 represents the degree of positive relationship between demandingness and short term memory.

Table 6

Correlations between Mood and Cognitive Processes

Variable	n	r	P
Crystal intelligence	16	-.196	.234
Long term retrieval	14	-.374*	.094
Visual-spatial	15	.147	.301
Auditory processing	10	-.376*	.142
Fluid intelligence	15	-.363*	.092
Processing speed	10	-.415*	.116
Short term memory	16	.285	.143

Note. One-tailed significance tests were performed. * denotes significant relationship. p value of <.05.

The correlation coefficients for relationships between mood and long term retrieval, auditory processing, fluid intelligence, and processing speed-0.374, -0.376, -0.363, and -0.415 respectively, could indicate that mood negatively and substantially influences these cognitive processes. The mother's observation that the child was highly moody, meaning unhappy, depressed, and crying frequently, seemed to decrease a child's ability for long term retrieval, auditory processing, fluid intelligence, and processing speed. The mother's perception indicated that the unhappy and depressed child had a reduced ability to store information efficiently and retrieve it later through association; to perceive, analyze, and synthesize patterns among auditory stimuli and to discriminate

subtle nuances in patterns of sound and speech; to reason and solve problems that often include unfamiliar information; and to fluently and automatically perform cognitive tasks, especially under pressure to maintain focused attention and concentration.

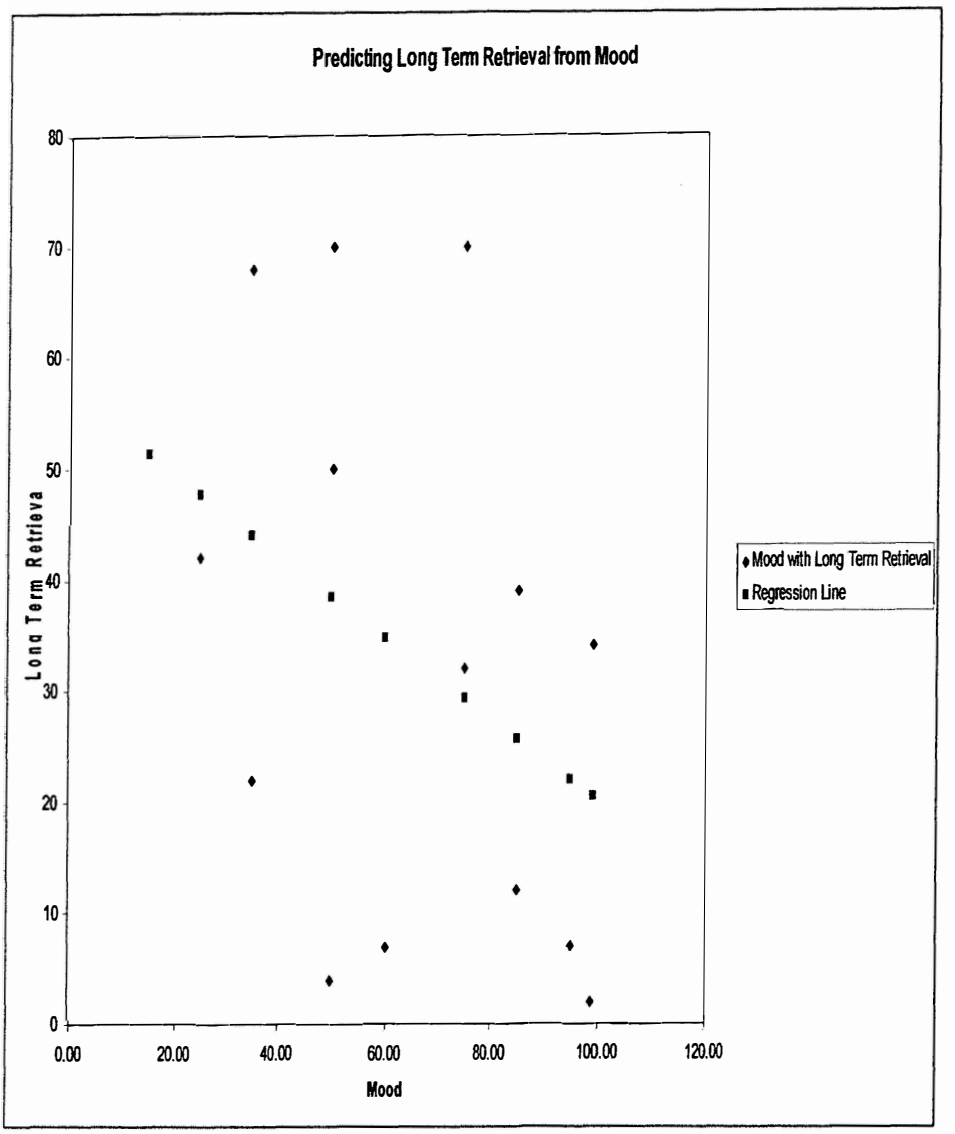

Figure 7. Mood and long term retrieval.

Figure 7 represents the degree of negative relationship between mood and long term retrieval.

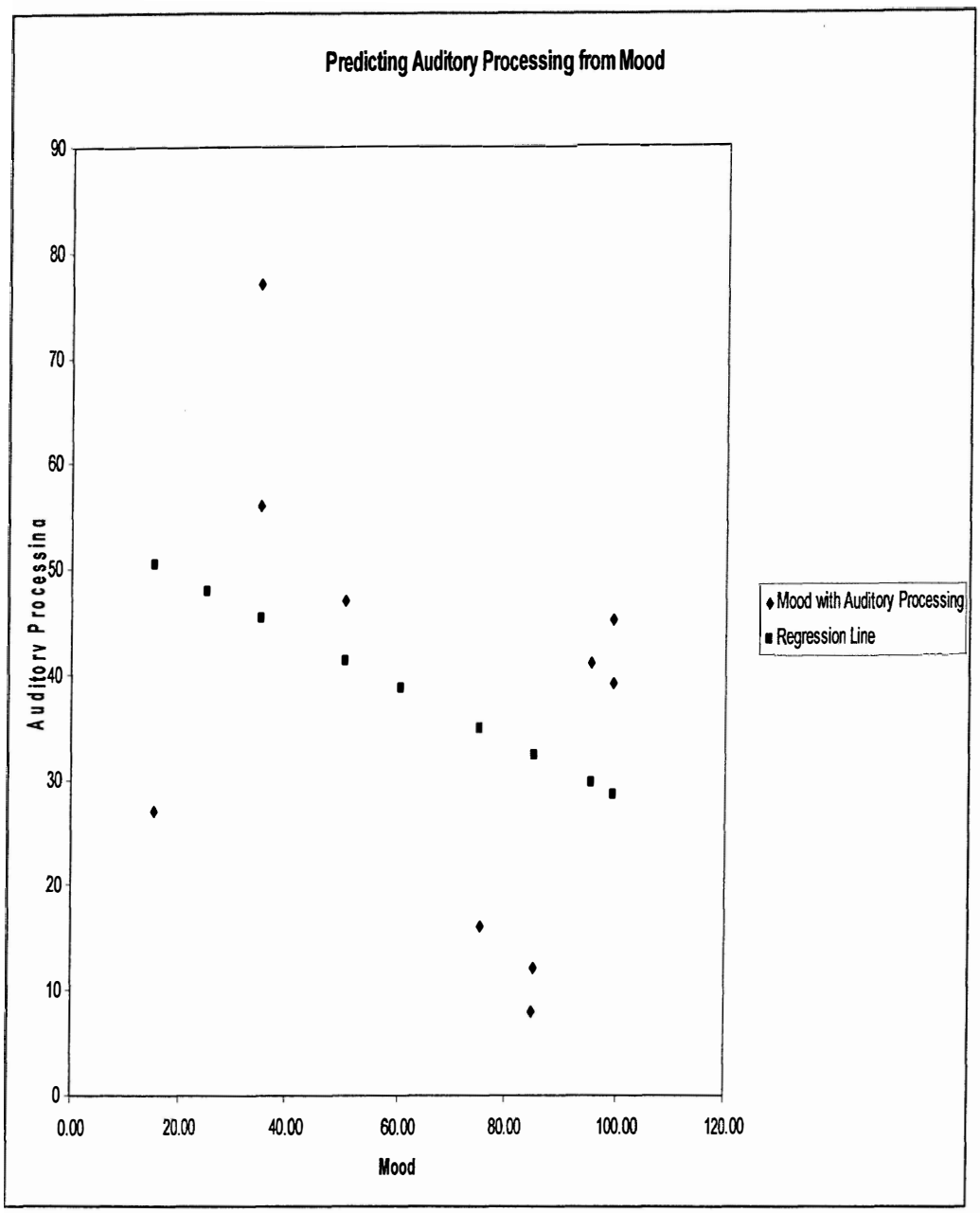

Figure 8. Mood and auditory processing.

Figure 8 represents the degree of negative relationship between mood and auditory processing.

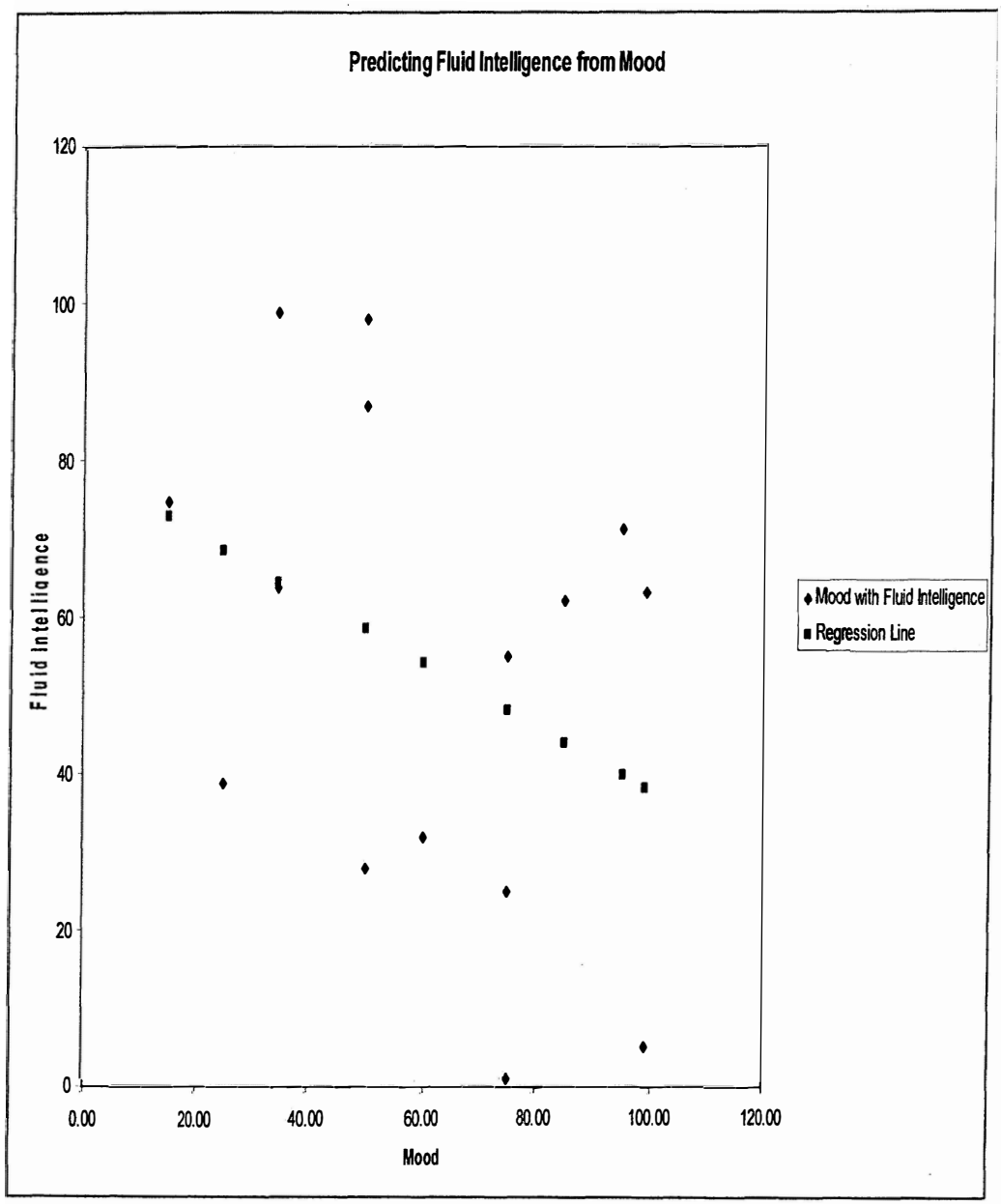

Figure 9. Mood and fluid intelligence.

Figure 9 represents the degree of negative relationship between mood and fluid intelligence.

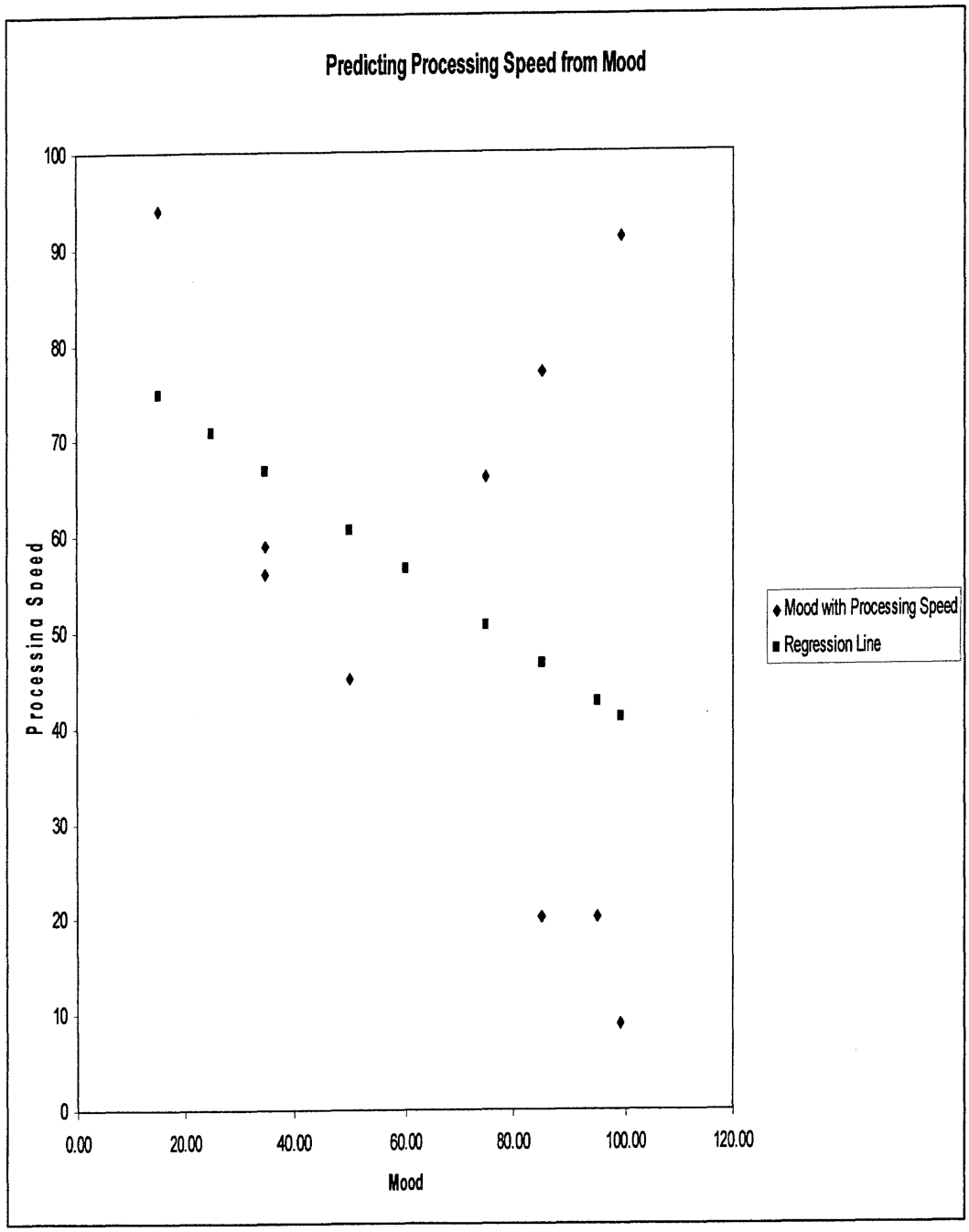

Figure10. Mood and processing speed.

Figure 10 represents the degree of negative relationship between mood and processing speed.

Summary

Table 7

Correlations between Distractibility, Adaptability, Demandingness, Mood and Cognitive Processes

	Distractibility	Adaptability	Demandingness	Mood
Crystal intelligence		.307		
Long term retrieval	-.489			-.374
Visual–spatial				
Auditory processing	.501			-.376
Fluid intelligence				-.363
Processing speed			-.399	-.415
Short term memory		.462	.397	

Note. One-tailed significance tests were performed

In summary, the PSI factors had both positive and negative relatioinships on cognitive processes. The results indicated negative effects of distractibility, demandingness, and mood on long term retrieval, processing speed, auditory processing, and fluid intelligence. The mother's perception was that distractibility, adaptability, and demandingness seemed to improve the cognitive processes of auditory processing, crystallized intelligence, and short term memory. Thus, distractibility and demandingness had both positive and negative relationships on the cognitive processes.

CHAPTER V

DISCUSSION

The purpose of this study was to address the research question: What is the relationship between a child's cognitive abilities (Cattell-Horn-Carroll Theory of general intelligence) and the parents' perception of their child's characteristics from the Child Domain subtest in the *Parenting Stress Index*?

Cognitive Abilities (Processes)

- Gc (crystallized intelligence)
- Gf (fluid intelligence)
- Glr (long term retrieval)
- Gs (processing speed)
- Gsm (short term memory)
- Gv (visual memory)
- Ga (auditory processing)

Child Domain

- AD (Adaptability)
- DE (Demandingness)
- DI (Distractibility)
- MO (Mood)

This chapter discusses five topics in the following order: (1) significant relationships between each PSI factor and cognitive processes, (2) implications of the study, (3) limitations of the study, and (4) future research. The significant relationships observed between each PSI factor and cognitive processes are discussed below.

Distractibility and Cognitive Processes

The results of this study indicated that children, when rated by their mothers, as distractible also demonstrated lower long-term memory and higher auditory processing. Children who were rated as distractible may have lower long term memory because they may not be able to efficiently store information and retrieve it later when needed. A common characteristic of a distractible child is failing to complete tasks, perhaps because he or she is unable to filter out irrelevant stimuli (Finzi-Dottan, Manor, & Tyano, 2006). This child may not effectively process many stimuli at one time. It is indicated lower long term memory skills may be a consequence of the child's inability to efficiently process information.

Children who are distractible may have higher auditory processing because they may be able to hear and focus on many things at one time. They may have become proficient at discriminating the important and the necessary auditory stimuli. Perhaps a child who lives in a home with a lot of noise from a variety of sources may have developed an ability to filter distractions, and acquire proficiency in perceiving, analyzing, synthesizing, and discriminating patterns of sound and speech.

Deater-Deckard et al. (2009) indicated a link between level of chaos (factor contributing to distractibility) and lower cognitive functioning as measured using the sum of scores from the oral vocabulary, pattern analysis, digit span/memory for sentences, and quantitative reasoning. Research by Sakamura, Dang, Ballard and Hansen (2008) for children ranging from 3 to 5 years old indicated that low persistence and high activity

were associated with borderline-deficient cognitive scores, and children with midrange persistence and activity had average cognitive scores. Leung and Connolly (1996) stated that hyperactive children were often distractible, and this temperament was associated with reduced cognitive functioning. Similarly, Ceci and Tishman (1994) reported that children categorized as hyperactive recalled fewer target stimuli as compared to children who were not hyperactive. However, their study reported that hyperactive children performed better in recall and recognition of incidental information, which might be attributed to better memory function.

Alloway, Gathercole, Kirkwood, and Elliott (2009) studied relationships between low working memory, and cognitive skills, classroom behavior, and self-esteem for 308 five to eleven year old children. There was a relationship between low working memory and cognitive skills such as vocabulary, reading, and math. Furthermore, these children were identified to have short attention spans, high levels of distractibility, and difficulties with reasoning. The authors reported that children with low working memory struggled with storytelling and visual representations although such activity could support working memory by drawing on long term memory resources.

Adaptability and Cognitive Processes

The results of this study indicated that children, when rated by their mothers, are appearing to have low adaptability and were also found to have higher crystallized intelligence and higher short term memory. However, Sakimura, Dang, Ballard and Hansen (2008) reported that there was a relationship between lower adaptability and

borderline-deficient cognitive scores. Wolfson, Fields, and Rose (1987) reported that lower adaptability manifested more symptoms of behavior problems. McDevitt and Cary (1978) observed a correlation between adaptability, and problem solving and lower scholastic achievement, which could be related to fluid intelligence. Similarly, Mumford and Connelly (1994) reported that higher adaptability could predict higher performance on problem solving and creative achievement. Miller (2000) studied parent-rated child temperament and school achievement in 1st, 4th and 7th grade children. She observed that adaptability and distractibility were significantly related to children's reading and math scores even with the effects of ability controlled.

A child who is unable to adjust to changes in his or her physical or social environment is perceived as one with low adaptability. This relative inflexibility may allow the child to better focus, which can result in increased crystallized intelligence and short term memory, as reported in this research. A child who has lower adaptability may, as a result, have to deal with fewer physical or social changes. This may allow the child to have better focus resulting in increased crystallized intelligence and short term memory.

Demandingness and Cognitive Processes

The results of this study indicated that children, when rated by their mothers, are appearing to be demanding also appeared to have lower processing speed and higher short term memory. Demanding children may have decreased processing speed because of their inability to fluently and automatically perform cognitive tasks, especially when

under pressure to maintain focused attention and concentration. Demanding children may not as easily respond to pressure for focused attention and concentration because they have primary focus on personal wants and may not be willing or able to respond to external demands.

It is possible that a child who is demanding may be strong willed or strong willed and therefore demanding. These children may have increased short term memory skills because they are persistent with regard to certain desires. This persistence may make them filter out other stimuli and focus on stimuli pertaining to their demand, which can result in increased short term memory. Although this increased short term memory is related to their wants, this attribute may have broader utility. It is possible that a demanding temperament could be beneficial in certain learning situations.

Mood and Cognitive Processes

The results of this study indicated that children, when rated by their mothers, who had higher mood scores had negative correlation with regard to long term retrieval, auditory processing, fluid intelligence, and processing speed. These four cognitive attributes require an ability to focus on the stimuli rather than block them out due to preoccupation with internal factors. A child who is unhappy, depressed, frequently cries and does not display signs of happiness would have difficulty efficiently processing information. A depressed mood generally has been associated with an imbalance in brain's chemical activity which may negatively influence various cognitive processes (Roesch, Weiner, & Vaughn, 2002).

Sakimura, Dang, Ballard, and Hansen (2008) reported in their study on children age 3 to 5 years that negative mood was associated with borderline-deficient cognitive scores, whereas midrange mood characteristic was associated with average cognitive scores. Schor (1985) from his study of 3 to 7 year old children reported that the children with negative mood had significantly higher activity and decreased levels responsiveness.

In summary, the results from this research, in general, support previous work by Burchinal, Feinberg, Pianta, and Howes, (2002), Evans, (2006), McIntire, (1991). These studies observed that parental stress was related to a child's lower levels of school readiness and cognitive ability. Previous research has also observed a negative relationship between parenting stress and children's attention, social, and emotional outcomes (Carlson & Corcoran, 2001; Deater-Deckard et.al, 2009; Evans, 2006; Eyberg, Boggs, & Rodriguez, 1992). However, the findings of this study were inconsistent with research conducted by (Ashbury, Wachs, and Plomin, 2005; Deater-Deckard et al., 2009; McIntire, 1991), which indicated that all measures of stress were negatively and significantly related to a child's cognitive abilities.

A number of other studies have revealed partially related relationships between parenting stress and their child's academic performance (Deater-Deckard et al., 2009; Lugo-Gil & Tamis-LeMonda, 2008). However, there are studies which indicated insufficient information regarding the relationship between parenting stress and their child's cognitive abilities (Calklins, Hongerford, & Dedmon, 2004; Carlson & Corcoran, 2001; Evans & Harrison, 2001; Evans, Harrison, & Burke, 1999). Also, while parenting

stress and child achievement have been identified as correlates of school performance, the importance of assessing parenting stress for predicting later school success need closer examination (Crinc, Gaze, & Hoffman, 2005). For example, does knowledge of parenting stress help identify which children are more likely to be at-risk for school performance? Furthermore, how can this information be used to assist educators in developing early interventions? Does parenting stress negatively or positively affect the seven cognitive processes identified in the Cattell-Horn-Carroll Theory? Educators are interested in identifying the best predictors of school success; therefore, it is essential to examine how family variables affect a child's performance. Bronfenbrenner's biological systems theory suggests that the characteristics of the child, parent, and the environment predict and moderate the magnitude of parenting stress, how the stress is perceived and projected and, how children adapt to and are affected by parenting stress (Bronfenbrenner, 1996).

Implications

On the basis of the indicated relationships between parenting stress and cognitive processes reviewed in the study, an expansion of school programs to employ a bioecological approach to assess the needs of a child should be considered. Such an expanded approach is especially important to take into account the reciprocal interactions within the family system. Developing ways to assist families to effectively cope with family stress could well be among the ways of accommodating educational goals of children (Sheeber & Johnson, 1992). Comparing the effectiveness of current evaluation

methods to identify students at risk to alternative evaluations can help educators meet the needs of students at risk. Specifically, educators should examine the children's risk status as measured by the PSI screener early in the assessment procedure, and use that data to form an alternative hypothesis and plan interventions.

As this study indicated, parenting stress may lead to negative child cognitive scores; therefore, families would benefit from programs that offer guidance in parent-child dyad interactions. Interventions perhaps should focus on showing parents ways to enhance the quality of parent-child interactions. These types of interventions can be beneficial to the family unit if they were offered by community centers and the school systems. Similarly, interventions that teach children to self-regulate their attention may help to develop competence in social, behavioral, and school domains (Bandura, 1978). Furthermore, as this research reported, some PSI factors of child temperaments may increase cognitive abilities. If additional research confirms these relationships then the commonly held negative view, for example, of lower adaptability may have to be revised. Rather than trying to change a child's temperament, perhaps it can be used to benefit and enhance his or her life. "We need to understand the child's temperament to draw a game plan rather than a battle plan" (Moore, 1996).

Limitations

The first limitation of this study is the quality and the quantity of participant sample. The participants did not represent a random sample, and it was not demographically and geographically diverse. Second, the sample size was small. Third,

the participant sample consisted of only those who were referred by their mothers to the ICBLE. Research has documented that perceptions of their children who were referred by their parents tend to rate their children as having more problems than children of non-clinic parent referrals (Ahern, 2003). The participants used in this study may not be truly representative of the heterogeneous group of children who have academic problems. Fourth, this study depended upon the mother's evaluation of the perceived contribution by the child to parenting stress. The mother filling out the PSI screener may report biased information in order to give a socially desirable result. It seems that there is a need to combine parental evaluations with observations of the child's behavior and other sources of verification. Fifth, there are several different screening instruments which could have been selected. Screening instruments can differ in focus (child or parent) and by raters. The *Parenting Stress Index* may be a psychometric limitation.

This study did not intend to establish any cause effect relationship. Furthermore, due to the limitations referred to above, caution should be exercised in valuing the observed relationships between PSI factors and cognitive processes. It is important not to generalize findings of this study.

Future Research

Additional research can be undertaken to replicate this study with a significantly larger sample and with a better measure of *Parenting Stress Index* factors and cognitive processes. For example, mothers' evaluations of their child's behavior need to be cross checked by utilizing other tools, such as third party evaluations of the parent and the child. Future research can also analyze data on parenting stress over several time

intervals to better understand fluctuations in parental stress and children's cognition. Similarly, additional research can evaluate data for children over a much longer period of time such as before preschool and through elementary, middle, and high school. Such longitudinal studies can evaluate the relationships throughout various stages of children's development. Furthermore, it could indicate if and when parenting stress has the greatest impact on the child's cognitive processes.

Finally, studies can evaluate the relationship not only between the maternal stress and her child's cognitive processes, but also include the paternal stress factors. There could be differences in the way that mothers and fathers experience and cope with parenting stress, and similarly, in the relationships between their stress and their child's cognitive processes. Also, there could be differences in the way that children respond to maternal and paternal parenting stress.

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APPENDIX A

IRB APPROVAL FORM

TWU
TEXAS WOMAN'S UNIVERSITY
DENTON DALLAS HOUSTON

Institutional Review Board
Office of Research and Sponsored Programs
P.O. Box 425619, Denton, TX 76204-5619
940-898-3378 Fax 940-898-3416
e-mail: IRB@twu.edu

June 28, 2010

Ms. Christine Woodbury
[redacted]

Dear Ms. Woodbury:

Re: Parenting Stress and the Relationship on Their Child's Cognitive Abilities

The above referenced study has been reviewed by the TWU Institutional Review Board (IRB) and was determined to be exempt from further review.

If applicable, agency approval letters must be submitted to the IRB upon receipt PRIOR to any data collection at that agency. Because a signed consent form is not required for exempt studies, the filing of signatures of participants with the TWU IRB is not necessary.

Another review by the IRB is required if your project changes in any way, and the IRB must be notified immediately regarding any adverse events. If you have any questions, feel free to call the TWU Institutional Review Board.

Sincerely,

Kathy DeOrnellas, Ph.D.

Dr. Kathy DeOrnellas, Chair
Institutional Review Board - Denton

cc. Dr. Larry LeFlore, Department of Family Sciences
Dr. Tammy L. Stephens, Department of Family Sciences
Graduate School

APPENDIX B

CONSENT TO PARTICIPATE IN RESEARCH

Integrated Clinic for Behavior and Learning Evaluation
College of Professional Education
Human Development Building 114
Texas Woman's University
Denton, Texas 76204

Consent Form – Child Evaluation

Date of Consent_____ Date Consent Expires_____

I consent to an evaluation of my child by a TWU graduate student for the purpose of gaining information regarding the presenting problem that I have shared with the evaluator. All graduate students will receive supervision for this testing provided by the faculty of TWU who are credentialed in their respective roles.

Name of Child: _____

Date of Birth: _____

I further understand that, as part of their training, other students may be viewing the assessment of your child; at all times confidentiality will be maintained.

The information provided by clients in this project will be used for research projects such as dissertations. For the purposes of this research, only the age and gender of the client will be used to identify the data such as scores of cognitive ability and/or achievement. At no time will any identifying information such as name of the client be associated with the data when that data is used in a study.

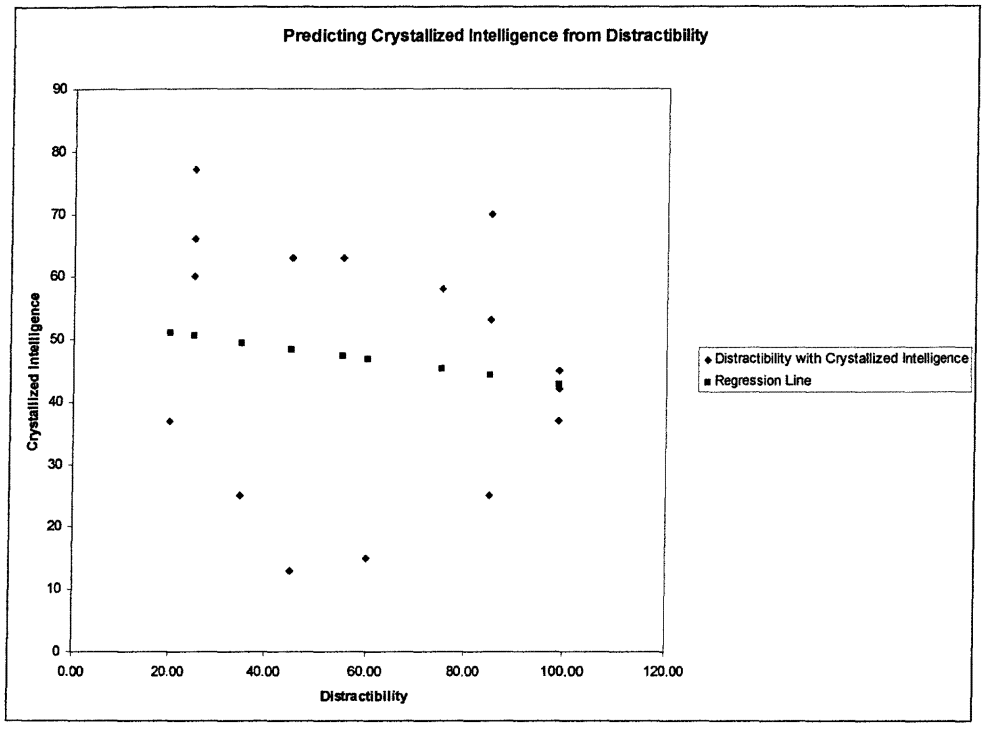
_____ Please initial that you have read this paragraph

_____
Signature of Parent

_____
Printed Name of Parent

APPENDIX C

FIGURES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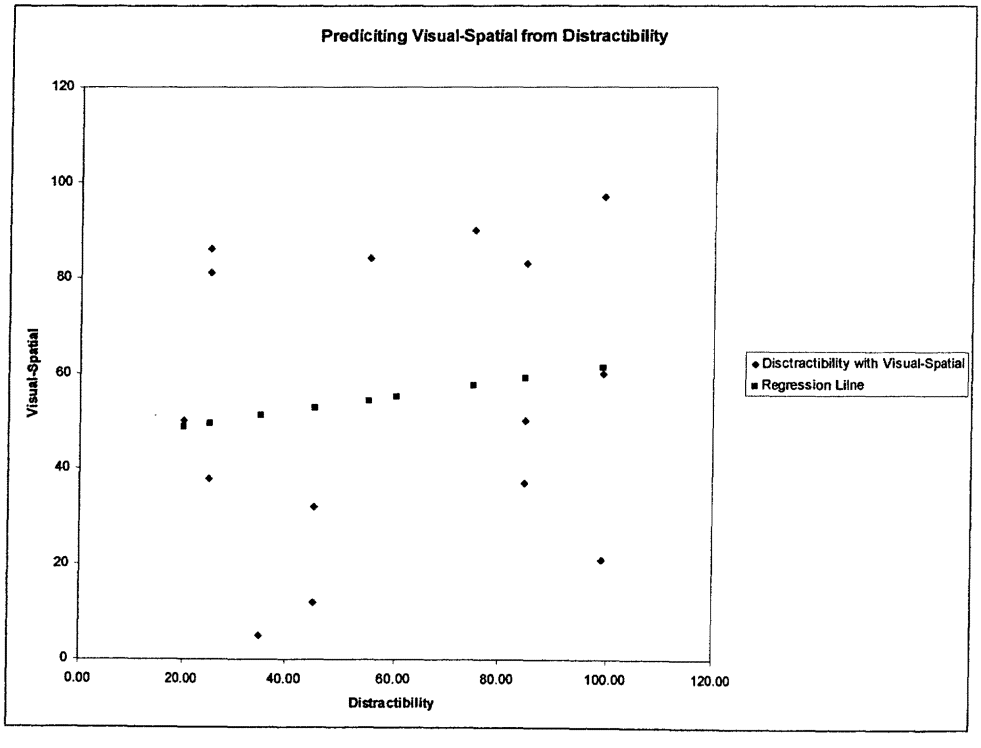
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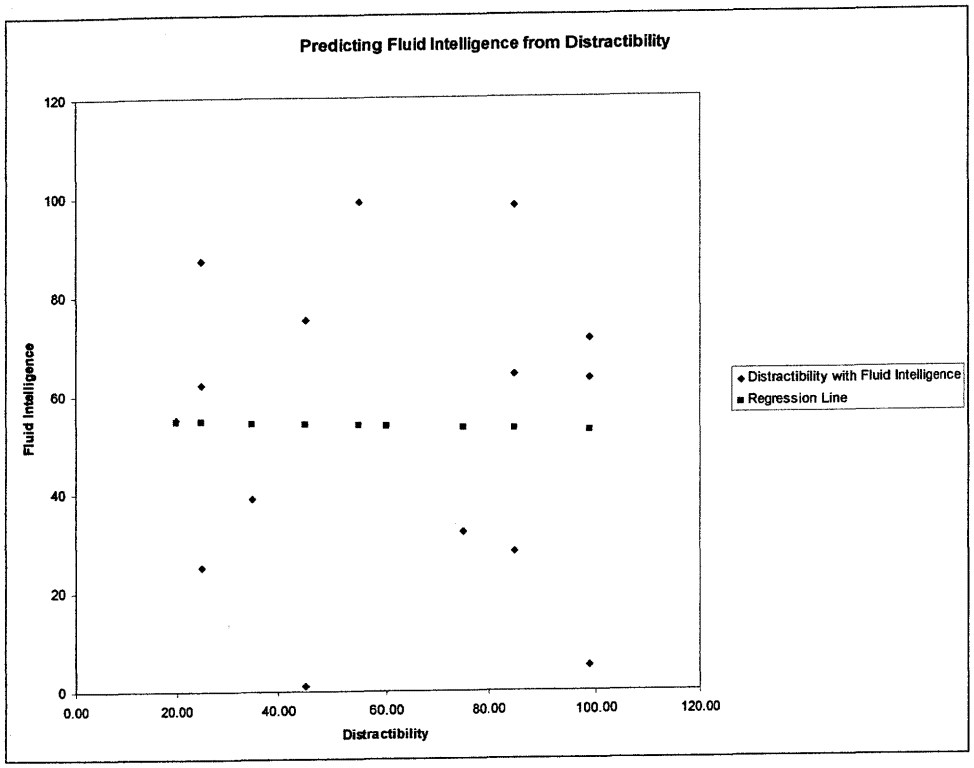
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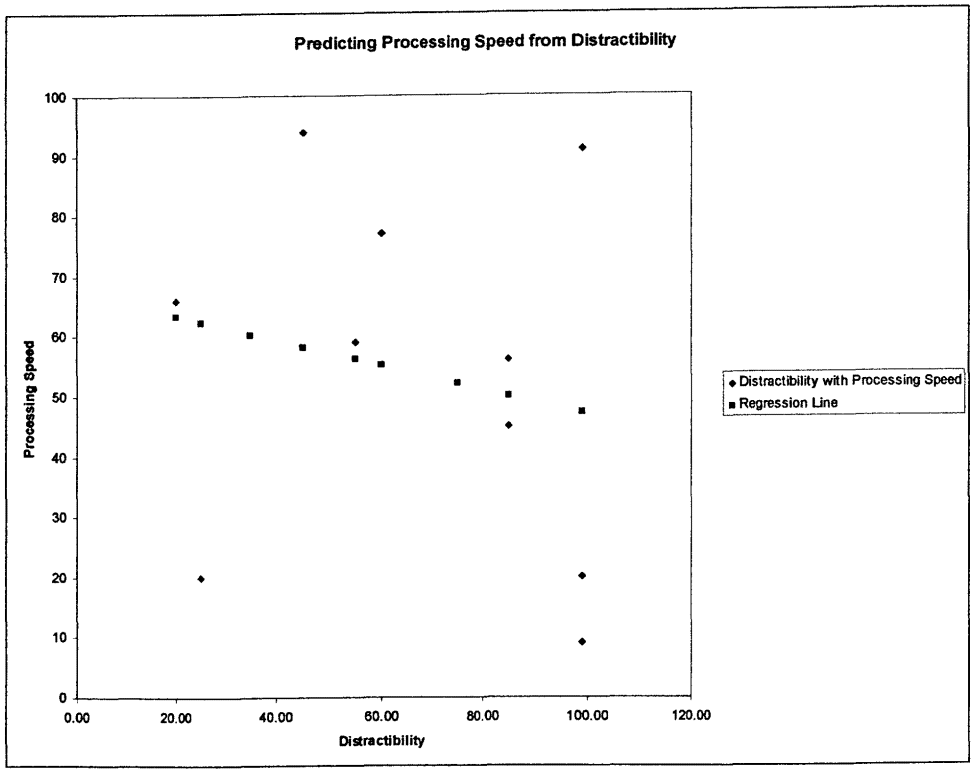
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Distractibility with Processing Speed
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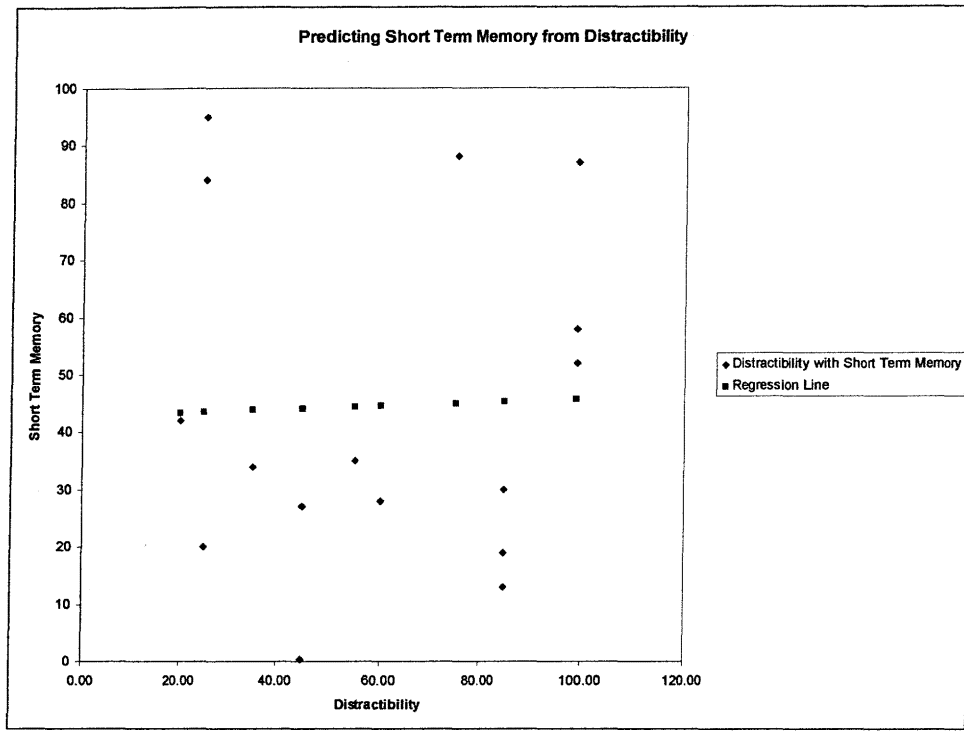
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Distractibility with Short Term Memory
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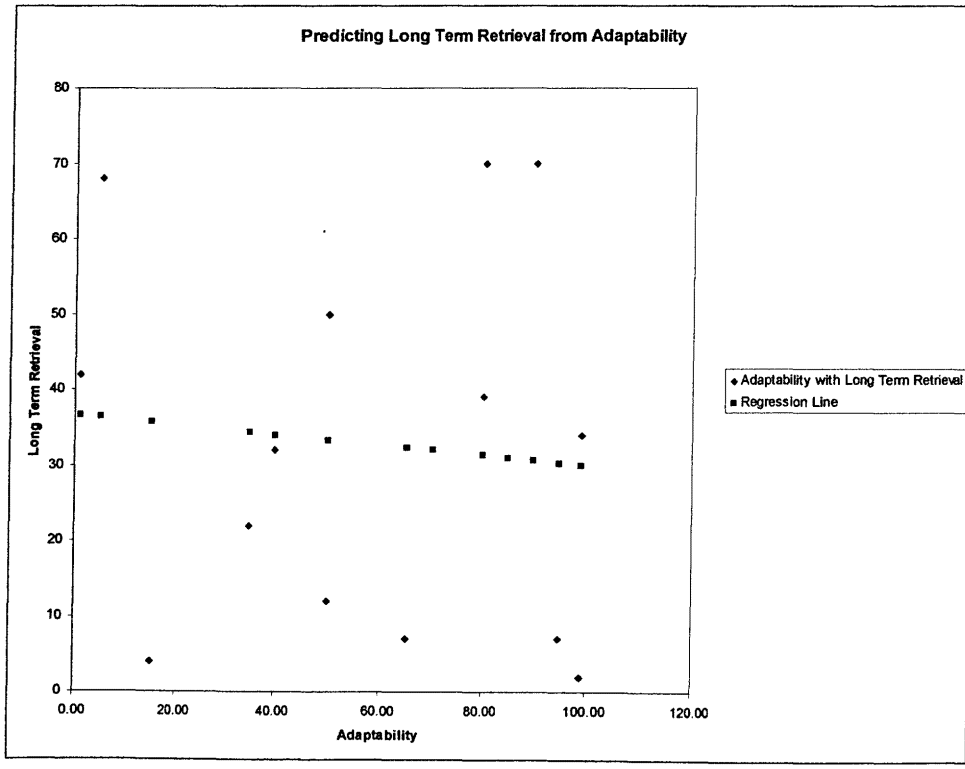
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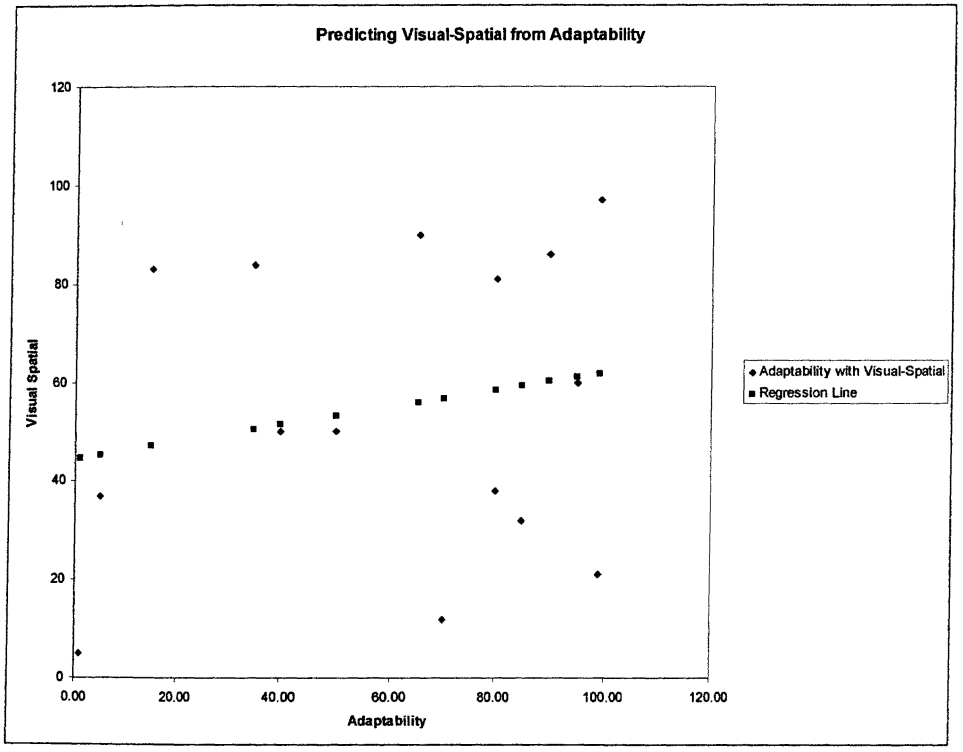
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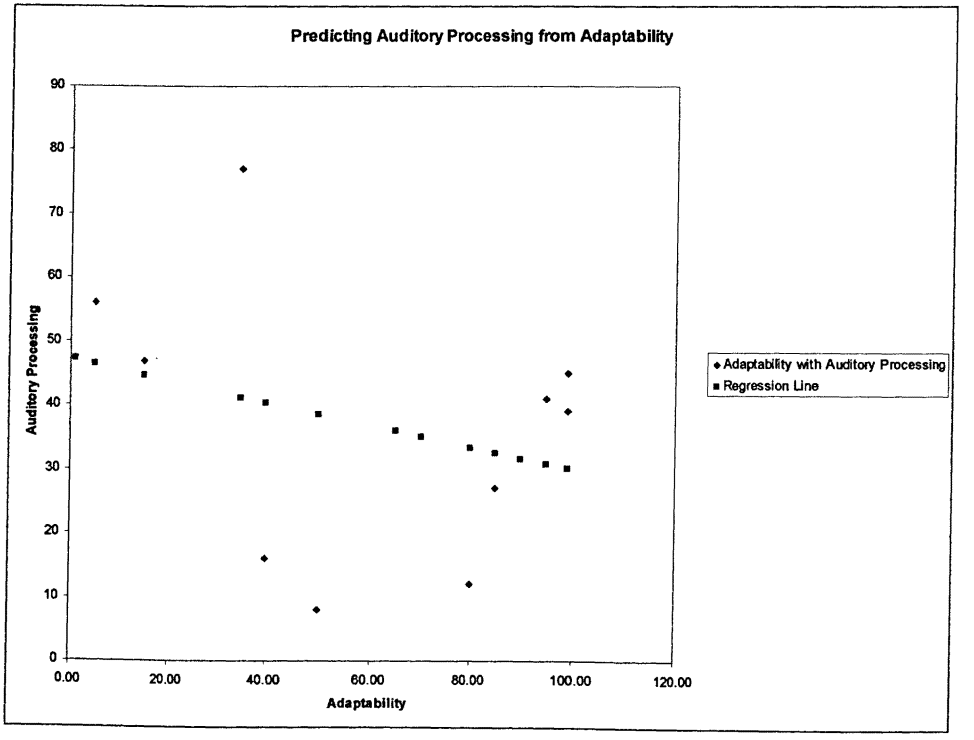
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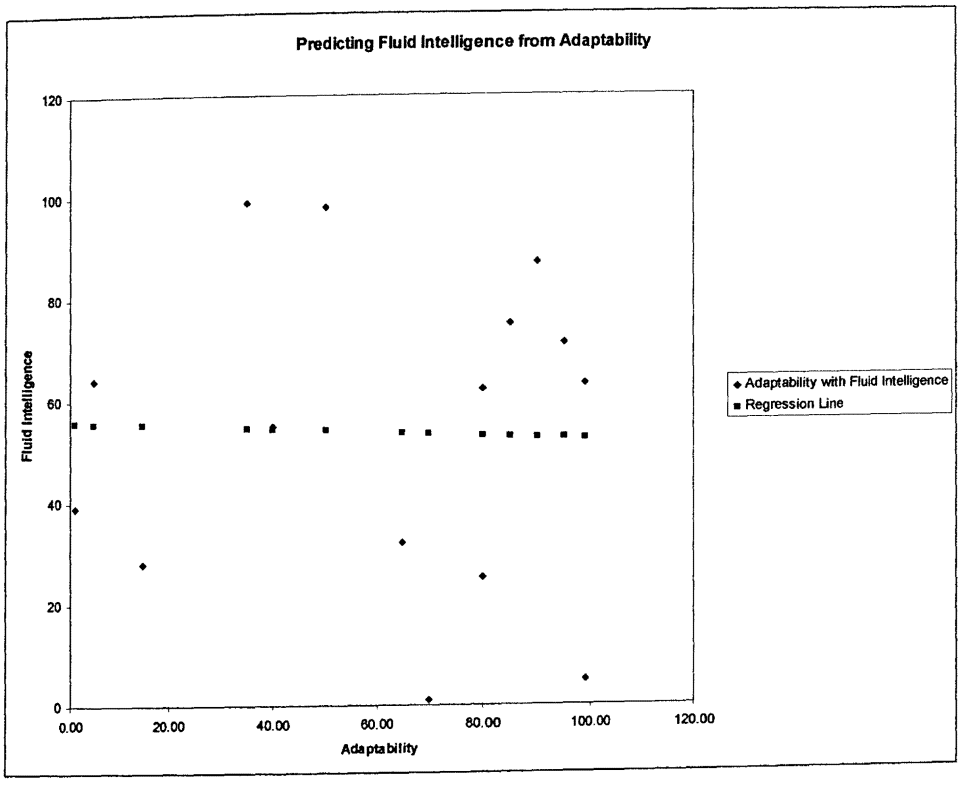
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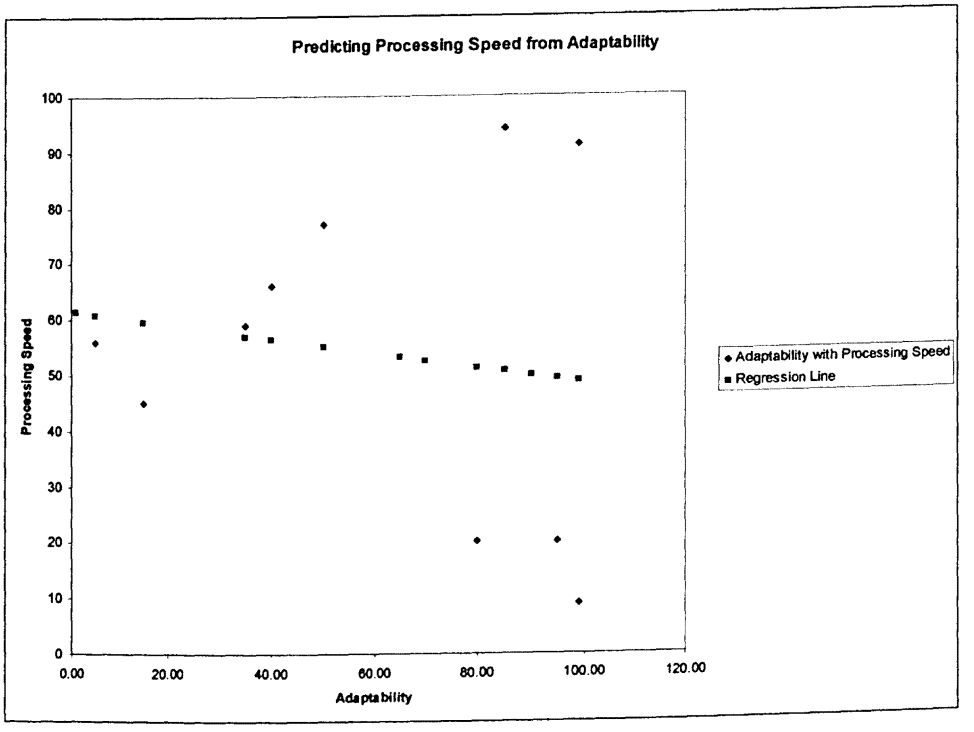
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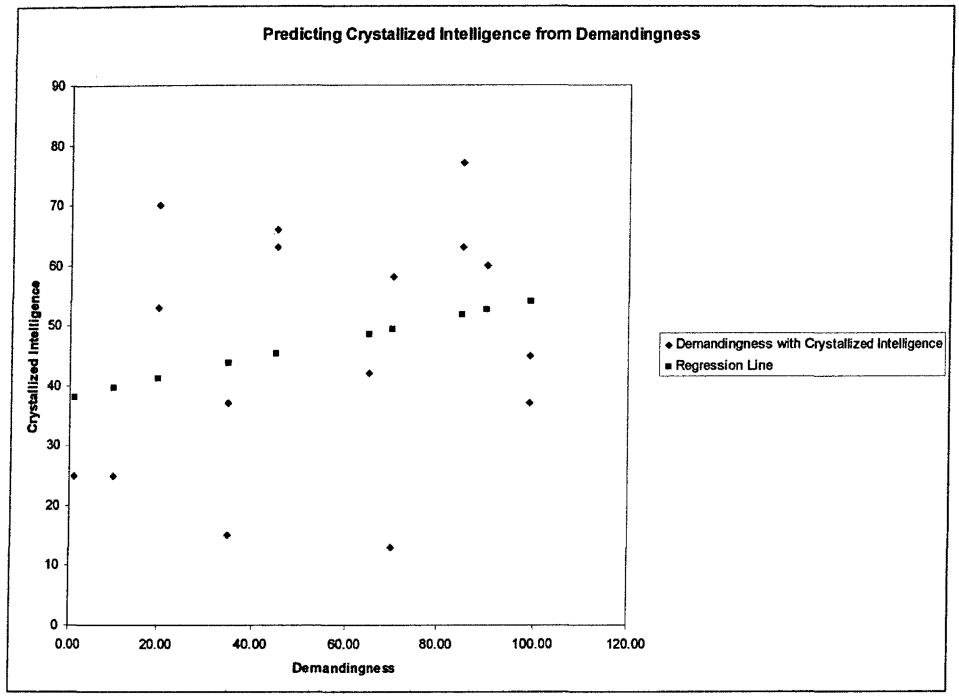
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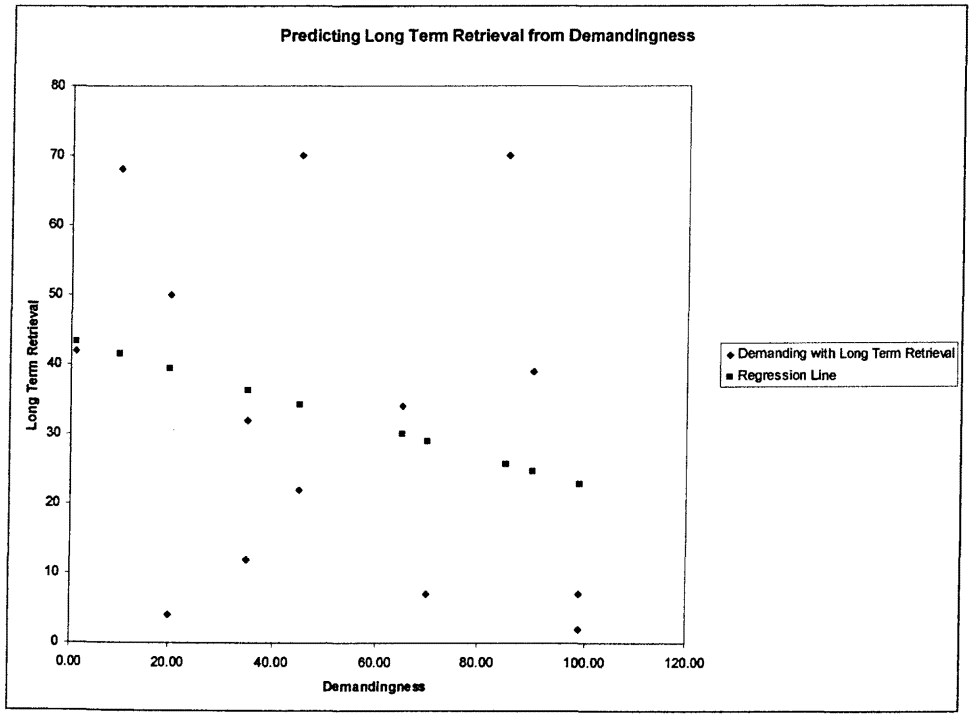
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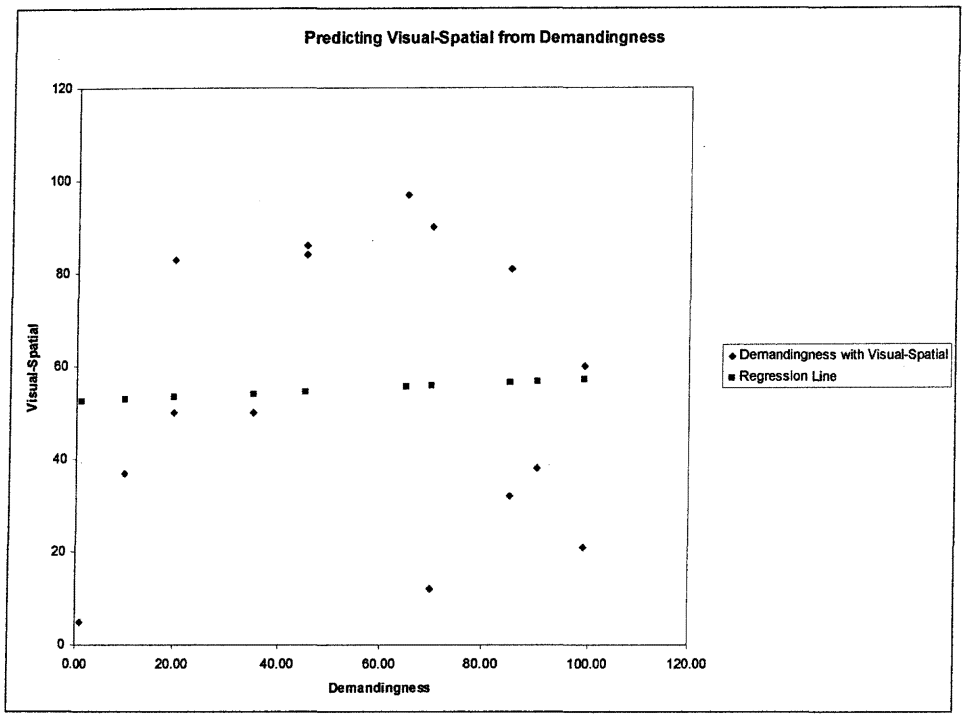
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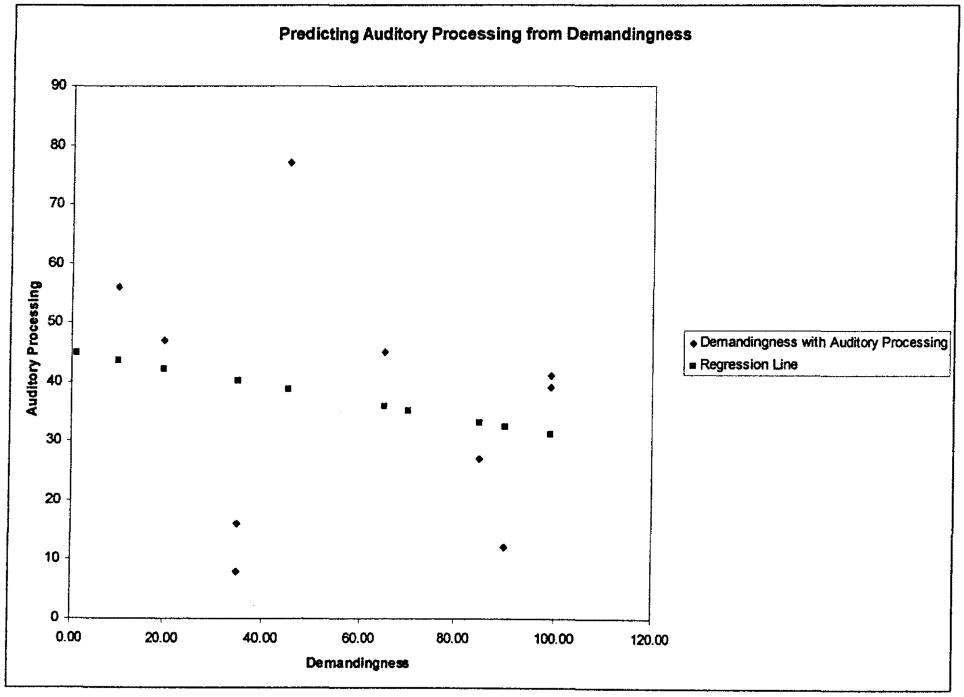
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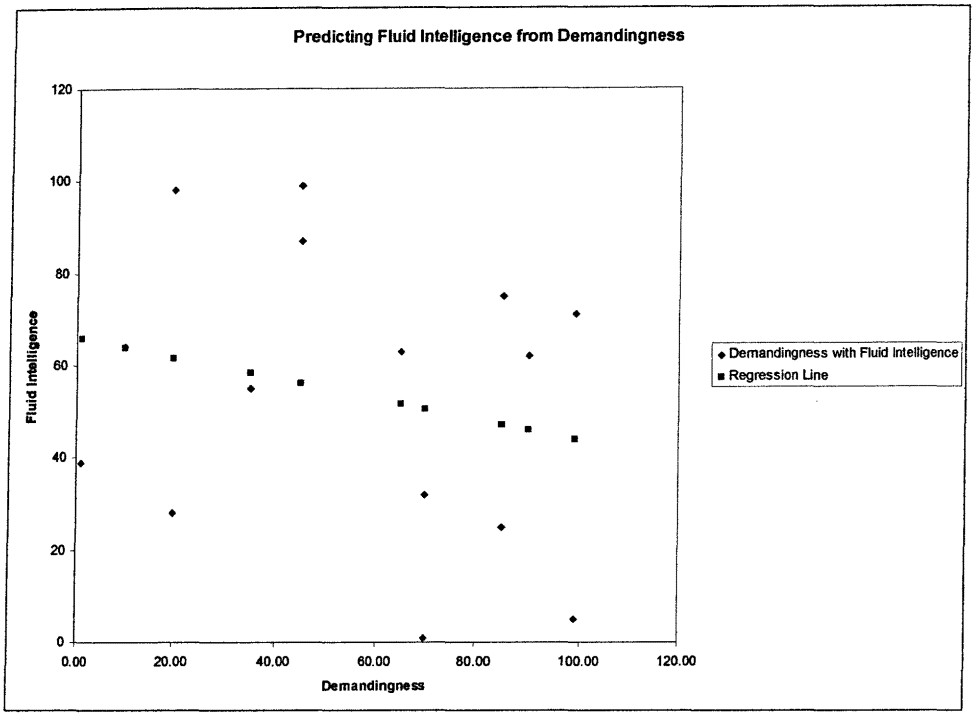
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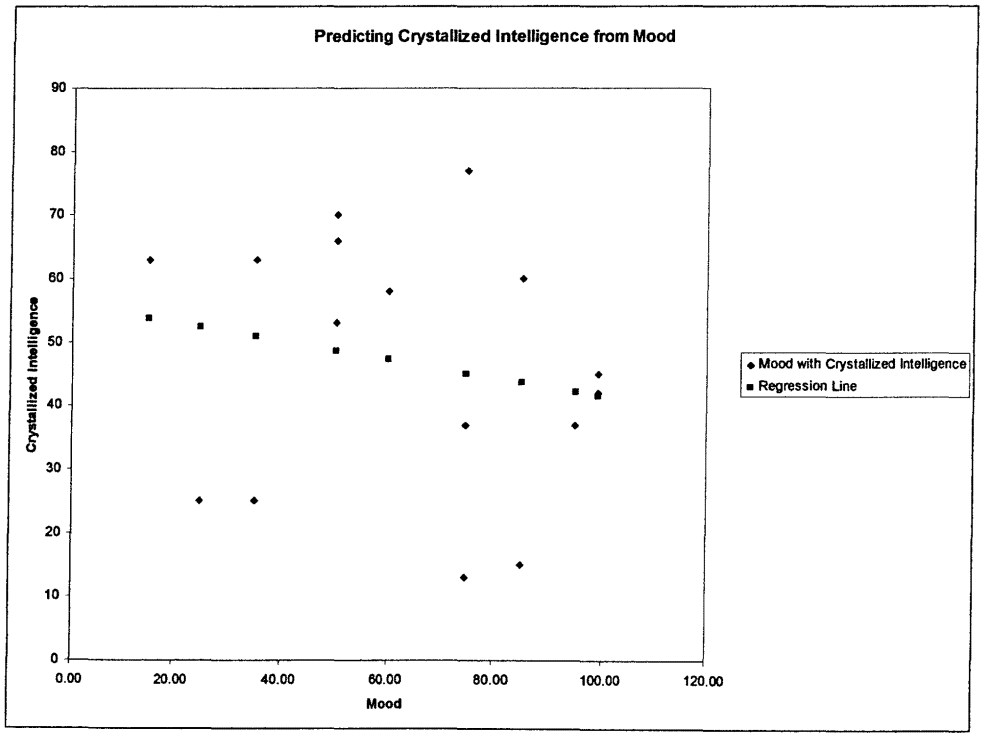
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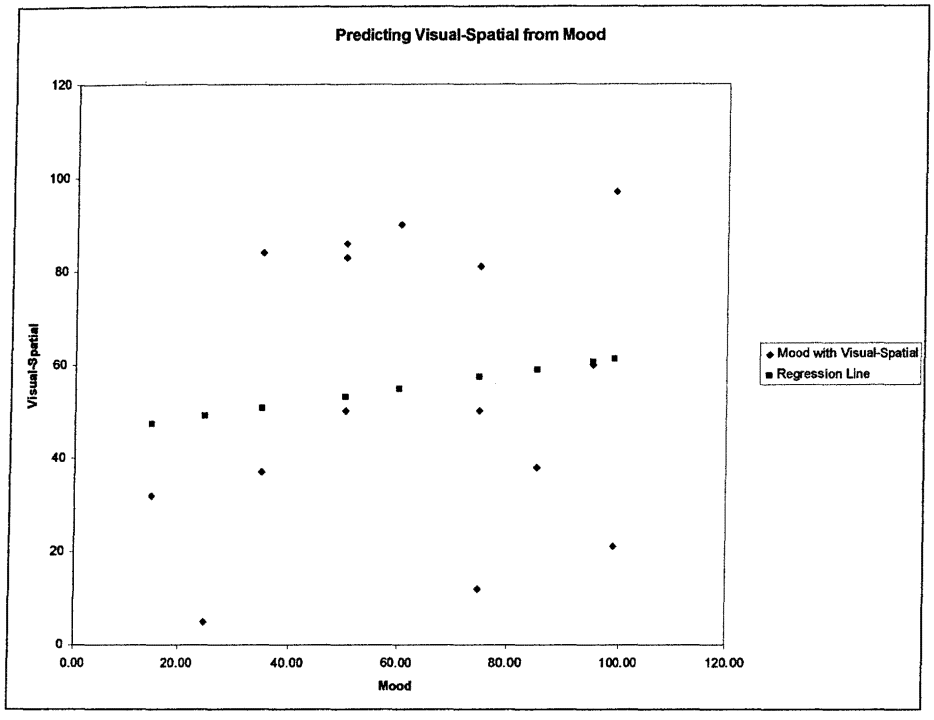
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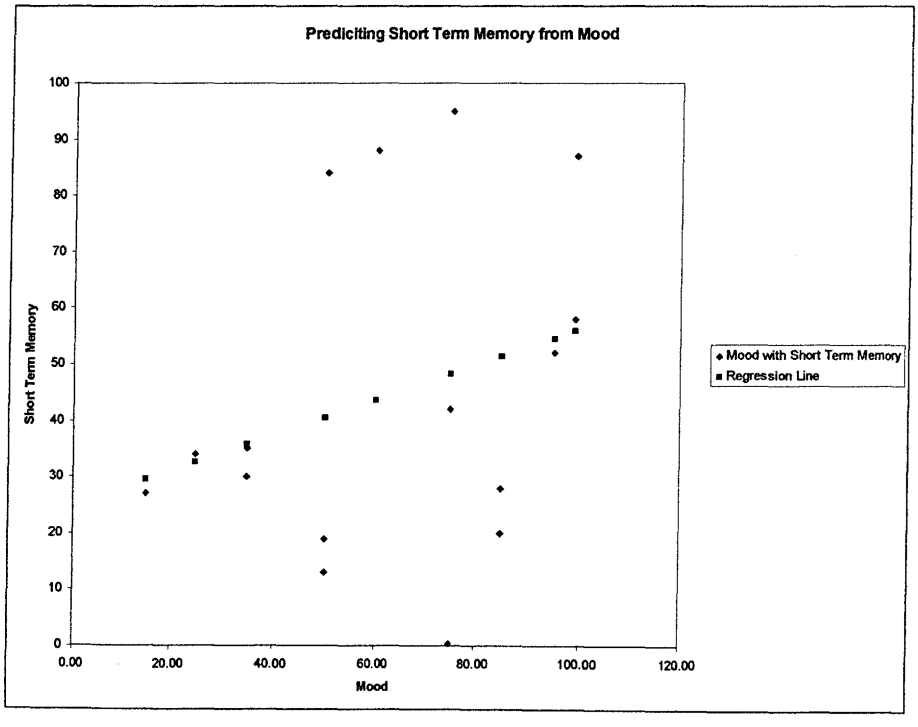
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