DIFFERENTIATION BETWEEN CHILDREN WITH ATTENTION DEFICIT-HYPERACTIVITY DISORDER AND CHILDREN WITH UNDIFFERENTIATED ATTENTION DEFICIT DISORDER USING THE MATERNAL PERINATAL SCALE

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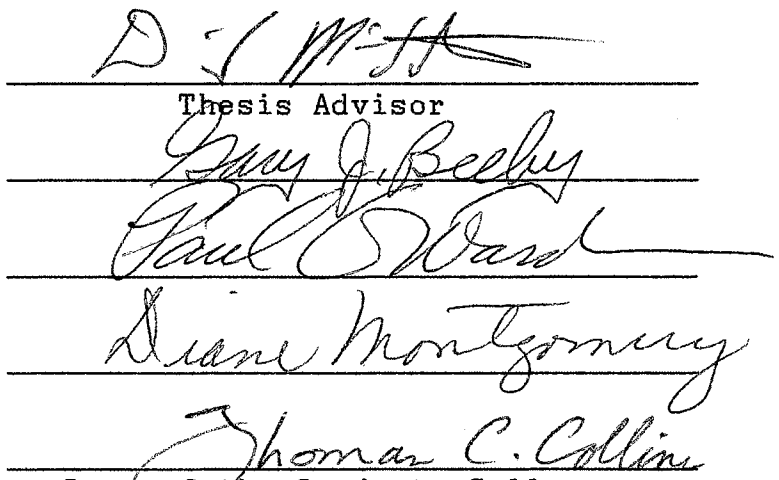

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CHAPTER I

INTRODUCTION

Attention-Deficit Hyperactivity Disorder (ADHD) is a diagnostic category used to set parameters for membership in a classification of common behavior problems in children affecting attention, impulsivity and hyperactivity. According to Weiss and Hechtman (1986), ADHD is considered the most common disorder referred to child psychiatric clinics. Barkley (1981) states it constitutes 30 to 40 percent of referrals to child guidance clinics, although it may constitute only 3 to 5 percent of children in the United States. One of the dilemmas faced by professionals involved with ADHD children is a lack of significant research involving children under the age of six and the unavailability of diagnostic techniques or assessment instruments capable of recognizing ADHD in children of very young age (Lahey & Carlson, 1991). As a result, children at risk for ADHD and its relative, Undifferentiated Attention-Deficit Disorder (UADD), are harder to detect and often not identified by professionals until the child enters school at age six or later (Ross & Ross, 1982).

Another problem is the inability of professionals agreement on terminology for differentiating ADHD/UADD. According to Barkley (1981), although the observable symptoms of the disorder have not changed much during the last 80 years, the disorder has been renamed more than 20 times during that period. The current definition, distinguishing ADHD and UADD, discounts the criteria set out in the previous definition because it placed more emphasis on inattention and impulsivity than on hyperactivity. The previous definition did not make hyperactivity a necessary criteria for the disorder. The distinctions of the previous concept of attention deficit disorders were multidimensional, such as distinguishing between children with and without hyperactivity (Frick & Lahey, 1991). At the time the Diagnostic and Statistical Manual of Mental Disorders - Third Edition (DSM-III-R, 1987) was revised, there was not sufficient research available to make the distinction between the two (Frick & Lahey, 1991). The current definition is unilateral in recognizing the three areas involved: impulsivity, attention and hyperactivity; specifying DSM-III-R diagnostic criteria must meet 8 of 14 behavioral criteria.

Lahey and Carlson (1991) contend that before ADHD and UADD can be distinguished, important differences

must exist between the two in terms of their correlates, etiology, prognosis or response to treatment. Little research has been done in this area to distinguish the differences between ADHD and UADD, and consequently, not enough information is available that would help in distinguishing between the two to make early diagnosis commonplace. According to Brazelton (1982), research indicates early intervention improves children's physical, cognitive and social abilities, reducing the effects of existing and potential handicaps. Information is needed to help identify ADHD children before school age. One way to accomplish this early is to consider maternal perinatal information for children already diagnosed as ADHD. Early indicators are available from maternal perinatal information. These data compared to information for children diagnosed with ADHD will determine whether they share common indicators or indicators not shared by a control group of normal children.

Since the early 1950's, psychologists have realized the importance of providing services to children with disabilities at a very early age. The early identification of disabilities provides the single most powerful means for reducing the impact of exceptionality (Friedlander, 1975). Identification of such risk

factors involved in learning can suggest appropriate intervention for decreasing the likelihood of loss of learning potential and the resulting loss of self-esteem, through impeded language development, slowed motor development, social-emotional maturity, etc. Identification and intervention prescription may require working with at-risk infants from shortly after birth through their pre-school years.

Some researchers contend observable developmental characteristics of infants at birth and during the first few months of life correspond directly to developmental outcomes while others believe there is no connection. Researchers have found that certain prenatal and perinatal factors are predictive of later developmental and learning difficulties (Cohen, 1983; Escalona, 1988; Hayman, 1983; Hobel, 1985; Rossetti, 1986). For example, asphyxia and anoxia (Hobel, 1985; Hunt, Tooley & Harrien, 1982; Kochanek, 1988; Siegel, 1983), central nervous system trauma or medical conditions such as subdural hematoma and seizures (Hayman, 1983; Rossetti, 1986), gestational age, both pre-and post-term infants (Broman, 1983; Field, Dempsey, & Shuman, 1983; Rossetti, 1986; Seigel, 1983), and low birth weight (Freeman, 1985; Hunt, et al., 1982; Klein, 1988; Siegel, 1983), have been predictive of later learning disabilities.

Sigman, Cohen, and Forsych (1981), found that prediction of future disabilities, based on early medical complications, has been poor. Freeman (1985) found that no more than 15 percent of severe mental retardation cases were attributed to perinatal factors. Although it is known that certain factors can increase the risk of neurologic impairment, Cohen (1983) and Freeman (1985) found that none of 60 prenatal factors distinguished which children would be affected.

The observable developmental characteristics of infants at birth and the presence of medical complications have some indirect effects on development. Other factors, such as environmental and biological, have influenced development. Kopp (1979) reviewed research which found that long-term effects of maternal perinatal risk factors are strongly influenced by environmental factors and that biological factors are often eliminated by supportive and sensitive care. It became apparent that to facilitate optimal outcomes for babies with neurological deficits (learning, motor, perceptual, and attentional problems) which make it difficult for an infant to adjust to his environment must be recognized early in a child's development (Brazelton, 1982).

If the interactions between the infant and the

environment are considered relevant to development, then the infant's experiences should play a significant role in the outcome (Self & Horowitz, 1987). According to Rossetti (1986), certain neonatal factors have been found to be predictive of later developmental performance. These include birth weight, gestational age, length of labor, method of delivery, neurological status and specific medical conditions. He concluded there was no test available that could adequately diagnosis neurodevelopmental performance in the early days of life. Rossetti (1986) concluded that until such tests were available, long-term follow-up was needed to accurately identify those infants who would be in need of intervention to eliminate or reduce neurodevelopmental delay.

An example of this reasoning is the proclamation recognition from professionals, such as, developmental specialists, speech and language pathologists, educators, who work with children have long recognized that problems occurring early in life persist through life and result in subsequent learning problems. Early intervention has been essential to helping children with handicapping conditions, to create better expectations for realizing their potential, thereby decreasing the chance for development of additional disabilities and

reducing the need for additional special education (McKey, Condelli, Ganson, Barrett, McConkey, & Plants, 1985; Rossetti, 1986). Identification of high risk children is essential at the earliest age possible (Brazelton, 1987; National Council on the Handicapped, 1988). Recent research has shown infant programs involving parent training, counseling and support groups, in addition to direct intervention with infants, have been successful (Pueschel, Bernier, & Weidenman, 1988). Preschool programs for the handicapped have been shown to be effective both educationally and economically. In fact, the earlier intervention is begun the greater the benefits. Early intervention may help enhance intellectual, physical, speech and language, psycho-social development and self-help skills. Secondary disabilities may be avoided and stress to the family may be reduced by early intervention. Reduced need for special-class placement and later institutionalization may also result from early intervention (National Council on the Handicapped, 1988).

Gray, Dean & Rattan (1987), established a screening instrument called the Maternal Perinatal Scale (MPS), (see Appendix A), that examined the impact of birth trauma and examined the predictability of perinatal

histories of children with childhood developmental disabilities. Based on retrospective studies of individuals with developmental and school-related problems, the MPS may prove useful in identifying infants with the potential for developmental and school-related problems shortly after their birth, thus making early intervention possible. The MPS considers implications of parental complications that may place a child at risk for school-related problems. The MPS examines specific maternal medical conditions and factors prior to pregnancy (e.g., diabetes, malnourishment, etc.) during pregnancy (e.g., vaginal bleeding, use of alcohol, drugs and tobacco etc.), labor and delivery (e.g., use of forceps, fetal presentation, etc.) and early life of the child (e.g., birth weight, gestational age, etc.).

Previous research has indicated variables during pregnancy and delivery which discriminate children with hyperactivity from normals. These variables have included such factors as: tobacco use, low placental weight, breech delivery, rupture of membranes one or more hours before onset of labor (Nichols & Chen, 1981); bleeding during pregnancy, RH Factor incompatibility, drugs or hormones, toxemia, prolonged labor, anoxia, prematurity, Caesaren section (Wender, 1974); maternal

smoking (Denson, Nanson, & McWatters, 1975); and alcohol consumption (Safer & Allen, 1976); vaginal bleeding, low birth weight (Pasamanick, Rogers, & Lilienfeld, 1956; and Rapoport, Quinn, & Lamprecht, 1974); respiratory distress (Pasmanick et al., 1956; Conners et al., 1972); low Apgar scores (McKay, 1969; Safer, 1973); and maternal age, fetal postmaturity, duration of labor (Hartsough & Lambert, 1985).

In addition, researchers interested in childhood development are considering and pinpointing the variables belonging in each of the developmental areas that can identify at-risk infants needing intervention in the first two years of life. Francis, Self & Horowitz (1987) indicated that scores on neonatal assessment scales may be affected by the infant's medication, mothers's anesthesia, blood cord (umbilical) levels, type of delivery, maternal diabetes or birth weight. Perinatal risk factors, as measured by the mother's recognition of perinatal information, resulted in a diagnosis of developmental disability of 82% accuracy (Gray, Dean, Strom, Wheeler, & Brockley, 1987). Specific items included in the MPS, may be useful in identifying children who will later exhibit symptoms of ADHD and UADD.

Statement of the Problem

The problem of this study was their a relationship relationship between maternal perinatal risk factors, as measured by the Maternal Perinatal Scale (MPS), in normal children and children diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD) and children with Undifferentiated Attention-Deficit Disorder (UADD)? The following hypotheses were studied:

Null Hypotheses One: Maternal perinatal factors, as measured by the MPS, will not differentiate between ADHD, UADD, and normal children with 80% accuracy.

Null Hypothesis Two: Maternal perinatal factors, as measured by the MPS, will not differentiate between ADHD/UADD and normal children with 80% accuracy.

Null Hypothesis Three: Maternal perinatal factors, as measured by the MPS, will not differentiate between ADHD and normal children with 80% accuracy.

Null Hypothesis Four: Maternal perinatal factors, as measured by the MPS, will not differentiate between UADD and normal children with 80% accuracy.

Significance of the Study

Additional information is needed to help identify the specific maternal perinatal complications which

might serve as identifiers for ADHD and UADD children. In terms of making a differential diagnosis certain maternal perinatal indicators should be studied. It is important to determine whether specific maternal perinatal indicators are more likely to occur with children that are diagnosed as ADHD or UADD. In addition, indicators can be used by health professionals and educators in distinguishing ADHD and/or UADD from normals and in making diagnostic decisions later in the child's life. These indicators can also serve professionals during the child's subsequent developmental stages in providing insights to the nature and severity of the disorder, in demonstrating the need for early intervention and in providing a guideline for determining the need for medication and dosage rate. Such a guideline might help determine the type of instruction and remedial techniques required.

Awareness of these indicators by hospital delivery-room staffs and health provision professionals and educators will help close the gap between delivery room and classroom -- to fill the void between problem development and early intervention.

CHAPTER II

REVIEW OF THE LITERATURE

Introduction

The review of the literature will reveal the need for an accurate understanding of and definition for attention deficit disorders. This will involve a historical overview of multiple investigations of the disorder and the varying definitions resulting. The review will consider the many characteristics of Attention-Deficit Hyperactive Disorder (ADHD), as determined by these investigations, including attention-related difficulties, inattention, impulsivity, hyperactivity, excitability, learning difficulties, social and emotional implications. The focal point of the review is maternal-perinatal information involving the possible etiology of ADHD: neurological factors, genetic factors, environmental toxins and etiological variations of Attention-Deficit Hyperactive Disorder.

During the past decade, Attention Deficit Hyperactivity Disorder has been one of the most researched areas of childhood behavior disorders (Barkley, 1981). According to Weiss (1985), more than

7,000 articles on this subject were published during the three-year span 1977 through 1979. Among the concepts pursued by the researcher-authors was determining the need for an accurate understanding and definition of attention deficit disorders. As a result of this research and the voluminous addition to the literature available on the subject, the term Attention Deficit-Hyperactive Disorder (ADHD) is the diagnostic term used to describe a group of common behavior problems in children. Another result has been the recognition of the variant form Undifferentiated Attention Deficit Disorder (UADD); however, this recognition has not produced a differentiating set of symptoms. According to Frick and Lahey (1991), there has not been adequate empirical support for a multidimensional definition; therefore, a revised unilateral definition was implemented in the Diagnostic Manual of Mental Disorders, Third Edition-Revised (DSM-III-R, 1987). For example, one of the reasons for debasing the old definition of Attention Deficit Disorder (ADD) was due to the fact some researchers believed this category might comprise a type of inattention accompanying non-verbal learning disabilities (Rourke, 1989), and thus, could be a new subtype of the Specific Developmental Disorders category. However, there is current research

indicating a differentiation between subtypes of attention disorder.

Lahey et al. (1988) subjected to cluster analysis clinicians' best-estimate ratings of children, involving the three factors (inattention-disorganization, motor hyperactivity-impulsivity and sluggish-drowsy) of ADD, which yielded two profiles of ADD: the first loading on inattention-disorganization and motor hyperactivity-impulsivity but low on the sluggish-drowsy factor (resembling Attention Deficit Disorder with Hyperactivity), the second low on motor hyperactivity-impulsivity but high on inattention-disorganization and sluggish-drowsy dimensions (resembling Attention Deficit Disorder-Without hyperactivity). Not only did these two profiles resemble the two Diagnostic Manual of Mental Disorders, Third Edition (DSM-III: American Psychiatric Association, 1980) forms of ADD, but 75% of the children independently diagnosed with Attention Deficit Disorder with Hyperactivity (ADDH) fell within the first cluster and 95% diagnosed with Attention Deficit Disorder without Hyperactivity (ADDW) fell within the second cluster. Hart et al. (1990) subjected to cluster analysis the inattention-disorganization and motor hyperactivity-impulsivity factor scores, based on teacher interviews, and found similar results.

According to Barkley (1987), although the symptoms of the disorder have not changed much during the last 80 years, the disorder has been renamed more than 20 times during that period. Some of the terms used to describe the ADHD child in the past were: defect in moral control (Still, 1902), minimal brain damage (Smith, 1926), hyperkinetic behavior syndrome (Laufer & Denhoff, 1957) minimal brain dysfunction (Clements & Peters, 1962), hyperkinetic reaction of childhood (American Psychiatric Association, 1968), hyperkinetic syndrome (Rutter, Lebovici, Eisenberg, Sneznevskij, Sadoun, Brooke, & Lin, 1969) minimal cerebral dysfunction, developmental hyperactivity, hyperactivity or hyperkinesis, attention deficit disorder with or without hyperactivity (American Psychiatric Association, 1980).

According to Barkley (1989), the relabeling of this disorder has occurred about every 10 years and indicates a change of emphasis in the primary area of concern within observable symptoms of the disorder, based on a growing body of research.

History

The criteria for classifying the disorder and the name of the disorder changed to ADHD in 1987.
Before the most recent revision (the DSM III-R), the DSM

III changed the terminology from "minimal brain dysfunction" to "attention deficit disorder" and changed the diagnostic criteria to include three subgroups. The first two groups were Attention Deficit Disorder with Hyperactivity (ADDH) and Attention Deficit Disorder Without Hyperactivity (ADDW). The presence or lack of hyperactivity became the determining factor. The third subtype, Attention Deficit Disorder-Residual, was developed to describe an individual once diagnosed as having ADDH in which the hyperactivity was no longer present but the other signs of the disorder persisted (American Psychiatric Association, 1980). The newer criteria developed in the DSM-III-R, contains two groups: Attention-Deficit Hyperactivity Disorder (ADHD) and Undifferentiated Attention-deficit Disorder (UADD) where signs of impulsiveness and hyperactivity are not present. The basic criteria stayed the same -- that the child displays developmentally inappropriate behaviors in his environment when compared to his peers, in areas of attentional skills, impulsiveness and activity level. In addition, these symptoms must effect the child's ability to function socially or to perform in the classroom.

Although, in most cases, the condition exists from birth, clinicians are not seeing these children until

they are referred as second, third and fourth graders. According to Cantwell (1975), the average number of symptoms is based on children between the ages of eight and ten because this appears to be the peak age range for referrals. He also indicated that children referred at a very young age tend to display more severe symptoms and have a greater number of symptoms with the opposite being true in the older child.

In the DSM III (1980), the child had to meet at least 3 out of the 5 criteria for inattention, at least 3 out of the 6 criteria for impulsivity and at least 2 out of the 5 criteria for hyperactivity. The onset had to be before the age of seven and of at least six months in duration. Symptoms could not be due to Schizophrenia, Affective Disorder or Severe or Profound Mental Retardation. To meet the criteria for Attentional Deficit Disorder Without Hyperactivity, the child had to meet only the criteria for inattention and impulsivity. Cantwell (1975), and Barkley (1981), felt that many children could meet the DSM-III criteria and that more stringent criteria needed to be developed to enhance the diagnostic process.

The DSM III-R lists 14 criteria of which a child must meet eight or more to be diagnosed ADHD. The primary focus of this diagnosis in the DSM III-R is on

poor attending skills. Five of the 14 criteria pertain to attentional skills (Gelfand, Jenson & Drew, 1988; Walen, 1989). The major characteristics of ADHD involve overactivity, inattentiveness, impulsivity, distractibility (Cantwell, 1975; Werry, 1979) and excitability (Safer & Allen, 1976; Wender, 1987). These characteristics will be discussed in the next section on characteristics.

Characteristics

There are many characteristics of ADHD. Some of the common features are discussed here.

Attention-related Difficulties

Attention-related difficulties, such as distractibility, can be due to visual stimuli, auditory stimuli, the child's own thoughts, short attention span, inability to finish a task or to concentrate, difficulty in following directions (not because he does not understand but because he is distracted by other stimuli), selective listening, impatient and poor listening skills. These children have difficulty redirecting themselves, once distracted. Several studies have shown that ADHD and UADD do not differ on independent measures of attention (Edelbrock, Castello,

& Kessler, 1984; King & Young, 1982; Lahey, Schaughency, Hynd, Carlson, & Nieves, 1987).

Inattention

Inattention includes failure to finish things such as school assignments and household chores, failure to listen, being easily distracted and subject to day dreaming, unable to concentrate or attend to oral instructions and losing things necessary for tasks at home and at school (Barkley, 1987; Cantwell, 1975; Gelfand, et al., 1988; Rudel, 1988; Wender, 1987).

Impulsiveness

Another characteristic is impulsiveness. ADHD children might have poor impulse control or poor self control, either verbally, physically (behaviorally or in writing tasks) and carelessness in academic output -- acting before thinking out solutions or consequences. These children appear disorganized, have poor planning skills, and poor social judgement. When they act impulsively (e.g., hitting classmates, throwing things, etc.), they know they have acted improperly but they do not know how to remedy the situation (by ceasing their impulsive behavior). It is important to note that these children are less able to control themselves, compared

to children without ADHD. They have difficulty pacing themselves, according to their abilities and the time available. They appear to be unaware of how quickly time passes and often insist they were not given enough time to finish their work.

Impulsivity means acting before thinking, having difficulty waiting to take turns, blurting out answers in class when not instructed to answer and shifting from one activity to another when it is inappropriate to do so. Impulsivity is interrupting or intruding on others, being disorganized in work and play and exhibiting poor planning of and sloppy work on school tasks. Impulsivity is being unable to say no to ones impulses, showing poor internal planning and judgement. The impulsive child might run, climb, talk or make noises excessively; and engage in physically dangerous activities, be a risk taker and require constant supervision (Barkley, 1985; Routh, 1980; Wender, 1987).

Lahey, Schaughency, & Frame (1984) found ADHD children to be more impulsive and distractible than children with UADD. However, children with UADD have been found to be more sluggish and drowsy (Lahey et al. 1985; Neeper, Lahey, & Frick, 1990) and frequently daydream (Neeper et al., 1990) compared to children with ADHD.

Hyperactivity

The next characteristic is hyperactivity. Hyperactivity differs from impulsivity in that the child with hyperactivity appears overly energetic, even to the untrained observer, while the child with impulsivity can be distracted or indulge his impulses with appearing overly energetic. Hyperactivity refers to a child's inability to comply, in an age-appropriate manner, with the behavioral demands of a situation; inability to sustain attention, to resist distracting influences and to inhibit impulsive responses (Routh, 1980). In overactivity, one displays intense and undirected energy, fidgetiness, inability to sit still or to stay in one's seat (Abikoff, Gittelmen-Klein, & Klein, 1977; Wender, 1987). Not all children with ADHD have this characteristic; however, this is the one characteristic that is hard to miss. This child, from infancy, cries a lot, sleeps very little, is overactive at mealtime, eating improperly, is always on the go and often appears to be accident prone. As these children get older and enter school some of the symptoms may appear to diminish; however, in school they fidget, are unable to sit in their seats, are constantly up to sharpen pencils and are always bothering other students. One important

factor is this behavior is not always noticeable during playtime or on the playground. These children may be able to be attentive and to sit still during tasks of great interest to them (e.g., science projects, computer work, etc.). Unlike the two behaviors of inattention and impulsivity, which may or may not occur in the home environment, hyperactivity cannot be inhibited in either school or home environments.

Excitability Characteristics

Excitability is manifested by low frustration tolerance which may be evidenced by temper tantrums and fits over unimportant matters. Once a child becomes energetic and overexcited, the child becomes very difficult to calm down. Attention-demanding behavior can be one of the most annoying characteristics. These children demand prompt, immediate attention. They often cling, poke and whine constantly and no matter how much attention one gives them, they need more. These children are usually noncuddlers; they do not like to go to sleep on the parent's lap or to sit on his/her lap to read and do not appear to be upset when left with strangers. According to Wender (1987), it appears these children do not develop the kind of affectionate behavior we expect of all children.

Learning Difficulties

Some ADHD children exhibit learning difficulties in school. If these difficulties are severe enough, they are termed learning disabilities; and that term is used in the wording of The Education of the Handicapped Act (PL 94-142, 1975); however, the DSM III-R calls it "Specific Developmental Disorders (SDD)."

Other characteristics the ADHD child may exhibit are poor school achievement, specific learning disabilities, physical and verbal aggression, conduct disorders, socially inappropriate behavior, deficits in self-control, depression and attention demanding behavior (Routh, 1980).

The most common areas of learning disability are reading and math. Written expression deficits appear to be a characteristic seen in ADHD children. Their handwriting appears messy or illegible. They are slow in completing anything that requires written work, from math to creative writing. This poor, fine-motor control can cause such tasks, easy to the normal child, to become difficult tasks for the ADHD child with this problem (Rudel, 1988). These problems can include tying shoes, throwing a ball and buttoning a shirt. Barkley's (1987) review of research indicates that not all ADHD children have these difficulties, and of the ones who

exhibit these learning/fine-motor problems, they often do not exhibit these to the same degree. He states that further research is needed in this area. Lahey et al. (1987) found a high rate of grade retention (71.5%) among boys diagnosed UADD, compared to only 16.7% retention among boys diagnosed ADHD. Similarly, Edelbrock et al. (1984) determined only 16.7% of the children with ADHD failed one or more school grades, while 71.4% of the group with UADD did so. Another study revealed seven times more children diagnosed hyperactive were described experiencing "very much" difficulty in all academic areas, compared to nonhyperactive classmates (Holborow & Berry, 1986). Berry, Shaywitz, and Shaywitz (1985), indicated girls with ADD were less likely to be hyperactive and less likely to receive special education services, even though they demonstrated significant attentional, cognitive, and language deficits.

Social Characteristics

Social characteristics are not unique, within themselves, to ADHD children. These characteristics can be seen in other children without ADHD, however, not to the extent seen in ADHD children. ADHD children appear to have more of these characteristics than normal

children. They are often seen as immature for their age, have fewer friendships, engage in more inappropriate behavior and are more disruptive. Many withdraw because of their inability to play or interact with children their own age. They often prefer to play with younger children (Barkley, 1985; Rudel, 1988). They have poor social skills because of their impulsiveness and a poor sense of personal boundaries (often because of inability to read body language or interpret others' feelings and a constant negative reinforcement for their attempts at social interaction). According to Routh (1980), rarely does a normal child over the age of 3 protest when separated from his mother; however, it is not unusual for hyperactive children ages 4 to 6, or occasionally older, coming in for clinical evaluation, to become upset enough during playroom observation to require the comforting presence of their mothers or familiar persons before the observation could be completed. Routh's informal playroom observation suggests that attachment behaviors are slower to diminish among hyperactive children than among normals, indicating hyperactive children are immature in their social development.

Lahey et al. (1984) found that teachers rated children with ADDW significantly higher in anxiety-

withdraw problems, observing them as being more shy and socially withdrawn than normals, and that children with ADDH received significantly higher Conduct Disorder, Socialized Aggression, and Psychotic Behavior ratings than normals and were also more aggressive and guiltless.

Edelbrock et al. (1984) determined children diagnosed ADDW obtained significantly higher social withdrawal ratings and lower happiness, higher unpopularity and aggression ratings than children diagnosed ADDH. Berry, Shaywitz, & Shaywitz (1985) compared children with ADDW and ADDH on several behavior characteristics, determining those with ADDH demonstrated poor response to changes in routine, low self-esteem and increased antisocial behavior. Children with ADDW, while also displaying low self-esteem, did not exhibit intractability, impulsivity or increased antisocial behavior.

On peer rating scales, both ADDH and ADDW groups received more liked-least and fewer liked-most peer nominations than controls (King & Young, 1982; Lahey et al. 1984). Edelbrock et al. (1984) compared teacher ratings of social competence for a group of clinic-referred school children with ADDH and ADDW and found that, although both groups showed social deficits, the

children with ADDH were rated more unpopular than those with ADDW. However, the children diagnosed ADDW were rated higher in social withdrawal than those diagnosed ADDH.

Emotional Characteristics

Emotionally, children with ADHD/UADD are easily excitable, moody, and tend to cry easily. Some externalize their frustration by being more aggressive and others internalize their frustration by withdrawing or showing signs of depression. They commonly exhibit low self-esteem, low tolerance levels or frustration levels and show little self confidence. They often feel inadequate or insecure because of their constant experiences of failure. They often have physical complaints of headaches and seem to be seen by school nurses more often than other children. Teachers often classify these children with statements such as: "class clown," "they could do better if they tried harder," and "they give all or nothing."

Lahey, Schaughency, et al. (1987) compared behavior characteristics of ADDH and ADDW groups and determined significantly variant behavior patterns. The ADDW group was more likely, in 43% of instances, to receive codiagnoses of either anxiety or depressive disorder

than was the ADDH group, in only 10% of instances. Teachers rated children with ADDH higher on scales with conduct problems, impulsivity and less sluggish than children with ADDW.

Incidence/Associated Symptoms

Throughout the literature Cantwell (1972), Weiss (1985) and Wender (1987), found such associated symptoms as conduct-antisocial disorders, substance and alcohol abuse, learning disorders, tic-tourettes syndrome, affective disorders, anxiety, psychosis and retardation. Even though the means for diagnosing ADHD are available, it is often a misunderstood classification for children in school. School personnel are familiar enough with "hyperactive" as a symptom of ADHD to make referrals but they are not usually aware of the term UADD, the form of attention deficit disorder lacking hyperactivity as a symptom.

With a symptom so observable and obvious as hyperactivity, it is no wonder ADHD is the most commonly observed and referred of the two forms. According to Wiess and Hectman (1986), ADHD is considered the most common condition referred to child psychiatric clinics. Outside the classroom, children are referred to mental-health facilities most often for hyperactivity (Ross &

Ross, 1982). Barkley (1981) noted that 30 to 40 percent of referrals to child guidance clinics were for ADHD, although it may constitute only 3 to 5 percent of children in the United States. Interestingly, studies conducted in Western European countries produced the same percentage of occurrence as the United States, with the exception of Great Britain, where the number of ADHD children is much less than in the United States. Several authors suggest this is due to the definition of hyperactivity in Great Britain and the fact British children with behavior problems are more likely to be diagnosed as having conduct disorders (Schachar, Rutter & Smith, 1981; Taylor, 1986).

Lahey and Kazdin (1986) reviewed the research, and the studies indicated the incidence of ADHD in school populations ranged from 1 to 20 percent. It does appear to affect males more frequently than females. The ratio appears to be 4 to 1. According to the DSM III (APA, 1987) it is nine times more prevalent in males than females. Barkley (1981) found the ratio reported in various studies, ranged from 4 to 1 and 9 to 1, with 6 to 1 as the average. Silver (1986) estimates that between 3 to 7 percent of children and adolescents are learning disabled, and of this group, about 20 percent demonstrate some central nervous system dysfunction

(mainly ADHD symptoms). Shaywitz and Shaywitz (1988) estimated that 10 percent of children classified as hyperactive also meet the criteria for learning disabled, and likewise, a third of learning-disabled children meet the criteria for ADHD. Wender (1987) estimated there were five million children in the United States who could be classified as hyperactive. He noted there were between 3 and 10 percent of school-age children with hyperactivity problems and associated learning problems. According to Sandoval & Lambert (1984-1985), the strong correlation between externalizing behaviors, such as hyperactivity, and determination of need for special education services suggests it is hyperactivity, rather than the more internalized attentional difficulties or learning disabilities, being used as the marker to identify children with ADD or LD.

In addition, Sandoval and Lambert (1984-1985) noted that since girls with ADD were less likely to be hyperactive, they were also less likely to be diagnosed and receive special education services. This implies children, especially girls, who are not hyperactive but merely experiencing academic difficulties and inattentiveness might never be diagnosed ADDW and referred for special services. Thus, children with ADDW

might comprise an underidentified, underserved group at significant risk for long-term academic, social, and emotional difficulty (Epstein, Shaywitz, Shaywitz & Woolston, 1991).

Etiology

There is much interest in causative factors surrounding hyperactive disorders in early childhood, and such factors, if well defined or understood, might help in identifying children at risk for the disorder and point to preventive measures. Such understanding might also help narrow the features or untangle the web of circumstances or symptoms we now generalize as childhood hyperactivity syndrome (Burg, Rapoport, Bartley, Quinn & Timmins, 1980).

Certain infants and preschoolers have deviating behavior patterns involving extreme overreactivity, sensitivity and inattentiveness. Some of these overactive infants are eventually diagnosed as hyperactive during their school years. However, many of these children displayed these characteristics of hyperactivity since birth but were not identified until they had entered school. The realization that these characteristics can be recognized at such an early age suggests a genetic aspect to the disorders, due to

intrauterine and neonatal factors, rather than family psychodynamic factors (Omenn, 1973).

The etiology of ADHD remains inconclusive and hypothetical. Barkley (1981, 1989) indicates no single etiology can adequately account for the symptoms and correlates of hyperactivity. It has multiple biological etiologies rather than an environmental etiology, the final common pathway being their effect on the central nervous system. Barkley sees familial-hereditary factors playing a large role in ADHD, and complications in pregnancy also contribute to the ADHD portion of the population.

As with other disorders, the simple explanation approach may not be appropriate for ADHD because overlapping symptomatology may be involved. Werry (1979) further suggests ADHD subclassifications must be based upon multivariate approaches to clinical, neurological and psychophysiological data, and such subclassifications will be required before problems of etiological explanation can be resolved.

Originally, it was presumed most hyperactivity cases were due to some type of brain damage. Although, according to Barkley (1991), studies of brain imagery have shown the brains to be normal, recent research has shown oxygenation problems such as focal hypoperfusion

(passage of oxygen through an organ through arteries) and reduced use of glucose in the brains of ADHD patients. There are some other potential predictors or pre-existing conditions putting children at risk. Some of these are neurological factors (e.g., abnormalities of arousal, neurotransmitter abnormalities), genetic factors, environmental toxins (e.g., food sensitivity, food allergies), biological variations, psychosocial factors and developmental delays (Barkley, 1981; Dunn & Dunn, 1973).

Children having more than one developmental correlate of hyperactivity are more likely to become hyperactive. For example, children with low birth weights, congenital disorders and family histories of hyperactivity are more likely to become hyperactive than those with only low birth weights (Safer, 1973).

Neurological Factors

The Central Nervous System (CNS) is one of two nervous systems within the human body which carries out communication functions such as reception, processing, storage and transmission of information for the individual. With more than 100 million neurons in the human brain, there is a multiplicity of points of interaction between the nerve synapses (Block, 1986).

The cerebellum synthesizes postural and kinesthetic information and refines and regulates motor impulses. Major pathways for fibers running between cerebral cortex and cerebellum sections of the brain allow for fine motor control, coordination and postural regulation (Barkley, 1981). A study by Watson (1978) indicated that the cerebellum may also be involved in some aspects of sensory processing, perception, discrimination, motor learning and emotionally-toned responses.

The cerebral cortex is composed of nerve cell bodies and their synaptic connections. This area is the most highly organized correlation center of the brain (Block, 1986). The cerebral cortex possesses focusing and shifting of attention as part of its cortical activity. Modality-specific alerting functions and memory functions are also contained in the cerebral cortex. The internal white matter of the cerebral hemispheres have conduction fibers that transmit neural impulses between cortical points between hemispheres or between cerebral cortex areas and lower centers (Block, 1986).

Neurons of the central nervous system are normally covered with a layer of insulation called myelin. Insulated nerves are said to be myelinated; uninsulated nerves unmyelinated. Satellite cells called glial cells

wrap around the nerve cell axons in layer upon layer of insulation to form this myelination (Barkley, 1981). By the age of three years myelination has reached approximately 90 percent of adult values in normal children. Myelination of the subcortex is complete by three years of age. Myelination of the cerebral commissures is complete by age nine. Finally, myelination of the intracortical white matter has been found to continue throughout life up to 60 years of age. Although different rates of myelination were present in different cortical regions, there has been no evidence of differences in the rate of development or growth spurt onset times between the cerebral hemispheres (Epstein et al. 1986). Matousek and Petersen (1986) revealed a continuous growth function with sudden and significant increments in relative power occurring in specific cortical regions. They indicated the ages at which the increments occurred over-lapped with Piaget's periods of cognitive development. The present findings provide evidence of differential rates of human cerebral development. Findings favor ontogenetic hypotheses of human cortical development in which there is a genetic unfolding of specific cortical connections at relatively specific postnatal stages (Epstein et al. 1986). This finding of differing times of myelination may have some

implications for children who suffer from immature, unmylinated nerve axons. This may have some bearing on the learning theories which are employed with low attentional students.

Satterfield (1973) compared 31 Minimal Brain Damaged children to 21 normals using EEGs and neurologic examination. He found a significant relationship between the degree of brain dysfunction and methylphenidate treatment response probability, suggesting a neurophysiological foundation for MBD. The findings are consistent with the theory of delayed central nervous system maturation. According to Barkley (1981), a brain damage hypothesis requires establishing that the brain has been physically damaged or altered, through performance of an autopsy, neurologic evaluation or "hard" neurologic signs. Despite a lack of evidence for the brain damage hypothesis, the idea that hyperactive children have suffered neurologic dysfunction continues to receive widespread endorsement. Laufer, Denhoff, and Solomons (1957) developed the biochemical explanation where the reticular activating system is the central processor of sensory input. Hyperactive children have excitatory and inhibitory

neurons which are biochemically inadequate for proper function, and overactivity results from deficient quantities of these stimuli-controlling neural transmitters. In contrast, Satterfield, Satterfield and Cantwell (1981) suggested a lowered excitability potential exists in the midbrain reticular activating system, requiring more stimulation, suggesting hyperactivity results from lack of stimulus.

Genetic Factors

Although no genetic link has been established in the literature, there appears to be a familial tendency toward ADHD. For example, fathers of ADHD children often characterize their own childhoods as being troubled by attentional problems in school ("nothing interested them for long") or marked by attentional problems leading to their dropping out of school. They remain restless and short-tempered individuals as adults (Rie & Rie, 1980). O'Malley & Eisenberg (1973) found that family histories often present a similar behavioral pattern among the father and the ADHD child's siblings. Safer and Allen (1976) contend hyperactive subjects generally have family histories of learning difficulties, behavioral difficulties and hyperactivity. Some 20 to 35 percent

of the fathers of ADHD children have histories of hyperactivity or repetitive behavioral difficulties in childhood (Bernstein et al., 1974; Silver, 1987; 1973; Morrison & Stewart, 1971; Quinn & Rapoport, 1974). These findings, as well as those from adoptive studies (Safer, 1973; Cantwell, 1975), support the hypothesis that genetic factors have a major influence in the development of hyperactivity, and the inheritance of hyperactivity seems to be traceable to either parent (Morrison & Stewart, 1974).

Welner, Welner, Stewart, Palkes and Wish (1977) determined significantly more male siblings of ADHD parents were also diagnosed as ADHD (in 26 percent of hyperactives), compared to only 9 percent for brothers in the control group. In two similar studies, Morrison and Stewart (1971) and Cantwell (1972) found that among the relatives of ADHD children, 12 parents of 59 ADHD children had histories of childhood hyperactivity compared to only 2 parents of 41 controls. Cantwell (1972) found that 10 parents of 50 ADHD children had histories of hyperactivity, while only one parent of 50 control children had a history of childhood hyperactivity. Both studies found that the ADHD children's relatives had a greater frequency of hyperactivity during childhood compared to the control

groups. Quinn and Rapoport (1974) reported that hyperactive grade-school boys with high anomaly scores were more likely to have had a paternal history of hyperactivity. In a study of four identical twins with hyperactivity, Lopez (1965) found there was 100 percent agreement, both individuals being hyperactive. Of the six paternal pairs only one showed hyperactivity, however four of the six pairs were of opposite sex.

Environmental Toxins

There has been some controversy over food-sensitivities or food allergies and their etiology of hyperactivity, surrounding the Feingold (1974, 1975, 1977) studies linking such allergies to hyperactivity. However, in Connors' study (1980) and his reviews of other studies, he did not find a relationship between food additives and hyperactivity. Lead poisoning or lead levels (David, 1974; David, Clark, & Voeller, 1972; Rummo, Routh, Rummo, & Brown, 1979; Wiener, 1970), maternal smoking (Denson, Nanson, & McWatters, 1975) and alcohol consumption during pregnancy affect fetal development in such a way as to create or contribute to hyperactivity in infancy.

Etiological Variations

One possible view of hyperactivity is that it is merely one extreme end of the normal temperament characteristics distribution line (Kinsbourne, 1977). Other aspects include prematurity, signs of fetal distress, precipitated or prolonged labor, perinatal asphyxia and low Apgar scores, feeding and sleeping difficulties during the first few weeks of life, presence of colic at 3 months of age, history of brain damage or injury to the central nervous system from trauma or infections, cerebral, or neurologic disorders, and a family history demonstrating alcoholism, hysteria and sociopathy, parental history of hyperactivity, learning disabilities and developmental learning disorders and impulse control problems (Clunn, 1991).

In the National Institute of Neurological and Communicative Disorders and Stroke's Collaborative Perinatal Project (Nichols & Chen, 1981), nine variables were found during pregnancy and delivery which discriminated children with hyperkinetic-impulsive behavior from children with no MBD symptoms. The variables were: (1) cigarettes smoked per day during pregnancy, (2) convulsions during pregnancy, (3)

hospitalizations during pregnancy, (4) low fetal heart rate in the second stage of labor, (5) low placental weight, (6) breech delivery, (7) low hemoglobin during pregnancy, (8) chorionitis (a highly vascular outer embryonic membrane) and (9) rupture of membranes one hour or more before the onset of labor (Nichols & Chen, 1981).

At birth, the hyperkinetic-impulsive behavior group had smaller head size, more meconium staining, more neonatal nerve abnormalities, more primary apnea, lower birthweight, more clinical erythroblastosis and more multiple apneic episodes.

Millichap (1975) listed pregnancy and birth complications of 100 hyperactive children. These included: bleeding during pregnancy, Rh factor incompatibility, drugs or hormones, toxemia, pelvic irradiation, rubella and infection, along with prolonged labor, anoxia, prematurity, jaundice and Caesaren section (Wender, 1974).

Safer & Allen (1976) found a number of historical and developmental features were significantly associated with ADHD -- items in the history occurring more frequently in ADHD children than in UADD children. For example, during pregnancy, the ADHD child's mother is more likely to experience vaginal bleeding (Pasamanick

et al., 1956; Rapoport et al., 1974). In addition, the timing of such bleeding in pregnancy has other implications. For example, Pasamanick et al. (1956) contend bleeding during the last trimester is significant; whereas, Rapoport et al. (1974) suggested bleeding during the first trimester and evidence of preeclampsia were more significant (Pasamanick et al., 1956; Conners, 1975). The ADHD baby tends to have a below-normal birth weight or to be premature (Pasamanick et al., 1956; Rapoport et al., 1974; Conners, 1975; Denhoff, 1973; Rubin, Rosenblatt & Balow, 1973; Caputo & Mandell, 1970; Bernstein et al., 1974). Premature birth averages five to 15 percent in the general population (Hardy, 1973; Chase & Byrnes, 1970), varying greatly with socioeconomic conditions. The prematurity rate among hyperactives is 10 to 25 percent (Rapoport et al., 1974; Conners et al., 1972). During the post delivery period, ADHD infants experience a greater frequency of respiratory distress (Pasamanick et al., 1956; Conners et al., 1972). Breathing difficulty following birth has also been associated with a slowed heart rate, and such perinatal difficulties are quantified using an Apgar score (McKay, 1969). ADHD children tend to have low Apgar scores at birth and are more likely to have congenital disorders (Safer, 1973).

Hartsough and Lambert's (1985) research of medical factors, comparing ADHD and normal children, revealed prenatal factors, rather than subsequent medical problems, are the best predictors of a later ADHD diagnosis. In their study, the significant perinatal indicators were maternal health during pregnancy, toxemia or eclampsia during pregnancy, maternal age under 20 at birth of child, parity of the child (being first born), fetal postmaturity (gestational age of ten months or more), duration of labor exceeding 13 hours, fetal distress during labor or birth and presence of congenital problems. The prenatal and perinatal variables not significant between ADHD and controls were previous miscarriages, Rh factor incompatibility, prematurity, abnormal delivery and low birth weight. These findings were consistent with the Collaborative Perinatal Project (Nichols & Chen, 1981). Although they had no control group for comparison, as did Nichols & Chen (1981) and Hartsough and Lambert's (1985), Frank and Ben-Nun (1988) compared 21 children with ADDH (now called ADHD) to 11 with ADDW (now called UADD), using neurological and neuropsychological assessment methods and found children with ADDH, about 50%, were also more likely than children with ADDW, 12%, to have perinatal or neonatal abnormality.

Hartsough and Lambert (1985) found the relationship between complications during pregnancy or birth and illness in early infancy was not strong enough to be used in predicting future school or behavior problems, even though the complications had been found to be associated with hyperactive behavior. However, Astbury, Orgill, Bajuk & Yu (1983) found that abnormal behavior (inattention, impulsivity and hyperactivity) at two years of age, distinguished a subgroup of children with significantly lower scores on the mental portion of the Bayley Scales of Infant Development (1969) from another subgroup with a history of more minor physical disabilities. However, ADHD children had birthweights similar to normals, indicating no significance in mean birthweight, as a causative factor; and likewise, no significant differences in gestational ages or in gender were evidenced among ADHD and normal children.

Summary

It is important to inquire about the pregnancy and the neonatal period in obtaining the developmental history from the parent, as well as the early childhood developmental pattern and the medical and family histories. The diagnosis must not be determined by positive histories in one or more of these areas, but

must be based on the presence of hyperactivity and the major manifestations of hyperactivity. However, additional support for the diagnosis can be found in the prenatal and perinatal periods and in infancy (Safer & Allen, 1976).

Although it is not possible to show causal effects using correlational data, Hartsough and Lambert (1985) contend that certain factors clearly influence the prenatal and perinatal histories of children, appearing disproportionately for those subsequently labeled as hyperactive and treated as such.

O'Malley & Eisenberg (1973) believe it is clear we can no longer deal with ADHD by telling parents "all will be well, just bear with it," that too many children are affected by this syndrome to overlook or ignore it, because it has the potential to profoundly affect their development and success as adults, and that further retrospective studies are needed before definitive statements of prognosis can be made.

The focus of this study is to identify the differences between the two ADD groups and normals, as far as perinatal information concerns them. The Maternal Perinatal Scale has been used to examine the relationship between perinatal information, cardiopulmonary conditions and developmental

disabilities. Gray et al. (1987), used 26 perinatal variables from the MPS, as completed by the mother within the first 96 hours post partum, to predict scores in the five categories on the Apgar Index (color, heart rate, reflex response, muscle tone and respiratory effort), as completed by delivery room personnel. The researchers found that 46% of the variability which could be accounted for by the MPS at one minute, increased to 70% at five minutes. These results suggest that a standardized maternal perinatal evaluation completed by the mother regarding the perinatal event may be useful in gathering retrospective information about the child's condition at birth. Gray, Dean, Strom, Wheeler, & Brockly (1987), did a retrospective study using the MPS and children previously diagnosed with mental retardation and demonstrated an 82% accuracy of prediction rate solely on the basis of the items of the MPS.

CHAPTER III

METHODS AND PROCEDURES

The purpose of this study was to determine whether information on the Maternal Perinatal Scale can help in the differential diagnosis of children with Attention-Deficit Hyperactivity Disorder (ADHD) and Undifferentiated Attention Deficit Disorder (UADD). This chapter contains descriptions of the sample, instrumentation and research design. Data collection and methods of analysis are described and discussed. Before this study was carried out, approval was sought and obtained from Oklahoma State University's Institutional Review Board (see Appendix B). All of the procedures were performed in accordance with their guidelines for ethical treatment of human subjects.

Sample

The sample consisted of 74 ADHD and 56 UADD and 135 normal children between the ages of 6 years 5 months and 13 years 4 months ($\bar{x}$ = 9 years 7 months). Table 1 shows the mean age, range and standard deviation for each group and the total sample. A One-Way Analysis of

Variance (F (2, 262) = 5.71, p <.004) was computed to determine whether significant differences in age existed between the groups. A Tukey's HSD was calculated to find where the differences occurred. A significant difference occurred between the UADD and ADHD group and between the UADD and normals.

Table 1

Means, Ranges, and Standard Deviations of Age in Months for Each Group

Group	Mean	Range	SD
Normal n = 135	114.28	77-155	21.33
ADHD n = 74	115.68	82-160	18.87
UADD n = 56	124.75	91-157	17.03
Total Sample	116.88	77-160	20.17

Note. N=265

The distribution of gender by group is presented in Table 2. There were more males than females in both the UADD and the ADHD group. This is consistent with the

literature. In this sample, 69% were male and 31% were female.

Table 2

Distribution of Gender by Group

	Group			
Sex	ADHD n = 74	UADD n = 56	Normal n = 135	Total N = 265
Male	63(85%)	48(86%)	71(53%)	182(69%)
Female	11(15%)	8(14%)	64(47%)	83(31%)
Total	74(28%)	56(21%)	135(51%)	265(100%)

The racial composition of the sample was 249 Caucasian, 3 were Black and 13 were Other. Ninety-four percent of the subjects were Caucasian, and six percent were minority. The distribution of the sampled population by racial composition is referenced in Table 3.

Table 3

Distribution of Race by Group

	Group				
Race	ADHD n = 74	UADD n = 56	Normal n = 135	Total N = 265	%
White	71	53	125	249	94
Black	1	0	2	3	1
Other	2	3	8	13	5
Total	74	56	135	265	100
% of Sample	28	21	51	100	

The children came from lower to upper class backgrounds as determined by the occupation of the major wage earner in their family and classified according to the Occupational Scale in Hollingshead's Two Factor Index of Social Position (Miller, 1977). This classification uses 7 categories: (1) higher executives of large concerns, proprietors, and major professionals; (2) business managers, proprietors of medium-sized

businesses, and lessor professionals; (3) administrative personnel, owners of small business, and minor professionals; (4) clerical and sales workers, technicians, and owners of little businesses; (5) skilled manual employees; (6) machine operators and semiskilled employees; and (7) unskilled employees. The frequency and percentage of the sample falling into the seven socioeconomic levels are presented in Table 4. The highest percentage overall occurred in the top level of socioeconomic status. Forty-two percent of the normal group were at the highest level and ninety-two percent of the normal group were within the top three socioeconomic categories.

Table 4

Distribution by Socioeconomic Status

	Group				
Occupation	ADHD n = 74	UADD n = 56	Normal n = 135	Total N = 265	%
Major Professionals	10	7	57	74	27.9
Lesser Professionals	4	7	3	36	13.6
Administrative	23	11	27	61	23.0
Clerical & Sales	11	16	18	45	17.0
Skilled	11	10	5	31	11.7
Semiskilled	9	4	2	15	5.7
Unskilled	1	1	1	3	1.1
Total	74	56	135	265	100.0

Procedure

The research sample was comprised of students enrolled in two suburban public school districts near a large southwestern city. The total student population of the two schools was 14,000 and included students in grades preschool through twelve. Of the original 600

surveys mailed out, 390 were returned with a return rate of 65%. Of the 390 surveys obtained by the researcher, 265 were usable, therefore this study included the 265 students whose parents had completed the Maternal Perinatal Scale. The students were divided into three groups: Attention-deficit Hyperactive Disorder (ADHD), Undifferentiated Attention-deficit Disorder (UADD), and Normal (control group).

The ADHD and UADD children were identified by physicians and licensed psychologists as having either Attention-Deficit Hyperactivity Disorder (ADHD) and Undifferentiated Attention-deficit Disorder (UADD) and verified by the investigator through school health and testing records. The Attention-Deficit Hyperactivity Disorder (ADHD) and Undifferentiated Attention-Deficit Disorder (UADD) groups were identified based on the criteria in the Diagnostic and Statistical Manual for Mental Disorders-III (Revised) by the American Psychiatric Association (1987) (DSM-III-R). The subjects included children who had been diagnosed as ADHD or UADD. According to the DSM-III-R, in order to meet the criteria for ADHD, the child's behavior must be more frequent then other children's behavior of the same age and mental ability. They must meet eight or more characteristics which have been exhibited for at least

six months. The characteristics of ADHD are summarized as follows: 1) often fidgets or is restless, 2) problems remaining seated, 3) easily distracted by stimuli, 4) difficulty taking turns, 5) impulsively responds before questions are completed, 6) difficulty completing tasks or chores, 7) difficulty in sustaining attention, 8) shifts from one uncompleted activity to another, 9) difficulty playing quietly, 10) talks excessively, 11) frequently interrupts, 12) does not seem to listen, 13) loses things, disorganized and 14) takes risks without thinking. These characteristics should have occurred before the age of seven and not be part of a pervasive developmental disorder. Children diagnosed as UADD displayed developmentally inappropriate and marked inattention but did not show signs of impulsiveness and hyperactivity.

The control group were randomly selected from children who were in regular education classrooms and were not receiving remedial or special education services at the time of the study. All children in the sample were screened by the school nurse through their medical records. Children who were diagnosed with other medical problems (i.e. Tourettes, seizures, cerebral palsy, mental retardation, etc.) were not included in the study. Also eliminated from the study were students

who were adopted and the parents could not complete the MPS, students whose parents gave more than one answer to a given question and those students with ADHD and UADD that could not be verified by a physician and/or licensed psychologist.

Instrumentation

Description

The Maternal Perinatal Scale (Dean, 1985) (Appendix A) was used to differentiate between ADHD, UADD, and normal children. The MPS consisted of 47 questions. The first twenty-six items were related to the pregnancy, birth and early life of the child (e.g., amount of swelling in the mother's feet and hands during pregnancy, forceps use, birth weight, etc.). The last twenty-one items concerned specific maternal medical conditions (e.g., diabetes) which occurred just prior to or during pregnancy of the specific child (Gray, 1988).

Scoring

Based on the literature, at-risk items were given a score of 1 and all others were given a score of 0 points (see Appendix A). Point totals were calculated for each sub-group (ADHD, UADD and Normals) on the 26-MPS questions and 21-item symptom checklist.

Reliability and Validity

The reliability and validity of the MPS has been substantiated. Several reliability studies have been performed with correlations on individual items varying from 1.00 to .85. Overall test-retest reliability of the MPS was .90, indicating a substantial level of stability over time (Gray et al., 1987).

One study has been done on the validity of the MPS. Gray, Dean & Rattan (1987) examined the validity of the MPS by comparing the mother's responses on the MPS with the information contained in the mother's hospital chart. Results showed 91% of the validity estimates to exceed $r = .90$ or greater. Additionally, intercorrelations of specific MPS information, determined by the questions, was consistent with prior research on the perinatal period. Thus, the MPS appears to be an accurate measure offering information consistent with that provided by medical records.

Statistical Analysis

This study was a causal-comparative (ex post facto) design with intact groups. A stepwise discriminate analysis was calculated to determine whether maternal perinatal information can differentiate between ADHD,

UADD, and Normals. Descriptive statistics such as the mean, standard deviations and ranges for the entire sample, the two ADHD groups and normals, were also provided.

CHAPTER IV

RESULTS

The major focus of the study was to differentiate between children diagnosed with Attention-Deficit Hyperactivity Disorder (ADHD) and children with Undifferentiated Attention-Deficit Disorder (UADD) and normal children (control group) by investigating the relationship of maternal perinatal risk factors, using the Maternal Perinatal Scale (MPS).

Descriptive Statistics

Each MPS protocol was scored in the format outlined in chapter three. Means and standard deviations for the Maternal Perinatal Scale were calculated for each group and the total sample. Table 5 presents the mean and standard deviation for MPS questions 1-26 for each group and the total sample. Question 11, the amount of maternal weight gain during pregnancy, and Question 24, history of previous complicated births, demonstrated the highest means across all three groups. There was a high rate of occurrence within the sample where mothers gained more than 36 pounds during their pregnancy.

There was also a high rate of occurrence of first time pregnancies, one or more full-term pregnancies resulting in a still birth or neonatal (first four weeks after birth) death, or a prior pregnancy resulting in a spontaneous abortion (miscarriage) within the sample. In addition, Question 8, the amount of maternal stress experienced during pregnancy, occurred with a high rate of frequency across all three groups. A majority of the mothers within the sample experienced pregnancies with moderate to a good deal of stress throughout their pregnancies. Appendix C reports the frequency of occurrence of at-risk indicators for each question (1-26) on the MPS by group and for the total sample.

Table 6 presents the mean and standard deviation for Checklist Items 27-47 by group and the total sample. Among the Condition Checklist Items, the mothers as a group were most likely to experience high blood pressure and/or anemia during their pregnancy. In comparing the three groups, the mothers of ADHD children were more likely to experience urinary infections. The ADHD mother's were the only group to report narcotic use during their pregnancy. Mothers of ADHD and UADD children were more likely to experience high temperatures or use tranquilizers during their pregnancies compared to parents of normal children.

Table 5

Means, Standard Deviations MPS Individual Questions by Group and for the Entire Sample

	ADHD n = 74		UADD n = 56		Normal n = 135		Total n = 265	
Questions 1-26	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Mother's pre-pregnancy wt.	.34	.48	.27	.45	.31	.47	.31	.46
Mother's hgt.	.38	.49	.38	.49	.28	.45	.33	.47
Father's hgt.	.49	.50	.41	.50	.42	.47	.43	.50
Prior preg.	.41	.49	.39	.49	.44	.50	.42	.50
Vaginal bleeding in preg.	.10	.30	.07	.26	.06	.24	.07	.26
Anesthesia	.10	.30	.21	.41	.16	.37	.16	.36
Child's wgt.	.03	.16	.05	.23	.03	.17	.03	.18
Maternal stress	.55	.50	.68	.47	.47	.50	.54	.50
Months to term	.26	.44	.25	.44	.16	.36	.20	.40
Length of Labor	.10	.30	.44	.35	.13	.34	.13	.33
Maternal wt gain	.58	.50	.52	.50	.62	.49	.59	.49
Maternal age	.42	.50	.32	.47	.32	.47	.35	.48
Prenatal care	.0	.0	.0	.0	.01	.09	.004	.06
Edema in preg.	.12	.33	.07	.26	.06	.24	.08	.27
Induced labor	.16	.37	.20	.40	.16	.37	.17	.38
Forcep use	.27	.45	.32	.47	.24	.43	.26	.44
Preg. planning	.43	.50	.48	.50	.36	.48	.41	.49
Multiple preg.	.0	.0	.05	.23	.04	.19	.03	.17
Medication	.27	.45	.23	.43	.23	.41	.23	.42
Presentation of fetus	.10	.30	.05	.23	.09	.29	.08	.28
Time membrane rupture - labor	.38	.49	.27	.45	.30	.46	.31	.47
Neonate's color	.10	.30	.20	.40	.11	.32	.13	.33
Gyn. surgeries	.11	.31	.09	.29	.10	.31	.10	.30
Type of preg.	.57	.50	.66	.06	.58	.50	.59	.49
Smoking	.28	.45	.21	.41	.13	.34	.19	.40
Alcohol	.05	.23	.04	.19	.02	.12	.03	.17

Appendix C reports the frequency of occurrence for each Checklist Item by group and for the total sample.

Table 6

Means, Standard Deviations MPS Checklist by Group and for the Entire Sample

	ADHD n = 74		UADD n = 56		Normal n = 135		Total n = 265	
Checklist	Mean	SD	Mean	SD	Mean	SD	Mean	SD
Thyroid disease	.05	.23	.00	.00	.02	.19	.03	.16
Hypertension	.15	.36	.11	.31	.08	.28	.11	.31
Anemia	.11	.31	.16	.37	.13	.34	.13	.34
Neurological problem	.00	.00	.04	.19	.00	.00	.01	.09
Emotional prob.	.10	.30	.05	.23	.02	.12	.05	.21
Urinary Infection	.15	.36	.09	.29	.07	.25	.09	.30
Gonorrhea	.01	.12	.00	.00	.00	.00	.004	.06
Syphilis	.00	.00	.00	.00	.00	.00	.00	.00
Heart Disease	.00	.00	.00	.00	.00	.00	.00	.00
Sickle cell	.04	.20	.00	.00	.01	.09	.004	.06
Diabetes	.01	.12	.00	.00	.02	.12	.01	.09
RH difference	.04	.12	.12	.39	.10	.30	.01	.30
Viral Infection	.04	.20	.02	.13	.02	.12	.02	.15
High temp.	.01	.12	.02	.13	.00	.00	.01	.09
Fainting spells	.05	.23	.02	.13	.04	.19	.04	.19
Parasitic infections	.00	.00	.02	.13	.00	.00	.004	.06
Narcotic use	.03	.16	.00	.00	.00	.00	.01	.09
Physical trauma	.00	.00	.02	.13	.01	.09	.01	.09
Malnutrition	.01	.12	.00	.00	.01	.09	.01	.09
Depression	.08	.28	.04	.19	.03	.17	.05	.21
Tranquilizer use	.04	.20	.02	.13	.00	.00	.02	.12

The MPS Questions 1-26 were summed for each child to obtain a total score for the first 26 questions. In addition, the Condition Checklist Items 27-47 were summed to obtain a total score. To obtain a MPS Total Score, both the Questions 1-26 and the Condition Checklist Items 27-47 were summed. Means and standard deviations for MPS Questions 1-26, Checklist Items 27-47 and Total MPS scores are represented in Table 7. A One-way Analysis of Variance (ANOVA) was computed to determine whether the groups differed significantly in the average number of at-risk indicators based on the sum of Questions 1-26 on the MPS. No significant difference was found between the groups ($F = 2.3769$, $p < .0948$). The One-way ANOVA was computed to determine whether the groups were significantly different in the total number of conditions checked resulted in F of 4.2680 ($p < .015$). The average occurrence of medical conditions experienced by the mother during pregnancy was significantly different between the groups. A Post-hoc analysis using Tukey's procedure found a significant difference between the ADHD and normal group at the .05 level of significance. All other comparisons were non-significant. A One-way ANOVA was computed to determine whether the three groups MPS Total Score was significantly different. A significant difference was

demonstrated between the three groups (F = 4.0602, p <.0183). Post-hoc analysis found a significant difference between the ADHD and normals at the .05 level of significance. All other comparisons were nonsignificant.

Table 7

Description of Sub-populations on Categories of the MPS

	Group					
	ADHD n = 74		UADD n = 56		Normal n = 135	
Total Score	$\bar{x}$	SD	$\bar{x}$	SD	$\bar{x}$	SD
MPS Questions (1-26)	6.027	2.107	6.125	2.115	5.474	2.349
Medical Conditions Checklist	.905	1.160	.888	.905	.540	.730
MPS Total	6.932	2.655	6.910	2.602	6.014	2.556

To determine if the distributions of the occurrence of the at-risk items differed among groups, the Chi-square test was computed on questions 1-26 on the MPS. The summary of the chi-squares analyses are reported in Table 8. Results of the chi-squares found that the occurrence of at-risk items were distributed evenly among the three groups on all but two questions. The distribution of at-risk verses non-at-risk responses on Question 8 (the amount of stress the mother experienced during pregnancy) and Question 25 (the number of cigarettes the mother smoked during pregnancy were significantly different across the groups. The observed summary table for the chi-square analysis for Questions #8 and #25 are shown in Tables 9 and 10 respectively. The mothers of the group with UADD reported more stress during pregnancy than the mothers of the other two groups. Smoking during pregnancy was reported more frequently by mothers of the ADHD group.

Table 8

Chi-square Test for Maternal Perinatal Items(1-26)

Question	X^2	Degrees of Freedom	Significance
1. Mother's pre-pregnancy weight	.73	2	.69
2. Mother's height	.98	2	.61
3. Father's height	.65	2	.72
4. Number of prior pregnancies	.39	2	.82
5. Vaginal bleeding in pregnancy	.90	2	.64
6. Anesthesia	3.63	2	.16
7. Child's weight	.84	2	.66
8. Maternal stress during pregnancy	7.28	2	.026
9. Months to term	3.95	2	.14
10. Length of Labor	.88	2	.65
11. Maternal wt gain	1.80	2	.41
12. Maternal age	2.33	2	.31
13. Prenatal care	.97	2	.62
14. Edema in pregnancy	2.60	2	.27
15. Induced labor	.36	2	.84
16. Forcep use	1.47	2	.48
17. Pregnancy planning	2.59	2	.27
18. Multiple pregnancy	3.56	2	.17
19. Medication	.82	2	.66
20. Presentation of fetus	.83	2	.66
21. Time membrane rupture - labor	1.45	2	.48
22. Neonates color	3.48	2	.17
23. Gyn. surgeries	.13	2	.94
24. Type of prior pregnancies	1.39	2	.50
25. Smoking in preg.	7.18	2	.027
26. Alcohol Consumption during pregnancy	2.59	2	.27

Table 9

Chi-square Test for Independence for Maternal Stress by Group

Group	None to Very Little Stress	Moderate to Major Stress	Row Total
ADHD n = 74	44.6 (26.8%)	55.4 (28.9%)	74 (27.9%)
UADD n = 56	32.1 (14.6%)	67.9 (26.8%)	56 (21.1%)
Normal n = 135	53.3 (58.5%)	46.7 (44.4%)	135 (50.9%)
Column Total	123 (46.4%)	142 (53.6%)	265 (100.0%)
X^2 = 7.28	D.F. = 2	Sig. = .026	

Table 10

Chi-square Test for Independence for Maternal Smoking by Group

Group	Non-smokers	Smokers	Row Total
ADHD n = 74	71.6 (24.8%)	28.4 (41.2%)	74 (27.9%)
UADD n = 56	78.6 (20.6%)	21.4 (23.5%)	56 (21.1%)
Normal n = 135	86.7 (54.7%)	13.3 (35.3%)	135 (50.9%)
Column Total	214 (80.8%)	51 (19.2%)	265 (100.0%)
X^2 = 7.17	D.F. = 2	Sig. = .027	

Tests of the Hypothesis

Null Hypothesis One:

Maternal perinatal factors, as measured by the MPS, will not differentiate between ADHD, UADD, and normal children with 80% accuracy.

A stepwise discriminant analysis was computed using questions 1-26 on the MPS. In addition, the items on the Condition Checklist (Items 27-47) were summed and the total score (Checklist Total Score) was entered into

the analysis for a total of 27 variables. The Box's M statistic was not significant, (F = 1.3, p =.07), indicating that the homogeneity of variance assumption was met and a discriminant was allowable. The stepwise discriminant analysis procedure maximizes the prediction of the variables and the ability to separate the groups. For example, in this procedure the first variable to enter is the one which maximizes separation among the groups (Stevens, 1986). The next variable to enter is the one that adds the most in further separating the groups and so on.

The first variable to enter into the stepwise discriminant analysis was the Checklist Total score indicating it was the variable that maximized the separation between the groups the most and had the highest correlation with the dependent variable and was significant at the .02 level (Wilks' Lambda = .9684). The second variable to enter the equation was Question 25, maternal smoking during pregnancy, and was significant at the .01 level (Wilks' Lambda = .9466). Question 9, months to term, was entered next into the equation and added the most in further separating the two groups at the .01 level of significance (Wilks' Lambda = .9262). The fourth variable to enter the equation was Question 8, maternal stress during

pregnancy, and further aided in separating the three groups at the .001 level of significance (Wilks' Lambda = .9065). The additional variables entered (F's to enter) into the equation are not reported since the Wilk's Lambda for the "best" set of discriminators is positively biased and this can lead to the inclusion of too many variables (Stevens, 1986). The significance level shown on the computer printout should not be used as the sole criteria to the separation between the groups because some variables which do not really contribute may be included into the analysis. "Hawkins has suggested that a variable be entered only if it is significant at the alpha/(k - p) level, where alpha is the desired level of significance, p is the number of variables already included and (k -p) is the number of variables available for inclusion (Stevens, 1992). To enter additional variables beyond step four would require an alpha level of .001.

The canonical correlations, eigenvalues and significance levels for each of the discriminant functions are presented in Table 11. The first function was significant at the .002 level of significance and explained 66.97 percent of the variance. The second discriminant function was not significant. Therefore, the correlation between the variables and the second

discriminant function were not reported and not rotated.

The discriminant Function is a linear combination of the MPS variables (Questions 1-26 and Checklist Total Score). Table 12 contains correlations between the discriminant function and the discriminating variables. The highest correlation between the discriminant function and the MPS variables were with the Condition Checklist Total Score (.54) and Question 25 (.50), maternal smoking during pregnancy. The discriminant function was primarily defined by these two variables. Questions 9 (months to term), 8 (maternal stress during pregnancy), and 14 (edema of extremities during pregnancy) were secondarily involved in defining the functioning.

Table 11

Canonical Correlations, Eigenvalues, and Significance Levels for Each of the Discriminant Functions

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance Level
1	.109	66.97	.314	.0019
2	.054	33.03	.226	.0937

Table 12

Correlations Between Discriminating Variables and Discriminant Function

Discriminating Variable		Discriminant Function
	Condition Checklist Total	.54
25.	Maternal smoking	.50
9.	Months to term	.36
14.	Edema of extremities	.28
10.	Length of labor	.12
26.	Maternal alcohol consumption	.10
16.	Forcep use	.09
19.	Medication during pregnancy	.09
13.	Prenatal care	-.08
20.	Presentation of fetus at birth	-.08
12.	Maternal age	.07
2.	Mother's height	.04
8.	Maternal stress	.33
22.	Color of neonate	.02
6.	Type of anesthesia	-.17
18.	Multiple pregnancies	-.22
21.	Time from membrane rupture	-.17
7.	Child's birth weight	-.001
17.	Planned pregnancy	.09
3.	Father's height	-.06
1.	Mother's weight prior to pregnancy	-.005
5.	Vaginal bleeding	-.008
15.	Induced labor	-.04
4.	Prior pregnancies	.03
23.	Prior gynecological surgeries	.002
11.	Maternal weight gain	.02
24.	Type of prior pregnancies	.005

To facilitate interpretation of the discriminant function, the discriminate function was rotated using the varimax method. The varimax rotated correlations

between the discriminating variables and the discriminate function is shown in Table 13. The highest rotated correlation between the discriminant function and the MPS variables were with Question 8, maternal stress during pregnancy (.56), and the Condition Checklist Total Score (.48). The discriminant function was primarily defined by these two variables. Questions 25 (maternal smoking during pregnancy) and Question 9 (months to term) were secondarily involved in defining the functioning. These are similar to the unrotated function, reaffirming the construct of the discriminant function and what it is primarily measuring.

Table 13

Varimax Rotated Correlations Between the Discriminating Variables and Discriminate Functions

Discriminating Variable		Discriminant Function
8.	Maternal Stress during pregnancy	.56
	Maternal Conditions Checklist	.48
25.	Maternal smoking	.41
9.	Months to term	.38
21.	Time of membrane rupture	-.25
17.	Pregnancy planning	.14
10.	Length of labor	.14
16.	Forcep use	.11
26.	Maternal alcohol consumption	.10
12.	Maternal age at birth	.08
15.	Induced labor	-.08
4.	Number of prior pregnancies	.04
2.	Mother's height	.03
11.	Maternal weight gain	.03
6.	Type of anesthesia	.08
18.	Multiple pregnancies	.01
22.	Color of neonate	.27
14.	Edema of extremities	.15
3.	Father's height	.001
13.	Prenatal care	-.03
7.	Child's birth weight	.06
1.	Mother's weight prior to pregnancy	.05
19.	Use of medication	.06
5.	Vaginal bleeding	.03
20.	Presentation of fetus	-.06
23.	Prior gynecological surgeries	-.01
24.	Type of prior pregnancies	.002

The Discriminant Analysis Classification Table is presented in Table 14. Approximately 52% of the subjects were correctly classified by group when using

the MPS. The normals had the highest percentage (55.6) of individuals correctly classified. Fifty percent of the UADD group was correctly classified and the ADHD group had the most misclassified members, with only 47.3% being correctly classified. The use of the MPS in making a differential diagnosis between UADD, ADHD and normal children was not supported. The MPS does not differentiate between the three groups with 80% or more accuracy, therefore, the null hypothesis was accepted.

Table 14

Stepwise Discriminant Analysis Classification Table of MPS by Three Groups

		Predicted Group Membership		
Group		1	2	3
Normal	n = 135	32	28	75
		23.7%	20.7%	55.6%
ADHD	n = 74	17	35	22
		23.0%	47.3%	29.7%
UADD	n = 56	28	14	14
		50.0%	25.0%	25.0%

Percent of "Grouped" cases correctly classified: 52.08%

Null Hypothesis Two:

Maternal perinatal factors, as measured by the MPS, will not differentiate between ADHD/UADD (as one group) and normal children with 80% accuracy.

A stepwise discriminant analysis was computed using questions 1-26 on the MPS. In addition, the items on the condition checklist (Items 27-47) were summed and the total score (Checklist Total Score) was entered into the analysis for a total of 27 variables. No Box's M statistic was performed because two non-singular group covariance matrices did not exist.

The first variable to enter into the stepwise discriminant analysis was the Checklist Total score (Wilks' Lambda = .9639) which maximized the separation between the two groups the most and had the maximum correlation with the dependent variable. The second variable to enter was Question 25, maternal smoking during pregnancy, which added the most in further separating the groups at the .001 level of significance (Wilks' Lambda = .9372). The third variable to enter into the equation was Question 9, months to term, at the .001 level of significance (Wilks' Lambda = .9182) and the fourth variable to enter was Question 18, multiple pregnancy, with a significance level of .0003 (Wilks' Lambda = .9883).

Table 15 presents the canonical correlation, eigenvalue and significance level for the discriminant function. Only one discriminant function was produced since only two groups were used in the analysis. The discriminant function was significant at the .0006 level of significance and accounted for 100% of the variance. The highest correlation between the discriminant and the MPS variables were with the Condition Checklist Total Score (.50), and Question 25 (.45) maternal smoking during pregnancy. The discriminant function was primarily defined by these two variables. Question 8 (.41) maternal stress during pregnancy and Question 9 (.36) months to term were secondarily involved in defining the function. Table 16 contains the correlation between discriminant function and the discriminating variables.

Table 15

Canonical Correlation, Eigenvalue, and Significance Level for the Discriminant Function

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance Level
1	.12	100	.3269	.0006

Table 16

Correlations Between Discriminating Variables and Discriminant Function Ordered by Size

Discriminating Variable		Discriminant Function
	Condition Checklist Total	0.50
25.	Maternal smoking during pregnancy	0.45
8.	Maternal stress during pregnancy	0.41
9.	Months to term	0.36
26.	Maternal alcohol consumption	0.27
11.	Maternal weight gain	-0.20
21.	Time from membrane rupture	-0.20
13.	Perinatal care	-0.17
22.	Color of neonate	0.11
12.	Maternal age	0.11
17.	Planned pregnancy	0.10
6.	Type of anesthesia	-0.09
14.	Edema of extremities	0.08
10.	Length of labor	-0.08
7.	Child's birth weight	0.07
20.	Presentation of fetus at birth	-0.07
19.	Medication during pregnancy	0.07
2.	Mother's height	0.06
23.	Prior gynecological surgeries	-0.05
3.	Father's height	-0.05
5.	Vaginal bleeding	0.04
15.	Induced labor	-0.04
16.	Forcep use	0.04
24.	Type of prior pregnancy	-0.04
4.	Prior pregnancy	0.02
1.	Mother's weight prior to pregnancy	0.02
18.	Multiple pregnancies	-0.02

The Discriminant Analysis Classification Table is presented in Table 17. Approximately 67% of the subjects were correctly classified by group when using

the MPS. The normals had the highest percentage (73.3%) of individuals correctly classified. Sixty percent of the UADD/ADHD were correctly classified. The use of the MPS in making a differential diagnosis between ADHD/UADD and the normal children was not supported. The MPS does not differentiate between the two groups with 80% or more accuracy, therefore, the null hypothesis was accepted.

Table 17

Stepwise Discriminant Analysis Classification Table of MPS by Two Groups

		Predicted Group Membership	
Group		1	2
ADHD/UADD	n = 130	79 60.8%	51 39.2%
Normal	n = 135	36 26.7%	99 73.3%

Percent of "Grouped" cases correctly classified: 67.17%

Null Hypothesis Three:

Maternal perinatal factors, as measured by the MPS, will not differentiate between ADHD and normal children with 80% accuracy.

A stepwise discriminant analysis was computed using questions 1-26 on the MPS. In addition, the items on the condition checklist (Items 27-47) were summed and the total score (Checklist Total Score) was entered into the analysis for a total of 27 variables. No Box's M statistic was performed because two non-singular group covariance matrices did not exist.

The first variable to enter into the stepwise discriminant analysis was the Checklist Total Score indicating it was the variable that maximized the separation between the two groups the most and had the most correlation with the dependent and was significant at the .006 level (Wilks' Lambda = .9639). The second variable to enter was Question 25, maternal smoking during pregnancy and was significant at the .001 level (Wilks' Lambda = .9372). Question 9, months to term, was the third variable to enter and was significant at the .001 level (Wilks' Lambda = .9182). The fourth variable to enter was Question 18, multiple pregnancy, and was significant at the .001 level (Wilks' Lambda = .9020).

Table 18 presents the canonical correlation, eigenvalue and significance level for the discriminant function. The discriminant function was significant at the $p < .0008$ level of significance and accounted for 100% of the variance. The highest correlation between the discriminant and the MPS variables were with the Condition Checklist Total Score (.47) and Question 25 (.45) maternal smoking during pregnancy. The discriminant function was primarily defined by these two variables. Question 9 (months to term), Question 18 (multiple pregnancies), Question 26 (maternal alcohol consumption) and Question 14 (edema of extremities) were secondarily involved in defining the functioning. Table 19 contains the correlation between discriminant function and the discriminating variables.

Table 18

Canonical Correlations, Eigenvalues, and Significance Levels for the Discriminant Function

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance Level
1	0.17	100	.38	.0008

The Discriminant Analysis Classification Table is presented in Table 20. Approximately 69% of the subjects were correctly classified by group when using the MPS. The normals had the highest percentage (75.6) of individuals correctly classified. Fifty-six percent of the ADHD group was correctly classified. The use of the MPS in making a differential diagnosis between ADHD and normal children was not supported. The MPS does not differentiate between the two groups with 80% of more accuracy, therefore, the null hypothesis was accepted.

Table 19

Correlations Between Discriminating Variables and Discriminant Function Ordered by Size

	Discriminating Variable	Discriminant Function
	Condition Checklist Total	0.47
25.	Maternal smoking during pregnancy	0.45
9.	Months to term	0.30
18.	Multiple pregnancies	-0.28
26.	Maternal alcohol consumption	0.27
14.	Edema of extremities	0.27
12.	Maternal age	0.24
6.	Type of anesthesia	-0.23
10.	Length of labor	-0.14
19.	Medication during pregnancy	0.12
3.	Father's height	0.12
21.	Time from membrane rupture	-0.11
8.	Maternal stress	0.11
20.	Presentation of fetus at birth	-0.09
24.	Type of prior pregnancy	-0.08
16.	Forcep use	0.07
1.	Mother's weight prior to pregnancy	-0.07
13.	Prenatal care	-0.05
4.	Prior pregnancies	-0.05
2.	Mother's height	0.05
15.	Induced labor	-0.05
17.	Planned pregnancy	0.04
23.	Prior gynecological surgeries	0.03
7.	Child's birth weight	0.02
11.	Maternal weight gain	-0.01
5.	Vaginal bleeding during pregnancy	0.01
22.	Color of neonate	-0.002

Table 20

Stepwise Discriminant Analysis Classification Table of MPS by Two Groups

		Predicted Group Membership	
Group		1	2
ADHD	n = 74	42 (56.8%)	32 (43.2%)
Normal	n = 135	33 (24.4%)	102 (75.6%)

Percent of "Grouped" cases correctly classified: 68.9%

Null Hypothesis Four:

Maternal perinatal factors, as measured by the MPS, will not differentiate between UADD and normal children with 80% accuracy.

A stepwise discriminant analysis was computed using questions 1-26 on the MPS. In addition, the items on the condition checklist (Items 27-47) were summed and the total score (Checklist Total Score) was entered into the analysis for a total of 27 variables.

No Box's M statistic was performed because two non-singular group covariance matrices did not exist. The first variable to enter into the stepwise discriminant analysis was Question 8, maternal stress during pregnancy (Wilks' Lambda = .9626), which maximized the separation among the two groups the most and had the maximum correlation with the dependent variable. The second variable to enter was Question 9, months to term, (Wilks' Lambda = .9471) which added the most in further separating the groups. The Checklist Total Score (Wilks' Lambda = .9342) and Question 21, time from membrane rupture to labor, (Wilks' Lambda = .9229) were the third and fourth variables entered.

The canonical correlation, eigenvalue and significance level for the discriminant functions is presented in Table 21. Only one discriminant function was produced since only two groups were used in the analysis. The discriminant function was significant at the .0069 level of significance and accounted for 100% of the variance. The highest correlation between the discriminant and the MPS variables were maternal stress during pregnancy (.59) and the Checklist Total Score (.43). The discriminant function was primarily defined by these two variables. Questions 9 (.34), months to

term, Question 25 (.31), maternal smoking during pregnancy (.31) and Question 11 (.29), maternal weight gain were secondarily involved in defining the function.

Table 21

Canonical Correlation, Eigenvalue, and Significance Level for the Discriminant Function

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance Level
1	.110	100%	.3154	.0069

Table 22 contains correlation between discriminant function and the discriminating variables ordered by size.

Table 22

Correlation Between Discriminating Variables and Discriminant Function Ordered by Size

Discriminating Variable		Discriminant Function
8.	Maternal stress	0.59
	Condition Checklist Total	0.43
9.	Months to term	0.34
25.	Maternal smoking during pregnancy	0.31
11.	Maternal weight gain	-0.29
21.	Time from membrane rupture	-0.25
6.	Type of anesthesia	0.18
17.	Planned pregnancy	0.18
10.	Length of labor	0.16
22.	Color of neonate	0.15
7.	Child's birth weight	0.12
18.	Multiple births	0.09
1.	Mother's weight prior to pregnancy	0.08
14.	Edema of extremities	0.07
24.	Type of prior pregnancy	0.07
16.	Forcep use	0.06
20.	Presentation of fetus at birth	-0.06
5.	Vaginal bleeding during pregnancy	0.06
23.	Prior gynecological surgeries	-0.06
2.	Mother's height	0.06
15.	Induced labor	-0.05
12.	Maternal age at pregnancy	0.05
4.	Prior pregnancies	0.04
13.	Prenatal care	-0.04
26.	Maternal alcohol consumption	0.03
3.	Father's height	-0.03
19.	Medication during pregnancy	0.01

The discriminant analysis group predictability between UADD and Normals is presented in Table 23.

Approximately 62% of the subjects were correctly classified by group when using the MPS. The UADD had the highest percentage (66.1%) of individuals correctly classified and 61.5% of the normals were correctly classified. The use of the MPS in making a differential diagnosis between UADD and normal children was not supported. The MPS does not differentiate between the two groups with 80% or more accuracy, therefore, the null hypothesis was accepted.

Table 23

Stepwise Discriminant Analysis Classification Table of MPS by Two Groups

		Predicted Group Membership	
Group Membership		1	2
UADD	n = 56	37	19
		66.1%	33.9%
Normals	n = 135	52	83
		38.5%	61.5 %

Percent of "Grouped" cases correctly classified: 62.83%

CHAPTER V

Discussion

The results of this study did not support the use of maternal perinatal information in the differential diagnosis of ADHD, UADD and normal children. Therefore, Null Hypothesis one was accepted. When using maternal perinatal information in the classification of ADHD, UADD and normal children only 52% of the children were correctly classified. A classification that is slightly better than chance. However, the prediction improved when comparing the normal group to the diagnostic group (ADHD and UADD groups combined). The accuracy of classification improved to 67%, but was not sufficient to reject Null Hypothesis Two. When using maternal perinatal information in the classification of ADHD and normal children 68.9% of the children were classified correctly, but was not sufficient to reject Null Hypothesis Three. When using maternal perinatal information in the classification of UADD and normal children 62.8% of the children were classified correctly, but was not sufficient to reject Null Hypotheses Four. These comparison between the normal

and diagnostic groups, while interesting, provided little information toward increasing the accuracy in differential diagnosis of ADHD and UADD children. However, it does demonstrate the high rate of misclassifications of normal children that would have been misdiagnosed as ADHD or UADD if only maternal perinatal factors were considered. These results do suggest that mothers who report several medical conditions and/or several at-risk conditions during their pregnancy are more likely to have children that will be diagnosed as ADD. This was consistent with Safer (1973) where children having more than one developmental correlate of hyperactivity were more likely to become hyperactive. For example, children with low birth weights, congenital disorders and family histories of hyperactivity were more likely to become hyperactive than those with only low weights. However, the primary questions that needs to be addressed is whether the occurrence of maternal perinatal factors and/or medical conditions occur differently among mothers of normal and ADD children. The majority of previous research studies has focused on reporting the incidence of pregnancy and birth complications of ADHD children without determining whether they occur differently among normal children. To date, only three

studies out of 24 done since 1984 trying to distinguish ADHD and UADD, had a control group; seventeen of these studies used subjects from a clinic setting and the others were from a school setting (Lahey & Carlson, 1991). One group may have been more severe, have overlapping problems or the same symptoms for classification may have been different. Without a control group it is difficult to compare the results to the general population or this study that has used a control group. This study found few differences between the two groups. Indicating that the occurrence of pregnancy and birth complications among mothers of normal and ADHD children were similar.

Even though overall group differences in perinatal factors were not found in this study, several MPS Question and the Condition Checklist should be considered when making a differential diagnosis between the three groups. Therefore, even though the Maternal Perinatal Scale would only be one aspect of these disorders, the use of maternal perinatal factors, along with other measures, may help explain differences between the groups and improve the process of assessment and diagnosis. More specifically, the amount of maternal stress experienced during the pregnancy, the number of cigarettes smoked during pregnancy and the

number of medical conditions should be considered along with other information gathered in the assessment of ADHD children.

This study added little in explaining the etiology of attention disorders. The etiology of ADHD remains inconclusive and hypothetical. Barkley (1981, 1989) indicates no single etiology can adequately account for the symptoms and correlates of hyperactivity. It has multiple biological etiologies, rather than an environmental etiology, the final common pathway being their effect on the central nervous system. Barkley sees familial-hereditary factors playing a large role in ADHD, and complications in pregnancy also contribute to the ADHD portion of the population.

However, as with other disorders, the simple explanation approach may not be appropriate for ADHD because overlapping symptomatology may be involved. Werry (1979) further suggests ADHD subclassifications must be based upon multivariate approaches to clinical, neurological and psychophysiological data and such subclassification will be required before problems of etiological explanation can be resolved.

On the MPS, means and standard deviations were calculated for each group and the total sample. There was a high occurrence across the groups on several

items: Question 11, the amount of maternal weight gained during pregnancy, Question 24, history of previous complicated births, Question 4, first time pregnancies, and Question 8, the amount of maternal stress experienced during pregnancy. Hartsough & Lambert (1985) studied medical factors in hyperactive and normal children and found prior complicated births and first pregnancy for the mothers in both the ADHD group and the control group with the finding being non-significant. Minde, Webb & Sykes (1968) obtained data from the actual birth records between hyperactive children and normal. They found no differences in the incidence of severe prenatal and paranatal difficulties.

To determine if the distribution of the occurrence of the at-risk items differed among groups, the Chi-square test was computed on Questions 1-26 on the MPS. The results of the chi-square found that the occurrence of at-risk items were distributed evenly among the three groups on all but two questions. Question 8, the amount of stress the mother experienced during pregnancy and Question 25, the number of cigarettes the mother smoked during pregnancy were significantly different across the groups. Denson, Nanson, & McWatters (1975), as well as Nichols & Chen (1981), found maternal smoking during pregnancy in their research with ADHD. This study also

found a significant difference existed between the ADHD group as compared to the UADD and normal group with Question 25, the number of cigarettes the mother smoked during pregnancy.

The significant difference on Question 8, the amount of stress the mother experienced during pregnancy, was found between the UADD group versus the ADHD and control group. These differences may be the results of financial obligations of the two-income society and the pressures of being a "super-mom", adds stresses to the pregnancy rarely experienced by any previous generation, which could indeed cause a rising incidence of attentional problems in children. In order to cope with this stress, pregnant mothers may seek an outlet for this stress by smoking, drinking alcohol or even to using prescriptive drugs to help mitigate stress.

Differences were found between the normal and ADHD group in the total number of maternal medical conditions reported by the mother. Hartsough & Lambert's (1985), as well as Safer & Allen (1976), also found a significantly higher maternal medical conditions (poor maternal health during pregnancy) in the ADHD group than the control group.

The generalization of the results of this

investigation should be made cautiously due to several limitations. The major limitation was the technical adequacy of the MPS. First, the scale lacked validity. A study of predictive validity was performed using the MPS (Gray, Dean, Strom, Wheeler & Brockley, 1989). The MPS was able to correctly categorize developmentally disabled children from a normal control group 83% of the time. The developmentally disabled group had IQ scores of less than 70 and compared to children who were functioning academically consistent with their ability and were not receiving special education services. The difference in results between the Gray, et al., study and this study could be due to the difference in populations. There may be more similarities between normal and ADHD children then with developmentally disabled children. Another study, (Gray, Dean, Rattan & Bechtel, 1988) looked at the validity comparing the mother's responses on the MPS to hospital chart records. The results indicated that 91% of the validity estimates exceeded an r value of .90 between the charts and the MPS items. However, the mother's responses were immediately after delivery and two days later, when the information is foremost in their minds. In this same study, the MPS scores were used to predict the children's 5 minute APGAR scores. The mother's

responses of the MPS accounted for 73% of the variance in the predicted APGAR score. Again, there was only a short time needed to recall this information.

Second, the intended scaling of the instrument was unclear and the responses had to be coded dichotomously. This restricted the range of the item responses and limited the variance. Although the item responses were totaled in an attempt to increase the variance, the results were unsubstantial. In this current study, all children that qualified for an Educable Mentally Handicapped placement in a school setting were excluded. Maternal perinatal factors need to be considered along with other information, and the occurrence of maternal perinatal factors among different diagnostic groups need to be compared to normals.

There is a need to study the occurrence of genetic characteristics that are not measured by the MPS. There may be some social incidences which we have not measured. In addition, completing the MPS was on a volunteer basis and results might be different from a nonvolunteer group. Although there is agreement in the observable behavior involved in the disorder of ADHD, there is not necessarily agreement in the criteria involved in its definition. Barkley (1991) recognizes the disorder as falling along a continuum of normal

child behavior, but at the extreme ends of the continuum. For this reason, it may be difficult to distinguish between different severities of the disorder. This particular group may have had problems that have not been diagnosed, and, in fact, the normal group may not have been a control group. Using the MPS might have produced inaccurate recall of information reported by the mothers. The mothers may not be able to retrieve perinatal information correctly many years later, or they reported that the pregnancy was a lot worse than it was. Without verifying it with hospital records, this information cannot be substantiated.

Summary

In this study, little support was found for the use of maternal perinatal information when making a differential diagnosis between ADHD, UADD and normal children. The Condition Checklist contributed to the separation of the groups and should be considered in making a diagnosis; this study indicates that the more medical conditions the mother, has the more at risk the child is for ADHD and UADD. In addition, amount of maternal smoking during pregnancy and maternal stress should be considered when making a differential diagnosis.

Recommendations for Future Research

1. Possible pre-disposing factors using a multi-generational instrument that accesses not only pregnancy and birth related factors but social disorders (alcoholism and smoking), behavior and genetic factors in more than just the immediate parents is needed.
2. Additional variables along with perinatal complications such as parenting skills, environmental and social-emotional factors is needed to understand differences in ADHD and UADD children.
3. Secondhand smoke, should be researched as a variable, since smoking during pregnancy was found to be an at-risk indicator for ADHD children.
4. Different diagnostic categories (i.e., learning disabled, emotionally disturbed, conduct disorders, etc.) should be included to determine whether the Maternal Perinatal Scale provides additional information in the differential diagnosis of ADHD and other disorders.
5. Future research should focus on substantiating the construct and predictive validity of the MPS scale.

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APPENDIX A

MATERNAL PERINATAL SCALE

MATERNAL PERINATAL SCALE

Raymond S. Dean

Jeffrey W. Gray

Name of Child_____ Date of Birth_____

Name of Mother_____ Race_____ Age_____

Name of Father_____ Race_____ Age_____

Occupation of Wage Earner(s):_____

_____ _____

Directions: This form should be completed by the child's natural mother or other individuals having intimate knowledge of this pregnancy and birth. For each of the following questions or statements, choose the response which best answers it for the child named above. Indicate your response by writing the number for that statement in the space to the left.

1. _____ Just before this pregnancy, the mother's weight was approximately:
   (1) 1. less than 90 lbs.
   (1) 2. 91-110
   (0) 3. 111-120
   (0) 4. 121-130
   (0) 5. 131-140
   (0) 6. 141-150
   (1) 7. greater than 151

2. _____ The mother's height at the time of pregnancy was:
   (1) 1. less than 5 ft.
   (0) 2. 5 ft., 1 in.--5 ft., 3 in.
   (0) 3. 5 ft., 4 in.--5 ft., 5 in.
   (0) 4. 5 ft., 6 in.--5 ft., 8 in.
   (0) 5. 5 ft., 9 in.--5 ft., 11 in.
   (1) 6. 6 ft. or greater

3. _____ The father's height is:
   (0) 1. less than 5 ft.
   (0) 2. 5 ft., 1 in.--5 ft., 3 in.
   (0) 3. 5 ft., 4 in.--5 ft., 5 in.
   (0) 4. 5 ft., 6 in.--5 ft., 8 in.
   (0) 5. 5 ft., 9 in.--5 ft., 11 in.
   (1) 6. 6 ft.--6 ft., 1 in.
   (1) 7. 6 ft., 2 in. or greater

4. _____ The number of pregnancies prior to the birth of the child named above was:
   (1) 1. none
   (0) 2. one
   (0) 3. two
   (0) 4. three or more

5. _____ What was the amount of vaginal bleeding during pregnancy?
(0) 1. none
(1) 2. some near end of pregnancy
(0) 3. some at beginning of pregnancy
(1) 4. a good deal throughout

6. _____ What type of anesthesia was employed during the delivery?
(0) 1. saddle block (anesthesia injected into the spine)
(1) 2. inhaled general anesthesia (e.g., "gas," ether)
(1) 3. injected general anesthesia
(0) 4. none

7. _____ This child's weight at birth was:
(1) 1. less than 3 lbs.
(1) 2. 3 lbs., 1 oz. to 4 lbs.
(1) 3. 4 lbs., 1 oz. to 5 lbs.
(0) 4. 5 lbs., 1 oz. to 6 lbs.
(0) 5. more than 6 lbs.

8. _____ What was the amount of stress the mother experienced during the pregnancy?
(0) 1. very little
(1) 2. a moderate amount
(1) 3. a good deal throughout

9. _____ This child was born after how many months of pregnancy?
(1) 1. 6
(1) 2. 7
(0) 3. 8
(0) 4. 9
(1) 5. greater than 9 months
(0) 6. not sure

10. _____ Approximately what was the length of labor (with regular contractions) prior to birth?
(0) 1. 1-2 hours
(0) 2. 3-5 hours
(0) 3. 6-10 hours
(0) 4. 11-16 hours
(1) 5. more than 16 hours

11. _____ About how much weight was gained by the mother during pregnancy?
(1) 1. less than 10 lbs.
(0) 2. 11-15 lbs.
(0) 3. 16-25 lbs.
(1) 4. 26-35 lbs.
(1) 5. 36-45 lbs.
(1) 6. in excess of 46 lbs.

12. _____ Mother's age at the time of this child's birth was:
(1) 1. under 15 years
(1) 2. 15-19 years
(0) 3. 20-29 years
(1) 4. 30-34 years
(1) 5. 35-39 years
(1) 6. over 40 years

13. _____ During the pregnancy when did the mother first consult a physician?
(0) 1. months 1-3
(0) 2. months 4-6
(1) 3. months 7-8
(1) 4. after 8th month

14. _____ To what extent did the mother experience swelling of legs, feet or hands during the pregnancy?
(0) 1. minimal
(0) 2. some near the end of pregnancy
(0) 3. some near the beginning of pregnancy
(1) 4. a good deal throughout

15. _____ Was labor medically induced for this child?
(0) 1. no
(1) 2. yes -- prior to nonth month
(1) 3. yes -- after nonth month

16. _____ Were forceps necessary in the delivery of this child?
(0) 1. no forceps were necessary
(1) 2. yes, forceps were used (check one: high forceps, low forceps, not sure)
(1) 3. not sure, birth was cesarean
(0) 4. not sure

17. _____ The degree to which this pregnancy was planned for was:
(0) 1. carefully planned for
(1) 2. not planned but pleased
(1) 3. not planned and unhappy with the news
(0) 4. unplanned and unmarried at the time of pregnancy

18. _____ Was the pregnancy for this child a multiple pregnancy?
(1) 1. yes-twins
(1) 2. yes--triplets or more
(0) 3. no

19. _____ What medication was taken by the mother during this pregnancy?
(0) 1. prescribed vitamins and/or iron
(1) 2. drugs to reduce tension
(1) 3. water loss medication
(1) 4. aspirin on at least a weekly basis
(1) 5. other _____
(1) 6. no medication was taken

20. _____ What was the direction of this child at the time of delivery?
(1) 1. feet first presentation (breach birth)
(0) 2. head first presentation
(1) 3. side presentation
(0) 4. not sure but have no reason to believe it was different from most other births

21. _____ The amount of time which passed from membrane rupture (breaking of water) to the start of labor for this child was:
(1) 1. medication was necessary to induce labor
(0) 2. contractions began prior or at the time of membrane rupture (breaking of water)
(0) 3. labor began naturally after less than two hours
(1) 4. labor began naturally after more than two hours
(0) 5. not sure.

22. _____ Soon after birth was there a time when your child's color was blue?
(1) 1. yes
(0) 2. no
(1) 3. did not see it, but this was reported to me

23. _____ What was the extent of gynecological surgery necessary prior to the birth of this child (more than one letter may be indicated)?
(1) 1. surgery was necessary to correct infertility
(1) 2. surgery was necessary during pregnancy
(1) 3. prior therapeutic abortion
(1) 4. prior voluntary abortion
(1) 5. surgery was necessary more than two years prior to this pregnancy
(0) 6. episiotomy (incision of vaginal opening to facilitate delivery) for prior birth
(0) 7. no prior gynecological surgery

24. _____ The number of pregnancies prior to the birth of this child was:
(1) 1. none
(1) 2. one or more full term resulting in a stillbirth or neonatal (first four weeks after birth) death
(0) 3. one or more resulting in normal birth
(1) 4. one or more resulting in a spontaneous abortion (miscarriage)

25. _____ The average number of cigarettes smoked per day during pregnancy was:
(0) 1. none
(1) 2. 1-10
(1) 3. 11-20
(1) 4. 21-30
(1) 5. more than 30

26. _____ The average amount of alcohol consumed per day during pregnancy was:
(0) 1. none
(1) 2. 1 to 2 drinks
(1) 3. 3 to 4 drinks
(1) 4. more than 5 drinks

Place a check mark (✓) next to each condition which occurred in the mother just prior to or during pregnancy of this child:

27. _____ thyroid disease

28. _____ high blood pressure

29. _____ anemia (weakness and paleness due to a deficiency of blood)

30. _____ neurological problem

31. _____ emotional problem

32. _____ urinary infection

33. _____ gonorrhea

34. _____ syphilis

35. _____ heart disease

36. _____ sickle-cell trait (hereditary abnormality of red blood cells)

37. _____ diabetes

38. _____ mother-baby blood differences (Rh negative, sensitized)

39. _____ viral infection

40. _____ high temperatures

41. _____ fainting spells

42. _____ parasitic infections

43. _____ narcotic use (e.g., heroin, morphine, codeine)

44. _____ physical trauma

45. _____ malnutrition

46. _____ depression

47. _____ tranquilizer use

APPENDIX B

OKLAHOMA STATE UNIVERSITY

INSTITUTIONAL REVIEW BOARD

OKLAHOMA STATE UNIVERSITY
INSTITUTIONAL REVIEW BOARD
FOR HUMAN SUBJECTS RESEARCH

Proposal Title: Differentiation between children with Attention-Deficit Hyperactive Disorder and children with Undifferentiated Attention-Deficit Disorder using the Maternatal Perinatal Scale.

Principal Investigator: David McIntosh/ Rosemary Mulkins

Date: 3-18-92 IRB # ED-92-040

This application has been reviewed by the IRB and

Processed as: Exempt [X] Expedite [ ] Full Board Review [ ]

Renewal or Continuation [ ]

Approval Status Recommended by Reviewer(s):

Approved [X] Deferred for Revision [ ]

Approved with Provision [ ] Disapproved [ ]

Approval status subject to review by full Institutional Review Board at next meeting, 2nd and 4th Thursday of each month.

Comments, Modifications/Conditions for Approval or Reason for Deferral or Disapproval:

Signature: Marcia L. Dilley Date: 3-24-92
Chair of Institutional Review Board

Ed-92-040

IRB # _____

APPLICATION FOR REVIEW OF HUMAN SUBJECTS RESEARCH
(PURSUANT TO 45 CFR 46)
OKLAHOMA STATE UNIVERSITY INSTITUTIONAL REVIEW BOARD

Title of project (please type): Differentiation between children with Attention-Deficit Hyperactive Disorder and children with Undiffernt-iated Attention-Deficit Disorder using the Maternatal Perinatal Scal

Please attach copy of project proposal.

I agree to provide the proper surveillance of this project to ensure that the rights and welfare of the human subjects are properly protected. Additions to or changes in procedures affecting the subjects after the project has been approved will be submitted to the committee for review.

PRINCIPAL INVESTIGATOR(S): (If student, list advisor's name first)

Typed Name	Signature
David McIntosh, Ph.D.	
Rosemary Mulkins	

School Psychology — Department
Applied Behavioral Studies — College

North Murray Hall — Faculty Member's Campus Address
744-6036 — Campus Phone Number

TYPE OF REVIEW REQUESTED: [X] EXEMPT [ ] EXPEDITED [ ] FULL BOARD
(Refer to OSU IRB Information Packet or the OSU IRB Brochure for an explanation of the types of review.)

1. Briefly describe the background and purpose of the research.

The data collection for this study was archival. The Maternal Perinatal Scale information was previously administered to parents of children with Attention Deficit Hyperactive Disorder, children with Undifferentiated Attention Deficit Disorder and normal children.

The purpose of this study is to investigate the relationship between maternal perinatal risk factors, using the Maternal Perinatal Scale, and differentiating between normals and children diagnosed with Attention Deficit Hyperactivity Disorder and children with Undifferentiated Attention Deficit Disorder.

2. Who will be the subjects in this study? How will they be solicited or contacted? Subjects must be informed about the nature of what is involved as a participant, including particularly a description of anything they might consider to be unpleasant or a risk. Please provide an outline or script of the information which will be provided to subjects prior to their volunteering to participate. Include a copy of the written solicitation and/or an outline of the oral solicitation.

Data previously collected from Oklahoma and Indiana which already has been established in data bases. No identifying information is in the data bases. For example, subjects are coded as 001, 002, etc.

3. Briefly describe each condition or manipulation to be included within the study.

None

4. What measures or observations will be taken in the study? Include a copy of any questionnaires, tests, or other written instruments that will be used.

The Maternal Perinatal Scale (Dean & Gray, 1985) was used to assess maternal perinatal characteristics of the sample and the information is archival.

5. Will the subjects encounter the possibility of stress or psychological, social, physical, or legal risks which are greater, in probability or magnitude, than those ordinarily encountered in daily life or during the performance of routine physical or psychological examinations or tests?
Yes [ ] No [X] If yes, please describe.

6. Will medical clearance be necessary before subjects can participate due to tissue or blood sampling, or administration of substances such as food or drugs, or physical exercise conditioning?
Yes [ ] No [X] If so, please describe.

Note: Refer to the OSU IRB Information Packet for information on the handling of blood and tissue samples.

7. Will the subjects be deceived or misled in any way? Yes [ ] No [X]
If yes, please describe and include an outline or script of the debriefing.

8. Will there be a request for information which subjects might consider to be personal or sensitive? Yes [ ] No [X] If yes, please describe.

9. Will the subjects be presented with materials which might be considered to be offensive, threatening, or degrading?
Yes [ ] No [X] If yes, please describe.

10. Will any inducements be offered to the subjects for their participation? Yes [ ] No [X] If yes, please describe.
If extra course credits are offered, are alternative means of obtaining additional credits available?

11. Will a written consent form be used? Yes [ ] No [X] If yes, please include the form, and if not, please indicate why not and how voluntary participation will be secured.

Note: The OSU IRB Information Packet illustrates elements which must be considered in preparing a written consent form. Conditions under which the IRB may waive the requirement for informed consent are to be found in 45 CFR 46.117 (c), (1) and (2).

12. Will any aspect of the data be made a part of any record that can be identified with the subject? Yes [ ] No [X] If yes, please explain.

13. What steps will be taken to ensure the confidentiality of the data?

Data is from already established data bases and subjects are identified by number only.

14. Will the fact that a subject did or did not participate in a specific experiment or study be made a part of any record available to a supervisor, teacher, or employer? Yes [ ] No [X] If yes, please explain.

15. Describe any benefits that might accrue to either the subject or society. (See 45 CFR 46, section 46.111 (a) (2)).

Looking at the Maternal Perinatal Scale to differentiate clinically between Attention-Deficit Hyperactivity Disorder and Undifferentiated Attention-Deficit Disorder, may give professionals a way to identify the disorders earlier and help benifit children through early treatment and interventions.

Signature of Head or Chairperson	Date
Department or Administrative Unit	3/16/92 Date
College/Division Research Director	3-18-92 Date

Checklist for Application Submission

[X] Proposal
[ ] Informed Consent Form/Assent (if appropriate)
[X] Instrument(s) (questionnaire, survey, testing, field)
[ ] Curriculum Vita (not necessary for Exempt review)
[ ] Departmental/College/Division Signatures

Number of copies to be submitted:

*Exempt Review: 2 copies
Expedited Review: 3 copies
Full Board Review: 7 copies

APPROVED 10-13-88

APPENDIX C

FREQUENCY OF OCCURRENCE OF AT-RISK INDICATORS FOR EACH QUESTION AND CHECKLIST ITEM ON THE MATERNAL PERINATAL SCALE BY GROUP AND FOR THE TOTAL SAMPLE

Table 24

Frequency of Occurrence of At-risk Indicators for Each Question (1-26) on the MPS by Group and for the Total Sample

Question 1-26	ADHD n = 74	UADD n = 56	Normals n = 135	Total n = 265
1	25	15	42	82
2	28	21	38	87
3	35	23	57	115
4	30	22	59	111
5	7	4	8	19
6	7	12	22	41
7	2	3	4	9
8	41	38	64	142
9	19	14	21	54
10	7	8	18	33
11	43	29	84	156
12	31	18	43	92
13	0	0	1	1
14	9	4	8	21
15	12	11	22	45
16	20	18	32	70
17	32	27	49	108
18	0	3	5	8
19	20	13	29	62
20	7	3	12	22
21	28	15	40	83
22	7	11	15	33
23	8	5	14	27
24	42	37	78	157
25	21	12	18	51
26	4	2	2	8

Table 25

Frequency of Occurrence for each Checklist Item by Group and for the Total Sample

Checklist Items	ADHD n = 74	UADD n = 56	Normal n = 135	Total n = 265
27	4	0	3	7
28	11	6	11	28
29	8	9	18	35
30	0	2	0	2
31	7	3	2	12
32	11	5	9	25
33	1	0	0	1
34	0	0	0	0
35	0	0	0	0
36	0	0	1	1
37	0	0	2	2
38	3	10	13	26
39	3	1	2	6
40	1	1	0	2
41	4	1	5	10
42	0	1	0	1
43	2	0	0	2
44	0	1	1	2
45	1	0	1	2
46	6	2	4	12
47	3	1	0	4

VITA

Rosemary Schapiro Mulkins

Candidate for the Degree of

Doctor of Philosophy

Thesis: DIFFERENTIATION BETWEEN CHILDREN WITH ATTENTION DEFICIT-HYPERACTIVITY DISORDER AND CHILDREN WITH UNDIFFERENTIATED ATTENTION DEFICIT DISORDER USING THE MATERNAL PERINATAL SCALE

Major Field: Applied Behavioral Studies

Biographical:

Personal Data: Born in Chicago, Illinois, December 24, 1947, the daughter of Sidney and Ellen Garry Schapiro. Married to Phillip D. Mulkins. Mother of Patrick Joseph Mulkins, Shawn Michael Mulkins and Kermit Allen Mulkins.

Education: Graduated from Hinsdale Central Township High School, Hinsdale, Illinois, in June, 1966. Received a Bachelor of Science degree in Speech and Language Pathology from the University of Tulsa in 1973; received Master of Arts degree in Speech and Language Pathology from University of Tulsa in 1975; received certification in Learning Disabilities and Psychometry from the University of Tulsa in 1976 and 1978. Enrolled in the School of Psychology certification program at Oklahoma State University. Completed requirements for the Doctor of Philosophy Degree at Oklahoma State University in July, 1993.

Professional Experience: Speech and Language Pathologist, Learning Disability Teacher, Psychometrist and Coordinator of Special Education, Verdigris Public School, 1975-1980; Director of Special Services, Tulsa Catholic

Diocese, 1980; Psychometrist, Tulsa-Okmulgee Regional Educational Service Center, 1980-1984; Psychologist-technician, Tulsa Developmental Pediatrics & Center for Family Psychology, summer 1987; Instructor, Northeastern State University, summer 1988; School Psychologist, Psychometrist, Learning Disabilities Teacher, Union Public Schools, 1984 to present.

Professional Organizations: Tulsa Association for Speech Pathologists and Audiologists: Treasurer 1976, President 1982, Historian 1983; American Speech-Language-Hearing Association; Association for Children/Adults with Learning Disabilities; Council for Exceptional Children; Attention Deficit Disorder Group for Parents (founding member); Oklahoma School Psychological Association: Vice President 1986, 1987; National Association of School Psychologists.