

DIFFERENTIAL DIAGNOSIS OF ATTENTION
DEFICIT HYPERACTIVITY DISORDERED
AND EMOTIONALLY/BEHAVIORALLY
DISORDERED CHILDREN USING THE
TEMPERAMENT ASSESSMENT
BATTERY FOR CHILDREN

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in partial fulfillment of
the requirements for
the Degree of
DOCTOR OF PHILOSOPHY
July, 1993

OKLAHOMA STATE UNIVERSITY

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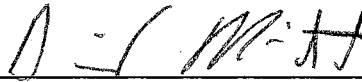
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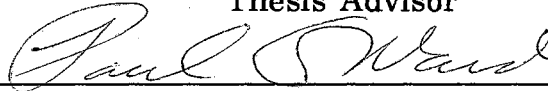
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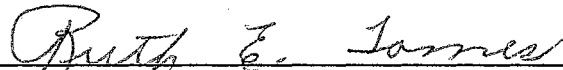
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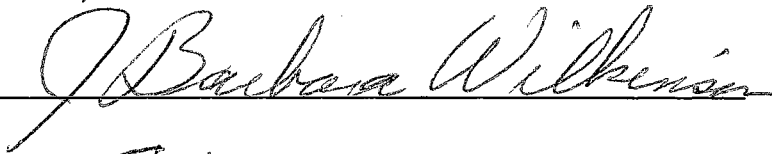
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ACKNOWLEDGMENTS

I wish to express sincere appreciation to the many friends and family members who have encouraged me along the road to this goal. You have been there to encourage me to continue when I needed it the most. I want to give special thanks to my husband, Larry, for all his support, encouragement, and patience.

Many thanks to Dr. David McIntosh, my dissertation advisor, for his patience, persistence, and many hours of direct assistance. To Dr. Paul Warden, my chairperson, I am grateful for his support and guidance throughout the years of study for this degree. Thanks are also due to Dr. Barbara Wilkinson for her careful editing and to Dr. Ruth Tomes for her suggestions and assistance.

I extend sincere thanks to the school districts and teachers who were the link to the parents who participated in this study. Without their cooperation, this study would not have been possible. And finally, this study is dedicated to those children with disabilities and difficulties in learning. As a school psychologist and teacher, it is for them that I strive to help make their school experience more valuable.

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INTRODUCTION

Although school psychologists have long been involved in the identification, placement, and intervention of school-aged children, the differential diagnosis of Attention Deficit Hyperactivity Disorder (ADHD) and Emotionally/Behaviorally Disordered (E/BD) children continues to be difficult. Part of this difficulty stems from the fact that ADHD and E/BD children exhibit similar behavioral characteristics. However, attempts have been made to precisely define the behaviors associated with each specific disorder.

For example, the Diagnostic and Statistical Manual of Mental Disorders, Third Edition--Revised (DSM-III-R) (American Psychiatric Association [APA], 1987) lists ADHD, Conduct Disorder, and Oppositional Defiant Disorder under the category of Disruptive Behavior Disorders. ADHD children have problematic symptoms that are classified into three areas: attention, impulsivity, and hyperactivity (APA, 1987). These same characteristics, as well as others, are often found in children identified as E/BD making it difficult, at times, to distinguish between the disorders (Hallahan & Kauffman, 1991).

The lack of a generally agreed upon definition of emotionally disturbed has also contributed to the confusion in making a differential diagnosis. For example, the terms Emotionally Disturbed

(ED) and Behavior Disordered (BD) are often used interchangeably throughout the literature when describing similar behavioral characteristics. Kauffman (1989) has suggested this category of disorders can be more appropriately described using the term Behavior Disordered. However, the general consensus is that ED and BD are more similar than they are different and these categories are more accurately described as E/BD. Therefore, the term E/BD was used throughout this study to represent the two disorders and for consistency. Emotional/Behavioral Disorders are characterized by problems such as anxiety, depression, or mood disturbance. Other diagnoses that may be considered to be E/BD include conditions that are described by the federal definition of Serious Emotional Disturbance. These include an inability to learn which cannot be explained by intellectual, sensory, or health factors, unsatisfactory interpersonal relationships, inappropriate behavior and feelings, pervasive unhappiness or depression, and physical symptoms or fears associated with school or personal problems (Federal Register, 1992).

Due to the similarities in characteristics, children with ADHD are often misdiagnosed as E/BD and E/BD children are misdiagnosed as ADHD (Dulcan, 1991). Fletcher, Morris, and Francis (1991) discussed the problems involved with defining the disorders and

classification research. One of the research problems was the lack of a precise definition regarding ADHD and its relationship to other disorders. Therefore, information is needed that will assist the psychologist in isolating specific characteristics relative to each of these disorders to improve diagnosis, placement decisions, and strategies for intervention.

In their discussion of classification issues and problems, Fletcher et al. (1991) reported the importance of differentiating the ADHD child from children with other problems and of determining the relationships between ADHD and parallel behavioral disorders such as oppositional or conduct disorders. Schaughency and Rothlind (1991) suggested the best approach in determining the diagnosis of ADHD is to use a multimethod, behavioral assessment and employ standard diagnostic criteria such as the DSM-III-R. To use this system, one of the questions that must be addressed regards the issue of differential diagnosis: Does an alternative diagnosis account for the difficulties?

A diagnosis of ADHD may not be the only cause of attention problems in a classroom or home setting. Attention problems could be caused by other disorders such as emotional difficulties or behavioral problems (Schaughency & Rothlind, 1991). According to Hinshaw (1987), 30% to 90% of children diagnosed with ADHD

exhibit significant conduct problems including aggression and antisocial behaviors (e.g., fighting, stealing, lying, truancy). Teeter (1991) noted that emotional disturbance co-exists with ADHD in about 30% to 65% of cases.

Weinberg and Emslie (1990) described two major problems in the evaluation of children with ADHD--the misdiagnosis of other disorders as ADHD and the failure to recognize disorders which co-exist with ADHD. Out of a sample of 100 referred children, they found 63 met the criteria for ADHD. However, only four had ADHD alone. Of the 63 children with ADHD, 73% (46) were clinically depressed, and 63% (40) evidenced both depression and learning disorders. Goldstein and Goldstein (1990) and Staton and Brumback (1981) reported a link between ADHD and E/BD by noting that symptoms of ADHD occur in up to 60% of depressed children.

Teeter and Prasse (1989) stated that when aggression and conduct disorders are associated with ADHD, an emotional/behavioral disorder may be documented. Children often display symptoms of both ADHD and conduct disorders and it is not always easy to determine the best diagnosis (Goldstein & Goldstein, 1990; Milich, Widiger, & Landau, 1987). Due to these overlapping characteristics of ADHD and E/BD, the identification of temperament characteristics that could be linked to ADHD or E/BD could help

differentiate between these two groups of children.

Research has indicated that children with particular temperament characteristics are more at risk for behavioral disorders (Thomas & Chess, 1977). Identification of specific temperamental traits or clusters of traits associated with either ADHD or E/BD might improve the process of differentiating between these groups of children.

Much of the research in the area of temperament has been based upon the pioneering work of Thomas and Chess (Thomas & Chess, 1977; Thomas, Chess, & Birch, 1968). They equate temperament to behavioral style which refers to how a person responds to their environment rather than the what or how well (content and abilities) or the why (motivations) of behavior. Nine categories of temperament and three general constellations based upon combinations of more than one category were established by Thomas and Chess (1977). The categories are activity level, rhythmicity, approach or withdrawal, adaptability, threshold of responsiveness, intensity of reaction, quality of mood, distractibility, and attention span and persistence.

The constellations or clusters of temperament described in Thomas and Chess' works were named "Easy", "Slow-To-Warm-Up", and "Difficult." The "Easy" children were characterized by regularity, positive approach to new stimuli, high adaptability to

change, and mild/moderate intense mood, usually positive. The "Slow-To-Warm-Up" group had less tendency to show irregularity of biological functions, negative responses of mild intensity to new stimuli, slow adaptability after repeated contacts, and mild intensity of reactions. The "Difficult" child was characterized by irregularity in biological functioning, negative withdrawal to new stimuli, non-adaptability or slow adaptability to change in the environment, and intense mood which was frequently negative.

A mismatch between temperament traits and environment (primarily parenting strategies) can lead to behavioral adjustment difficulties (Thomas et al., 1968). This was most likely to occur when the child was characterized as "Difficult." Research has indicated a link between the presence of a "Difficult" temperament and school and/or home problems (Carey, 1972, 1974; Graham, Rutter, & George, 1973) and to behavior problems (Thomas & Chess, 1977; Thomas et al., 1968). However, a direct causal relationship between temperament and learning and behavior problems was not suggested. They indicated that a child's temperament influences personal-social transactions by reducing or intensifying potential problems. While the "Difficult" temperament has been associated with behavior problems, the "Slow-To-Warm-Up" temperament has been associated with school achievement problems (DeStefano, Wang, & Gordon, 1985;

Thomas et al., 1968; Thomas, Chess, Birch, Hertzog, & Korn, 1963).

Kauffman (1989) also pointed out the hyperactive child fit the description of the "Difficult" temperament and that a difficult temperament may increase a child's risk for hyperactivity.

The link between temperament and behavior disorders has also been supported by Buss and Plomin (1975). They identified four dimensions of temperament. These were: (1) Emotionality, (2) Activity, (3) Sociability, and (4) Impulsiveness. They eventually eliminated the dimension of Impulsiveness because it failed to meet the criteria of heritability for inclusion in their theory.

Some of these characteristics of temperament defined by Thomas and Chess and Buss and Plomin are evident in children with ADHD and E/BD. These common characteristics include Thomas and Chess' categories of activity level, distractibility, attention span and persistence, and adaptability (Thomas & Chess, 1977; Thomas et al., 1968). All four of Buss and Plomin's temperaments could be noted in some ADHD and E/BD children (Buss & Plomin, 1975; Kauffman, 1989).

Differential diagnosis is an important issue and must be addressed for children presenting the symptoms of ADHD which may overlap with several emotional/ behavioral disorders such as oppositional defiant disorder, conduct disorder, depression, anxiety,

and various problems of adjustment. The purpose of this study was to examine whether temperamental characteristics can differentiate between normal, Attention Deficit Hyperactivity Disordered (ADHD), and Emotionally/ Behaviorally Disordered (E/BD) children.

Statement of the Problem

Do differences in temperament exist between normal, Attention Deficit Hyperactivity Disordered (ADHD), and Emotionally/ Behaviorally Disordered (E/BD) children? The following null hypotheses were studied:

Null Hypothesis One: Temperament, as measured by the Temperament Assessment Battery for Children-Parent Form (TABCP) (see Appendix), will not differentiate between normal, ADHD, and E/BD children, with 90% accuracy.

Null Hypothesis Two: Temperament, as measured by the TABCP, will not differentiate between normal children and the diagnostic group of ADHD and E/BD children, with 90% accuracy.

Significance of the Study

Professionals have experienced uncertainty in assessing children with emotional/behavioral disorders and attentional deficits. Definitions for these disorders tend to be vague and symptoms overlap. Psychologists must deal with a dual system which involves the terminology and criteria of the DSM-III-R and the educational

classification system of P.L. 101-476. To enhance the understanding of these conditions, school psychologists must be familiar with the range of symptoms and behaviors associated with ADHD and E/BD, be able to detect the co-existence of disorders, and make appropriate referrals and recommendations (Schaughency & Rothlind, 1991). The study of temperament may help differentiate between these disorders.

If differences in temperament are found to exist between the groups included in this study, this may help in the differential diagnosis of children with behavioral disorders. Even though a direct causal relationship between temperament and behavioral disorders has not been suggested (Thomas & Chess, 1977; Thomas et al., 1968), certain characteristics of temperament have been found to be associated with hyperactivity (Kauffman, 1989) and behavior disorders (Thomas & Chess, 1977; Thomas et al., 1968). Therefore, even though temperament would be only one aspect of these disorders, the study of temperament may help explain differences in behavior and improve the process of assessment and diagnosis. An increased risk of developing emotional/behavioral disorders during childhood may be associated with a certain combination of temperamental characteristics (Bates, Maslin, & Frankel, 1985; Thomas & Chess, 1977, 1980; Wolkind & DeSalis, 1982).

Few studies were found which examined temperament as a variable in behavioral disorders (Barron & Earls, 1984; Thomas & Chess, 1977; Thomas et al., 1968). Pfeffer and Martin (1983) showed that certain temperamental factors were associated with the development of psychopathological symptoms in early childhood. No studies were found to directly link temperament as a variable in ADHD. However, studies have linked characteristics of ADHD with certain dimensions of temperament (Garrison & Earls, 1987; Kauffman, 1989; Lerner, Palermo, Spiro, & Nesselroade, 1982; Rowe & Plomin, 1977).

Fletcher et al. (1991) discussed a 1987 report to Congress from the Interagency Committee on Learning Disabilities which emphasized the importance of research to develop a system which would more clearly define and improve the diagnosis of learning disabilities, conduct disorders, and attention deficit disorders, and explore the relationships between these conditions. Psychologists need to decide if the student displays behaviors at a developmentally inappropriate level and to a problematic or symptomatic degree. This calls for behavioral assessment which uses a variety of procedures, such as interviews, rating scales, observations, and different informants. This information is important if reliable strategies for treatment, remediation, and prevention are to be developed.

Basic Limitations

This study is subject to the following limitations:

1. The samples were restricted to the age range of five through seven. Therefore, results cannot be generalized to other age levels.
2. The samples were restricted to males; therefore, the results cannot be generalized to females.
3. Some subjects in the E/BD group (13) were also diagnosed as ADHD.

REVIEW OF THE LITERATURE

The purpose of this chapter is to review the literature pertinent to the development of temperament, its relationship to Attention Deficit Hyperactivity Disorder and Emotional/Behavior Disorders, and the problems involved in diagnosis of these disorders. Specifically, the following areas will be addressed: temperament research by Thomas and Chess, Thomas and Chess Goodness of Fit concept, further temperament research, difficult temperament and behavior disorders, measurement issues, attention deficit hyperactivity disorder, and differential diagnosis.

Temperament Research by Thomas and Chess

Research by Thomas and Chess has been the foundation for many investigations on the temperament of children. In 1956, they began a longitudinal study (known as the New York Longitudinal Study [NYLS]) which followed 136 individuals from 85 families. The principal aim of the study was to objectively define temperament in children and describe the contributions of temperament to normal and abnormal development of behavior. The subjects were primarily from middle or upper-middle class New York families. They were followed from three months of age to adulthood. Parents were interviewed four times during the first year of the study and twice a year until the children were adolescents. A follow-up was completed

in adulthood at 18 to 22 years of age. Other assessments of the children in the study included home and school observations, teacher interviews, and standardized cognitive and achievement tests (Thomas & Chess, 1977; Thomas, Chess, & Birch, 1968; Thomas et al., 1963). Thomas and his colleagues also conducted longitudinal studies with a working-class sample of Puerto Rican children and a middle-class sample of mentally retarded children to obtain data from families of a contrasting background.

The following nine categories of temperament were established (Thomas et al., 1963) through a content analysis of the parent interviews:

1. **Activity Level:** The extent to which the child is in motion (motoric activity) during routine daily activities including eating, dressing, playing, bathing, and handling. It also includes the sleep-wake cycle.
2. **Rhythmicity (regularity):** The predictability or unpredictability of functions. This includes the regularity of sleep or waking patterns, feeding, elimination, and hunger.
3. **Approach or Withdrawal:** How the individual reacts to a new or unfamiliar situation, person, or task. Approach responses are positive while withdrawal reactions are negative.
4. **Adaptability:** The child's ability to get used to new or altered

situations. It refers to the ease with which their initial reaction is modified in a desired way.

5. **Threshold of Responsiveness:** The intensity level of stimulation necessary to evoke a response from the child.

6. **Intensity of Reaction:** The energy level of the response regardless of whether it is positive or negative.

7. **Quality of Mood:** The amount of friendly, pleasant, joyful behavior as opposed to unpleasant, crying, and unfriendly behavior.

8. **Distractibility:** The degree to which environmental stimuli interferes with the current or ongoing behavior of the child.

9. **Attention Span and Persistence:** Attention span refers to the length of time an activity is pursued by the child while persistence refers to the continuation of an activity despite obstacles or requests to stop.

After further analysis of these nine categories, Thomas et al. (1968) discovered clusters of traits that could be grouped into constellations. These temperament constellations were named "Easy", "Slow-To-Warm-Up", and "Difficult." The "Easy" children were characterized by regularity, positive approach to new stimuli, high adaptability to change, and mild/moderate intense mood, usually positive. The "Slow-To-Warm-Up" group had less tendency to show irregularity of biological functions, negative responses of mild

intensity to new stimuli, slow adaptability after repeated contacts, and mild intensity of reactions. The "Difficult" child was characterized by irregularity in biological functioning, negative withdrawal to new stimuli, non-adaptability or slow adaptability to change in the environment, and intense mood which was frequently negative.

However, it soon became clear from the Thomas et al. research that not all children fit into one of these clusters. This was due to the different combinations of traits which were manifested in different children. Also, there was a wide degree of variability among those children who did fit one of the groups. A child could be extremely easy in all situations while some may be relatively easy in some situations. A few children are extremely difficult in all situations while others may show mild characteristics of being difficult. The temperamental constellations represent variations in behavior within normal limits.

Attempts to duplicate the Thomas et al. work has brought criticism and conflicting results. For example, Buss and Plomin (1984) based a study on Rowe and Plomin (1977) and found that of the nine NYLS dimensions, only Attention Span/Persistence emerged as a clear factor. Due to the way in which the Distractibility category appeared, it was best regarded as Soothability. Items from Approach/

Withdrawal, Adaptability, and Threshold of Responsiveness clustered on a factor they called Sociability while other factors from Approach/Withdrawal, Intensity of Reaction, Threshold of Responsiveness and Quality of Mood loaded on a factor called Emotionality. A total of seven factors--Attention Span/ Persistence, Sociability, Reactivity, Sleep Rhythmicity, Soothability, Reaction to Foods, and Stubbornness--were found in this study. Only the first factor, Attention Span/Persistence, matched a NYLS dimension.

In similar research, Lerner et al. (1982) were also unable to duplicate the NYLS results. They devised the Dimensions of Temperament Survey (DOTS) based on the NYLS data. This survey yielded five factors: Activity, Rhythmicity, an impulsivity-like factor, Adaptability/Approach-Withdrawal, and Reactivity. Here again, the dimensions in the NYLS were not confirmed.

Rothbart (1981) found only an Activity scale which replicated the conclusions of the NYLS and found similar results as Rowe and Plomin in a Soothability scale. Plomin and DeFries (1983) factor analyzed an abbreviated version of one of the most frequently used measures of the NYLS temperaments and found only two of the original dimensions. They confirmed Distractibility and the persistence component of Attention Span/Persistence.

Buss and Plomin (1984) reviewed research which analyzed the

dimensions of temperament in the NYLS and stated that no empirical evidence exists for the nine temperaments. Two of the temperaments--Distractibility and Attention Span/Persistence--receive some confirmation through factor analysis. However, the other seven factors contain items that spread out over several categories. They stated, "Unless one is willing to ignore standard psychometric criteria, it is clear that the nine NYLS temperaments must be restructured. Furthermore, these disconfirming factor analyses call into question the theoretical assumptions underlying the NYLS approach" (p. 24).

According to Buss and Plomin (1984) the three constellations of temperament defined by Thomas et al. (1963) were replaced by a dimension ranging from easy to difficult. Children toward the difficult end of the continuum were assumed to be more likely to develop behavior problems. Thomas and Chess (1982) found low correlations between the easy-difficult scores from infants and toddlers and home and school adjustment at three and five years, early adult adaptation, and adult adaptation. Difficult temperament in infancy has not been found to predict later behavioral problems; however, after infancy it does become predictive (Buss & Plomin, 1984).

In summary, several attempts have been made to duplicate the

Thomas et al. (1963; 1968) research. The categories of Attention Span/Persistence and Distractibility have been confirmed by some researchers while others have also confirmed the Activity dimension. Even though these were the only categories confirmed, the other dimensions of temperament were found to cluster on factors that were re-named by other researchers.

Thomas and Chess Goodness of Fit Concept

Another aspect of the Thomas and Chess theory is the concept of "Goodness of Fit" (Thomas et al., 1968). This results when the demands of the environment match the child's own characteristics and style of behaving. "When this consonance between organism and environment is present, optimal development in a progressive direction is possible" (Thomas & Chess, 1977, p. 11). "Poorness of Fit," on the other hand, results when a discrepancy between the demands of the environment and the capacities of the child exists. This may result in maladaptive behavioral functioning.

Few data have been collected to support the Goodness of Fit hypothesis. Scholom, Zucker, and Stollak (1979) studied teacher-rated adjustment in relation to the fit between parental and infant temperament. They found only weak relationships. Lerner and Lerner (1983) applied the Goodness of Fit model to school adjustment and achievement. They looked at similarities between children's self-

reported temperament and temperament expectations of teachers and peers. Teachers were consistent in their expectations for temperament. They wanted their students to be Easy: low in Activity, high in Attention Span and Adaptability, high in Rhythmicity, and low in Reactivity. Based on their scores, the students were divided into two groups: (a) those who met or exceeded teachers' expectations and (b) those who fell below expectation. Some support was found for the hypothesis that children whose temperament met teachers' expectations for Reactivity, Attention Span, and Adaptability performed better at school. Lerner (1984) provided support for the Goodness of Fit model and inferred that neither a child's attributes alone nor the demands of their environment alone are the key predictors of their adaptive functioning. It is instead, the relationship between the child and the environment that is most important.

The concept of poorness of fit relates to the development of disturbed behavior. Thomas and Chess (1977) indicated that disturbed behavioral functioning was the result of excessive stress on the child resulting from poorness of fit and dissonance between environmental expectation and demands and the capacities of the child. If the environment places excessive demands for adaptation on the child which are beyond their capacity, development is undermined. Emotional and behavioral problems such as

nightmares, school refusals, distrust, poor self-image, and overreaction may result from continuous friction and antagonism with parents and teachers (Teglasi, 1987; Thomas & Chess, 1977, 1980). Therefore, the concept of Goodness of Fit takes into account the child's temperament and the social environment and how they interact. The expression of temperament occurs in response to the environmental demands. Having a poor fit is associated with adverse individual and interpersonal functioning (Lerner, 1984).

Thomas et al. (1968) indicated that identical patterns of temperamental traits can be acceptable in one setting but not in another. Some parents may be unable to accept the individuality of their child who is distractible and nonpersistent. Such parents may make continual demands on these children to do tasks that do not fit with their temperament, i.e., sit still and concentrate for long periods of time. The expectations of the environment determine the acceptability of the child's behavior (temperamental traits) and influence the Goodness of Fit (Teglasi, 1987) and, therefore, could influence the diagnosis of ADHD and E/BD.

In summary, limited research has been done to confirm the Goodness of Fit or Poorness of Fit concept. The findings have shown, however, that the relationship between the child and the environment is the key to adaptive functioning. Therefore, environmental

demands which exceed a child's capacity may result in emotional and behavioral problems.

Further Temperament Research

Buss and Plomin (1975) defined temperament similarly to Thomas et al. (1968, 1977) as the generalized style or how of behavior. However, they emphasized the stability and genetic aspects of temperament. Temperament characteristics must meet certain criteria to be included in their theory. The criteria were inheritance, stability during development, presence in adulthood, adaptive qualities, and presence in other animals. They later stated the crucial criterion for inclusion in the theory was inheritance (Buss & Plomin, 1984). Therefore, the dispositions listed as temperaments must be sustained by evidence from twin studies and other behavioral genetic methods. One other criterion was added--the presence in early childhood, preferably infancy (the first two years of life). After reviewing the research on the heritability of impulsivity, it was dropped as a dimension of temperament because it failed to meet this criterion. Buss and Plomin (1984) indicated that impulsivity was rarely studied as a personality trait. When it has appeared in temperament research it resembled distractibility.

Buss and Plomin (1975) listed four temperaments: emotionality, activity, sociability, and impulsivity. Activity is the "how much" of

behavior and can range from active to lethargic. Emotionality is the intensity of behavior and is expressed in the individual by being either emotional or impassive. Proximity seeking, how physically close a person is to others, describes the dimension of sociability and can be expressed on a range from gregarious to detached. Finally, impulsivity is expressed by impulsive or deliberate behavior.

Buss and Plomin (1975) limited the temperament of emotionality to fear, anger, and distress. The authors suggested that the easy-difficult label was emotionality. Difficult temperament correlated .45 with emotionality (distress) and -.35 with soothability which lends support to the view of difficult children as being easily distressed and difficult to soothe (Daniels, Plomin, & Greenhalgh, 1984). According to Teglasi (1987), "Buss and Plomin's assessment of emotionality incorporates the Thomas and Chess dimensions of negative mood, low threshold of response, withdrawal orientation, poor adaptability, and high intensity" (p. 637). Activity was defined in general terms as energy output. An active person moves around more, tends to be in motion, and hurries more than others. Sociability is the tendency to prefer the presence of others to being alone. Sociable children prefer group play, like to go to sleep with others in the same room, and in general value interaction with others over the benefits of privacy. The final component, impulsivity,

consisted of four components: inhibitory control, as manifested in resistance to temptation and delay of gratification; decision time, as reflected in making up one's mind quickly or being obsessive; persistence in ongoing tasks; and sensation seeking, which involves being bored easily and seeking exciting stimulation.

Rothbart and Derryberry (1981) attempted to link temperament to the way the nervous system functions. They moved away from the stylistic qualities of behavior and emphasized the psychobiological bases of early behavioral traits and focused on reactivity and self-regulation. This approach examined the reactive aspects of infant behavior in terms of physiologic arousal, and the active qualities of self-regulation. They alleged that temperament was constitutionally based and therefore measurable via physiologic indices and should be demonstrated to be constant across time and context. Reactivity is associated with Thomas and Chess' threshold, intensity, distractibility, and activity. The purpose of self-regulation is the control of stimulation to promote optimal arousal for efficient emotional and intellectual functioning. Approach and withdrawal represent attempts at self-regulation. Adaptability is related to self-regulation of arousal as a way of coping with initial responses (Teglasi, 1987).

This section has discussed the temperament research completed by Buss and Plomin and Rothbart and Derryberry. These researchers

have emphasized different aspects of temperament than the work done by Thomas, Chess, and colleagues. However, comparisons can still be made which indicate similarities between the research findings.

Difficult Temperament and Behavior Disorders

Five temperament traits comprise the constellation referred to as the difficult child syndrome based on the NYLS (Korn 1984; Teglasi, 1987; Thomas et al., 1968): (a) nonadaptive or slow adaptation (on the Adaptability dimension), (b) irregular (on the Rhythmicity dimension), (c) withdrawal in new situations (on the Approach or Withdrawal dimension), (d) high intensity of reactions (on Intensity of Reaction), and (e) negative mood (on Quality of Mood). The occurrence of these five traits has been linked to behavior problems (Thomas & Chess, 1977; Thomas et al., 1968). Thomas et al. (1968) reported that the difficult temperament syndrome at an early age is predictive of behavior problems at a later age. Teglasi (1987) stated that about 10% of children possess this combination of temperaments. "These children exhibit eating and sleeping problems, resist new places or activities, don't get accustomed to changes in routine, and are generally characterized by crying, worrying, or intense anger" (p. 637).

Researchers have linked temperament to developmental problems such as excessive crying in infancy (Carey, 1983); temper

tantrums and proneness to accidents in early and later childhood (Thomas & Chess, 1977); psychological adjustment during different stages of life (Barron & Earls, 1984; Chess & Thomas, 1984); and behavior problems and the quality of mother-child interactions (Webster-Stratton & Eyberg, 1982). This led Barron and Earls (1984) to suggest that children with difficult temperament were more likely to show poor adjustment.

Difficult temperament is not the sole cause of behavior disorders (Thomas et al., 1968) but disturbed development as well as normal development are the result of several factors including the interaction between the child and the environment. Temperament, therefore, may influence behavior but it is not the only factor that determines behavior. Temperament may make it easier or harder for a child to control himself (Wender, 1987). Thomas et al. (1968) did not suggest a causal relationship between temperament and behavior disorders, but expected ". . . that given a uniform environment and a set of stresses . . ." certain temperaments would be more likely to result in behavior disorders than others (p. 9). For example, Pfeffer and Martin (1983) conducted a study to determine whether parents of preschool children referred for a psychological evaluation because they were difficult to manage, and parents of children not referred, differed in the temperament ratings of their children. Results

indicated that the referred group was more active, less rhythmic, less adaptable, had a higher threshold (less sensitive to environmental stimuli), less distractible, and were less persistent than the nonreferred group. These results demonstrated that parents of referred children rate temperament differently than parents of nonreferred children. In other studies (Teglasi, 1987; Thomas & Chess, 1977), children with difficult temperaments in conjunction with physical disabilities or mild mental retardation (which may result in reduced adaptive behavior skills) were found to be at greater risk for developing behavioral problems than their nondisabled peers. The level of intelligence and other abilities contribute to the extent to which the child is able to meet environmental demands. In a sample of mentally retarded children 8 to 11 years old, 80% of the children with three or more signs of difficult temperament were also diagnosed as manifesting a behavior disorder. The disorder rate was only 47% in a younger, nonretarded group of children with the same mental age, and the same three or more signs (Chess & Korn, 1980).

Korn (1984) tried to determine predictability of the difficult/easy temperament between age groups. He found that temperament at ages three and four was significantly correlated with temperament in young adulthood. However, temperament in ages one, two, and five was not significantly correlated with the young adult scores. He

also examined gender differences and stated that if a girl has an easy temperament as a child, especially after the first year, it would be a good indication of what she would be like as a young adult. That was not found to be true for boys who had an easy temperament except at age four. However, difficult temperament in girls in the first five years was not predictive of temperament as a young adult. With boys who had a difficult temperament as a young child, especially at ages two, three, and/or four, it was a fairly good indication of what he would be like as a young adult. Therefore, difficult/easy temperament scores at ages three and four were better predictors of young adult difficult/easy temperament than the scores at the earlier ages of one and two. However, age five was poorer at predicting than were ages three and four. Also, girls with easy temperament and boys with difficult temperament were more predictable from the earlier years to young adulthood.

Bates (1980) challenged Thomas and Chess' concept of difficult temperament, as well as their view that temperament represents an attribute of the individual and that parental characteristics and other environmental factors may modify or intensify the child's difficult temperament just as the child's temperament may influence the parents' attitudes and behavior. Bates reviewed evidence on each of the criteria for inclusion in Thomas and Chess' theory.

Bates (1980) examined data on the genetic basis of temperament. Studies that used parent-report data on twins suggested a genetic basis, but due to external validity problems, the data did not clearly answer the question of the degree to which children's individual differences were inherited. He then analyzed the issue of continuity and agreed there was evidence of some continuity in very early individual differences. However, the methodological problems of tracing traits across different stages of development and the lack of relevant studies in the area made it difficult to be certain. Bates also considered the issue of collecting information through caregiver reports and found that only a modest proportion of the variance in parent ratings of infants' temperament has been accounted for by objective observations. Finally, he investigated the issue of difficult temperament. Evidence on the relationship between parent perceptions of infant difficult temperament and childhood behavior disorders was inconclusive. The data did not support the concept that a difficult temperament was a within-the-child behavior. Rather, current research supported the idea of difficult temperament as a social perception--that how the parent perceives the child would likely play a role in how the child actually behaves.

Based upon his own research, Bates (1980) also challenged the Thomas et al. (1968) research due to the lack of empirical support and

suggested that the concept of difficult temperament should not be used for purposes such as infancy screening and intervention programs. However, he did maintain the concept had enough construct validity to justify further research on the development of individual differences, especially when seen as a parent perception.

Thomas, Chess, and Korn (1982) refuted Bates' claims and offered support of their original theory. They noted qualitative and quantitative investigations which supported the difficult child constellation. This was done through analyses of the parent interviews and a quantitative comparison of the item scores for each of the nine temperamental categories in those children in the NYLS who had developed behavior problems by age six and those who had not. These qualitative and quantitative studies were then confirmed by a factor analysis of the children's temperament scores (Thomas et al., 1968). They described a range in the degree to which children showed difficult temperament and developed a difficult temperament score. This score was a single number obtained by adding the numerical scores from each of the five categories which comprised the difficult child constellation. The score was an improvement over the previous method of using behavioral signs of the difficult child (Thomas & Chess, 1977).

Rothbart (1982) questioned the term "difficult" due to its negative

connotations and the concept that difficult infants may be at greater risk for later behavior disorders. She stated that the data in support of difficult infants' risk status was not strong and thus the likelihood of false positives or false negatives was high. This would create another risk--that of incorrectly labeling children as difficult due to unreliable tests.

In summary, some have challenged Thomas and Chess' concept of difficult temperament. However, research has linked temperament to various developmental and behavioral problems which would lend support to the concept (Barron & Earls, 1984; Carey, 1983; Chess & Thomas, 1984; Thomas & Chess, 1977). Bates (1980) questioned all aspects of the Thomas and Chess theory and suggested difficult temperament was a social perception rather than a trait found within a child.

Measurement Issues

Bates (1980) pointed out the lack of an accepted definition of temperament and noted weak empirical support for the definitions that are most commonly used. Other researchers have also reported a lack of agreement on a generally accepted definition (Goldsmith & Gottesman, 1981; Lyon & Plomin, 1981; Rothbart & Derryberry, 1981; Thomas & Chess, 1980). The common practice is to define this trait operationally, based on the instruments used to assess temperament.

(Lyon & Plomin, 1981; Thomas & Chess, 1980).

Hubert, Wachs, Peters-Martin, and Gandour (1982) reviewed the psychometric adequacy of the various instruments used to operationalize the concept of temperament. They emphasized the interview, observation, and questionnaire formats used to assess infant and child temperament. In terms of the measurement instruments available at the time of their review, they found most of the instruments to have restricted normative samples in terms of either size or representativeness. For the most part, temperament scales were based on the NYLS dimensions.

Psychometrically, there was no single satisfactory measure of infant or child temperament (Hubert et al., 1982). Most of the instruments studied had high interjudge reliability, moderate internal consistency, and moderate but inconsistent levels of test-retest reliability. Interparent agreement was low and data on stability was inconsistent. Validity evidence was sparse and hindered by methodological problems. They found low convergent validity, inconsistent findings on concurrent validity, and moderate levels of predictive validity.

Sanson, Prior, and Kyrios (1990) were also concerned with measurement issues in temperament and the prediction of later behavior problems. They suggested the significant relationships

found between temperament and behavioral adjustment may be due to confounding issues related to the measurement scales. The content of the measures used to test temperament or behavior disorders may overlap conceptually. They tested this hypothesis by having psychologists judge the extent to which the items from temperament and behavior problem questionnaires measured both constructs. They found the temperament items to be better measures of temperament than of behavior problems. Items which measured externalizing behavior problems (e.g., aggressiveness, acting-out) did not appear to be confounded; however, items assessing internalizing behavior problems (e.g., withdrawal, anxiety) were regarded as better measures of temperament. Therefore, they recommended a more sophisticated approach to data collection and analysis than simply correlational data.

According to Bates (1990), the conclusions by Sanson et al. (1990) could be misleading. There was a theoretical basis for the overlap between temperament and behavior problem measures and a separation between the two constructs should not be expected. Otherwise, there would not be a need to look for the role of temperament in the development of behavior problems.

Fagan (1990) investigated temperament and behavior problems as they relate to gender. He found teacher ratings of temperament in

boys to be more highly correlated with behavior problems than the temperaments of girls. Due to the possibility of bias in teacher ratings, it should not be concluded that temperamental boys have more behavior problems than temperamental girls. However, this research supported other findings that boys display more externalizing behavior difficulties than girls (Crowther, Bond, & Rolf, 1981).

In summary, a lack of agreement among researchers on the definition of temperament has led to questions regarding the psychometric properties of temperament assessment instruments. It was noted that many instruments have limited generalizability due to restricted normative samples. Sanson, Prior, and Kyrios (1990) suggested the relationships found between temperament and behavior problems may be due to confounding issues related to the assessment instrument. However, Bates (1990) proposed a theoretical basis for the overlap and stated that a separation between temperament and behavior problems should not be expected.

Attention Deficit Hyperactivity Disorder

Shaywitz and Shaywitz (1991) reported that Attention Deficit Disorder (they use the term synonymously with ADHD) was one of the most common disorders of childhood affecting 10% to 20% of the school-age population. Frick and Lahey (1991) noted that prevalence

estimates ranged from 1% to 12% depending upon the definition used. Most estimate it to be at about 3% with males (from community samples) being three times more likely to have the disorder than females. In clinic samples, the ratio is from six to nine times more common in males than females (American Psychiatric Association, 1987). The age of onset of ADHD is before five (Blackman, Westervelt, Stevenson, & Welch, 1991) or seven (APA, 1987) and may not be severe enough to prompt evaluation until the child enters school. ADHD is a frequent reason for referral to mental health clinics and has a significant impact upon psychosocial adjustment. In older children, the impact is greater on school performance, whereas in younger children it is more likely to effect the social aspects of behavior (Blackman et al., 1991).

The diagnostic features of ADHD, as well as the terms used to describe the condition, have been redefined frequently. The terms minimal brain damage and minimal brain dysfunction were originally used to name the condition due to the belief of a central nervous system disorder (Strauss & Lehtinen, 1947). Other terms have been used which focused on the excessive motor component of the problem such as hyperactive child syndrome and hyperkinetic reaction of childhood (APA, 1968). The Diagnostic and Statistical Manual of Mental Disorders, Third Edition ([DSM-III] APA, 1980)

provided the first detailed description of the disorder but that description was changed again in 1987 in the DSM-III-R (APA, 1987). According to Frick and Lahey (1991), this new definition also eliminated the distinction among the dimensions of sustained attention, impulsivity, and motor hyperactivity by proposing a unidimensional definition. Much of the recent research on ADHD has concerned these definitional problems. Many studies are not comparable because of differing definitions of ADHD. Jordan (1988) included several behavioral dimensions in his description of ADHD. In addition to short attention, impulsivity, and motor hyperactivity, he listed easily distracted, poor listening skills, not finishing tasks, poor organization skills, disruptiveness, emotional overflow, insatiability (desires are never satisfied), blames others, and overreacts to criticism.

Even though the definition of ADHD has changed over the years, there is a general agreement that the essential features of ADHD include developmentally inappropriate degrees of inattention, impulsivity, and motor hyperactivity (Frick & Lahey, 1991). For preschoolers and young children, high activity level is often the most noticeable and troublesome. However, inattention and impulsivity are also evident in the child's failure to complete tasks, difficulty following directions, or carelessness. Some children with

hyperactivity are constantly on the go, destroy rather than play with toys, have difficulty playing alone, or may lack friends because of aggression or inability to cooperate in play (Blackman et al., 1991).

In young children, it may be difficult to make a diagnosis of ADHD. It is not always easy to distinguish hyperactivity from developmentally appropriate behavior in this age group. Young children exhibit day-to-day variability of behavior and may have situational responses to the environment, while adult interpretations of child behavior vary (Blackman et al., 1991).

The causes of ADHD are likely multidimensional. Theories of etiology include neurological factors, genetic factors, environmental toxins, biological variation, and psychosocial factors (Barkley, 1981; Jordan, 1988; Kauffman, 1989). ADHD has been attributed to an inborn temperamental difference in a child possibly due to chemical deficiencies in neurotransmitters (Wender, 1987), differences in brain chemistry, (Jordan, 1988), and neuroanatomical dysfunction (Hynd, Hern, Voeller, & Marshall, 1991). Kauffman noted a link between difficult temperament and hyperactivity, but indicated that temperament alone does not cause hyperactivity but does make a child at higher risk for the problem. Thomas and Chess have noted the same conclusions regarding behavioral difficulties-- temperament is not a direct cause, but places the child at higher risk

(Thomas & Chess, 1977; Thomas et al., 1968).

Kauffman (1989) and Blackman et al. (1991) suggested that it was difficult to separate hyperactive (ADHD) and conduct disordered groups on the basis of behavior alone. These groups of children often behave similarly. High activity levels are common among many different kinds of children, including anxious or depressed children (Koupernik, MacKeith, & Francis-Williams, 1975). Other studies have reported a strong relationship between ADHD and depression (Staton & Brumback, 1981). Cantwell (1975) noted the most significant symptoms other than conduct disorders among ADHD children were depression and low self-esteem.

Several different characteristics of ADHD children during the early childhood years have been described by investigators. Barkley (1989) reported poor school performance, failure to finish assignments, disruptive behavior in the classroom, poor social relations, and the appearance of learning disabilities. Campbell (1990) noted difficulties in socialization while Ross and Ross (1982) stated that aggressive, oppositional behavior may appear. Weiss and Hechtman (1986) reported a negative impact on achievement and related this to a cycle of poor self-esteem and depression. Wender (1987) cited a low frustration tolerance, which, along with a cycle of social difficulties, difficult temperament, and experience, resulted in

low self-esteem. A child with ADHD may take risks and engage in dangerous acts to gain attention and enhance self-image. Teeter (1991) summarized studies completed on ADHD children at different age levels. She concluded that a large group of children with ADHD do not outgrow the symptoms. Emotional, conduct, and learning problems emerge as a result of low self-esteem, lack of school success, and impaired social relationships.

The dimensions of temperament that characterize a child as having problematic behavior are very similar to characteristics of ADHD (Garrison & Earls, 1987). The temperamental characteristics of high activity level and marked distractibility are frequent sources of difficulty for parents, teachers, and children (Teglasi, 1987). Extremely active and distractible children may be diagnosed as having an attention deficit disorder. High activity, marked distractibility, and low attention span/persistence contribute to impulsivity (Lerner et al., 1982; Rowe & Plomin, 1977). High activity levels increase the problems associated with high distractibility and may make a child appear out of control or refuse to stop an absorbing activity. Teglasi (1987) also reported that impulsive children have a difficult time monitoring their behavior, forget assignments or tasks, have trouble following instructions, interrupt frequently, and have difficulty paying attention.

Children exhibiting pervasive symptoms of ADHD, problem behaviors in all settings at all times, are more likely to have symptoms which persist into adulthood. For these children, more severe problems such as the related emotional/behavioral problems of oppositional or conduct disorders often develop (Blackman et al., 1991). It is often difficult to separate symptoms of ADHD, emotional/behavioral disorders, or just irritating behaviors characteristic of some young children. The prognosis is poorer for those with emotional/behavioral problems.

This section has discussed the definition, possible causes, prevalence estimates, and diagnostic features of ADHD. Through the years, several names and characteristics have been used to describe what is currently called ADHD. The essential features of the disorder include problems with attention, impulsivity, and hyperactivity. Several factors complicate the diagnosis of ADHD in young children including the similarities in the diagnostic criteria and a child's age-appropriate behavior and the similarities between the characteristics of ADHD and dimensions of temperament that characterize problem behavior.

Differential Diagnosis

It is important to differentiate the ADHD child from children with emotional/behavioral problems such as conduct disorders,

oppositional defiant disorder, depression, and anxiety. According to Hinshaw (1987), the two most prevalent classes of problems that bring children to the attention of mental health professionals are ADHD and excessive violation of social norms, usually including aggressive or anti-social conduct. Hallahan and Kauffman (1991) reported that aggressive, acting-out behaviors, particularly conduct disorders, were the most common problems exhibited by children with E/BD. Hinshaw (1987) summarized research which indicated ADHD and conduct disorders were distinct disorders that differ in important ways. However, there remains a substantial overlap between the two disorders. Children who present with these problems often display characteristics of both disorders and it is not always easy to determine the best diagnosis (Milich et al., 1987).

Children with a diagnosed conduct disorder must display at least three criteria which include stealing with or without confrontation of the victim, running away from home, lying, fire setting, truancy, destroying property, physical cruelty to animals, and initiating physical fights (APA, 1987). The DSM-III-R (APA, 1987) also notes that attentional difficulties, impulsiveness, and hyperactivity are common and may justify an additional diagnosis of ADHD. ADHD may be a predisposing factor. Goldstein and Goldstein (1990) noted that some of the diagnostic criteria associated

with conduct disorders are also present in ADHD children. Their impulsivity may lead ADHD children to steal, lie, or engage in behaviors such as fighting. The seriously conduct disordered child is destructive, aggressive, and engages in activities to hurt others. The psychologist must determine if an early and significant history of attention-related problems existed. The diagnosis of conduct disorder should be reserved for those committing serious and persistent violations of the rights of others. The conduct disordered child will present symptoms of ADHD which are not easily documented through objective data.

Shapiro and Garfinkel (1986) reported results of a study on nonreferred elementary school children who participated in a screening for behavioral problems. The prevalence of inattentive-overactive symptoms suggestive of ADHD was determined to be 2.3% of the population ($N=315$) while 3.6% of the children had aggressive/oppositional symptoms suggestive of conduct disorders and 3.0% showed symptoms of both ADHD and conduct disorders.

The concept of Goodness of Fit (Thomas et al., 1968) may apply to the situation of conduct disordered children and temperament. Goldstein and Goldstein (1990) reported that some conduct disordered children and adolescents began with symptoms which included those of ADHD children. However, their problems may have been made

worse as a result of a bad fit between the child and parent temperament, misinterpretation by others in the environment regarding the cause of the child's problems, and a lack of effective intervention. "The majority of children or adolescents presenting with conduct disorder and ADHD in all likelihood displayed ADHD and oppositional problems preceding the onset of serious conduct disorder" (p. 161).

Hinshaw (1987) reported that despite the overlap in characteristics, subgroups of ADHD and conduct disordered children differ in several respects. Antisocial parents, family hostility, and low socioeconomic status were more often found among conduct disordered children than among ADHD children. The ADHD group more often displayed cognitive and achievement deficits. He also found ADHD children to be off task more frequently in the classroom and play situations but were not at greatly increased risk for behavioral deviance in adolescence. In contrast, the conduct disordered group were more frequently on task in structured settings and tended to be popular as well as rejected, suggesting greater control of behavior and better social skills. However, their social and behavioral outcomes were worse. Children displaying combinations of both disorders tended to have the worst features of both. He concluded by stating that investigators must use assessment tools

that can differentiate these domains if meaningful research is to be conducted.

Werry, Reeves, and Elkind (1987) and Reeves, Werry, Elkind, and Zametkin (1987) pointed out similarities in the diagnoses of ADHD, conduct disorders, and anxiety disorders. Likenesses were found in personality, activity, interpersonal, neurodevelopmental, academic, and cognitive variables that have been found to characterize differences in each of the diagnostic categories from normal subjects. Both the ADHD and conduct disordered groups were noted to have difficult temperaments. ADHD and anxiety disordered groups may come from less disturbed, less deprived backgrounds than the conduct disordered group. They concluded ADHD was an early presenting, mostly male, neurodevelopmental disorder accompanied by high activity levels, impulsivity, and cognitive impairment leading to marked underachievement. Conduct disorders were seen as early presenting marked by egocentricity, aggressiveness, a defect of empathic interpersonal relationships, and adverse child rearing environments. Anxiety disorders resulted in the least differences compared to normal subjects with the only important specificity being the parents are also anxious.

Less serious than a conduct disorder, the DSM-III-R (APA, 1987) includes the following characteristics of oppositional defiant

disorder: argumentative with adults, frequently loses temper, is often angry and resentful, is easily annoyed by others, blames others for mistakes, and often swears or uses obscene language. Although several of these criteria are frequently characteristic of ADHD children, it is rare that a child with only an oppositional defiant disorder will display sufficient behavioral, situational, and objective data to be diagnosed as ADHD (Goldstein & Goldstein, 1990).

Since the behavior of the ADHD child often does not meet expectations of others, it is not surprising that they develop oppositional behaviors. They receive a lot of negative feedback from parents, teachers, and peers regarding their behavior. A child with a difficult temperament may be harder to manage. The diagnostician must carefully examine the child's history and present circumstances to determine if attention and arousal-related problems occurred prior to and were a major force in the development of oppositional behavior.

The co-existence of disorders have also been found within the group of children displaying internalizing emotional/behavioral disorders such as depression, anxiety, or withdrawal. Weinberg and Emslie (1990) noted other recognizable conditions in children fulfilling the criteria for ADHD. These included depression, learning disorders, primary disorder of conduct, and mania. ADHD criteria was met by 21 out of a sample of 65 children admitted to the

psychiatric unit who fulfilled criteria for major depressive disorder. In another sample, 53% of the children with ADHD fulfilled criteria for conduct disorders.

Staton and Brumback (1981) reported that symptoms of ADHD occur in up to 60% of depressed children. Goldstein and Goldstein (1990) stated that few ADHD symptoms are observed in boys experiencing major depression; however, depression symptoms are commonly noted in ADHD children. It has also been suggested that children with ADHD diagnosed on the basis of impulsive symptoms rather than inattention, may actually be depressed (Jensen, Burke, & Garfinkel, 1988). When depression is a factor, there is frequently a positive family history (Goldstein & Goldstein, 1990). Also, the DSM-III-R (APA, 1987) noted that in order to make a diagnosis of major depressive episode the child must present a change in previous functioning over a two-week period in which at least one of the symptoms is either depressed mood or loss of interest or pleasure. The majority of the problems exhibited by the child with ADHD are persistent and chronic. Therefore, the ADHD child would not be considered to experience single-episode major depression. Some ADHD symptoms do, however, overlap with depression. These include sleep problems, irritability, hyperactivity, impulsivity, and difficulty with concentration (Goldstein & Goldstein, 1990).

In terms of anxiety disorders, Goldstein and Goldstein (1990) reported that it was rare for an ADHD child to develop these symptoms. In addition, it was also rare for a child with anxiety problems to present the range of attention and overarousal symptoms typically displayed by most ADHD children.

Care must be taken to distinguish between ADHD symptoms that result due to other underlying emotional/behavioral difficulties, and those symptoms which reflect a core form of attentional and hyperactivity problems as the presenting diagnosis (Bohline, 1985). The corresponding treatment and intervention approaches are different for the groups.

In summary, emotional/behavioral disorders including conduct disorder, oppositional defiant disorder, depression, and anxiety have been found to co-exist with ADHD. However, researchers have found differences between the disorders as well. ADHD may be a predisposing factor in both conduct disorder and oppositional defiant disorder. The major features of attentional difficulties, impulsiveness, and hyperactivity are also common features in conduct disorder. Impulsivity may, in fact, lead to behavior diagnosed as conduct disorder. It was rare to find the co-existence of oppositional defiant disorder (Goldstein & Goldstein, 1990) or anxiety disorders and ADHD. Several symptoms common in depression

were also noted in ADHD children. Overall, evidence has been found to support the co-existence of ADHD with conduct disorder and depression.

Summary

The focus of all the Thomas et al. research was to determine the contribution of temperament to normal and abnormal behavior development. Many other researchers have based their work upon the findings of the Thomas group. Although similarities existed among findings, consistent dimensions of temperament did not emerge. However, some research indicated a link between difficult temperament and behavior disorders.

Children with ADHD and E/BD exhibit similar behavioral characteristics. This makes it difficult to separate these groups for diagnostic and intervention purposes. Differences in temperament may exist between these groups as well as between ADHD, E/BD, and normal children. If differences are found to exist, this will assist the psychologist in the identification process and in designing more appropriate programs of intervention.

METHOD

This chapter will describe the subjects, procedure of the study, and the instrument used to assess temperament.

Subjects

Subjects for this study were 92 males, ranging in age from 60 months to 95 months with a mean age of 83.85 months. Subjects were in one of three intact groups: Attention Deficit Hyperactivity Disordered (ADHD), Emotionally/Behaviorally Disordered (E/BD), or normal. The normal group consisted of 35 subjects, the ADHD group consisted of 35 subjects, and the E/BD group had 22 subjects. Table 1 shows the mean age and standard deviation for each group and the entire sample. A One-Way Analysis of Variance ($F(2, 89) = 1.053, p < .353$) determined that no significant difference in age existed between the groups.

Eighty-four subjects were Caucasian, two were Black, one was Hispanic, and five were Native American. The subjects were predominantly Caucasian with only 8.7% of the total sample representing minority groups. Table 2 summarizes the subjects according to race and group.

Table 3 depicts the number of wage earners in each classification by group. Occupation of the major wage earner in the family was classified according to the Occupational Scale in

Table 1

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

<u>Group</u>	<u>Mean</u>	<u>Range</u>	<u>SD</u>
Normal	82.06	65 - 95	9.67
ADHD	84.63	61 - 95	9.28
E/BD	85.45	60 - 95	9.60
Total Sample	83.85	60 - 95	9.51

Note. N=92

Hollingshead's Two Factor Index of Social Position (Miller, 1977) into 7 categories: (a) higher executives of large concerns, proprietors, and major professionals; (b) business managers, proprietors of medium-sized businesses, and lesser professionals; (c) administrative personnel, owners of small businesses, and minor professionals; (d) clerical and sales workers, technicians, and owners of little businesses; (e) skilled manual employees; (f) machine operators and semiskilled employees; and (g) unskilled employees.

Table 2

Race of Subjects by Group

Race	Group			Total	%
	Normal	ADHD	E/BD		
Caucasian	30	33	21	84	91.3
Black	1	0	1	2	2.2
Hispanic	0	1	0	1	1.1
Native American	4	1	0	5	5.4
Total	35	35	22	92	
% of Sample	38.0	38.0	23.9		100.0

Procedure

Subjects for the three groups were from selected school districts in Oklahoma, Kansas, and Missouri. In the normal group, subjects were randomly selected from students in the appropriate age range from two rural school districts. The ADHD and E/BD subjects were selected from schools in the Tulsa, Oklahoma, Kansas City, Kansas, and Joplin, Missouri, metropolitan areas and a nine-county area of rural southeast Kansas. Many schools agreed to participate in the study. However, due to the limited age range of this study, few students in

Table 3

Occupation of Major Wage Earner for Each Group

Occupation	Group			Total	%
	Normal	ADHD	E/BD		
No designation	2	2	0	4	4.3
Major Professionals	0	2	2	4	4.3
Lesser Professionals	3	4	3	10	10.9
Administrative	1	2	2	5	5.4
Clerical, sales	8	9	3	20	21.7
Skilled	8	6	4	18	19.6
Semiskilled	7	3	4	14	15.2
Unskilled	6	7	4	17	18.5
Total	35	35	22	92	100.0

any one school district qualified for participation.

The following criteria were used to determine eligible subjects for the diagnostic groups. The ADHD group was identified based upon the criteria in the Diagnostic and Statistical Manual, Third Edition, Revised ([DSM-III-R] APA, 1987) and included only children who had been diagnosed with the disorder by a psychologist or pediatrician and

were receiving medication for treatment. These children did not have an additional diagnosis and were solely diagnosed as ADHD. The DSM-III-R criteria includes 14 symptoms that could be classified into three areas: attention, impulsivity, and hyperactivity. A child can be classified as ADHD if eight of these symptoms are present for at least six months and the onset of symptoms is prior to the age of seven. These symptoms include, but are not limited to: difficulty remaining seated, fidgeting, squirms in seat, easily distracted, difficulty awaiting turn or following through on instructions from others, and difficulty with remaining on task.

The E/BD group was defined as in the Individuals with Disabilities Education Act--P.L. 101-476--definition for Serious Emotional Disturbance (SED) and included those children who met the criteria in the definition as determined by a multidisciplinary team in their local school district. Public Law 101-476 defines Serious Emotional Disturbance as:

- (i) The term means a condition exhibiting one or more of the following characteristics over a long period of time and to a marked degree that adversely affects a child's educational performance--
 - (A) An inability to learn that cannot be explained by intellectual, sensory, or health factors;

- (B) An inability to build or maintain satisfactory interpersonal relationships with peers and teachers;
- (C) Inappropriate types of behavior or feelings under normal circumstances;
- (D) A general, pervasive mood of unhappiness or depression; or
- (E) A tendency to develop physical symptoms or fears associated with personal or school problems.

(ii) The term includes schizophrenia. The term does not apply to children who are socially maladjusted, unless it is determined that they have a serious emotional disturbance (Federal Register, Vol. 57, No. 189, Tuesday, September 29, 1992, p. 44802).

The term E/BD was used for the purposes of this study instead of SED. Kauffman (1989) suggested the use of this term because the terminology is in transition. He stated,

"Seriously emotionally disturbed" is the label currently used in federal legislation and regulations regarding special education. "Behaviorally disordered" is the term preferred by many professionals in the field of special education, however, because it is a more accurate descriptor of the socialization difficulties of children and youth. (p.4)

The use of the term behaviorally disordered is also consistent with

the position of the Council for Children with Behavioral Disorders (CCBD), a Division of the Council for Exceptional Children. Several additional terms are also used throughout the literature such as emotionally handicapped, emotionally impaired, behaviorally impaired, or socially and emotionally maladjusted (Kauffman, 1989). Teeter (1991) reported on a CCBD committee which argued that children with behavioral disorders and social maladjustment should be included in the federal definition of SED. CCBD has called for a revised federal definition that is educationally based and reflects the current knowledge of the field.

Some of the E/BD children (13 subjects) were also diagnosed as ADHD. These subjects were included in this study due to sample size requirements of the statistical design and the difficulty locating subjects in this age range diagnosed as E/BD. The information gained was felt to warrant their inclusion even though some generalizability of the results was lost.

Instrument

Description

The Temperament Assessment Battery for Children-Parent Form ([TABC-P] Martin, 1988) was designed to measure basic personality-behavioral dimensions (temperaments) of children from 3 to 7 years of age (see Appendix). Six temperamental scales were

measured: (a) Activity--tendency to engage in gross motor movement, especially fast, vigorous movement; (b) Adaptability--ease and speed of adjustment to new social situations; (c) Approach/Withdrawal--tendency to approach or withdraw from new social situations; (d) Emotional Intensity--tendency to express emotions, especially negative emotions; (e) Ease of Management Through Distraction--ease with which the parent can move the child's attention from inappropriate to more appropriate behavior through distraction; and (f) Persistence--attention span and tendency to solve difficult learning or performance situations. These variables are assessed to produce a description of the child and a comparison of the temperamental characteristics to other children in the same age range.

The TABC-P consists of 48 items describing behaviors of children as they occurred in the home. In completing the form, the parent responds to each item on a 7-point Likert Scale based on the frequency with which the behavior described in the item has occurred during the last three months. The items were scored as: 1--hardly ever, 2--infrequently, 3--once in a while, 4--sometimes, 5--often, 6--very often, or 7--almost always. The TABC-P required approximately 15 minutes to complete and an additional 10 minutes to score. Martin modified the TABC-P from the Thomas, Chess, and Korn Parent and Teacher

Temperament Questionnaires (Thomas & Chess, 1977).

Scoring

In scoring the TABC-P, approximately one-half of the items were reversed scored to control for response set bias. Raw scores on the instrument were converted to T-score equivalents (mean = 50; standard deviation = 10). T-scores were plotted on a Profile Sheet in order to visualize the pattern of T-scores across the scales. T-scores may be transferred to percentile ranks and descriptive categories--very high, high, high average, average, low average, low, and very low.

Scores were interpreted using the following guidelines (Martin, 1988). A high score on the Activity scale indicated a strong tendency to engage in vigorous motor activity. On the Adaptability scale, a high score indicated a greater ease and speed of adjustment. Martin, 1988, noted that some items referred to adjusting to changes in rules or adult expectations, while some items referred to the ability to feel at ease quickly with strangers. Approach/Withdrawal scores reflected the tendency to be outgoing versus shy or the tendency to enjoy new activities. High scores on this scale indicated an outgoing tendency in novel situations. On the Emotional Intensity scale, a high score indicated intense emotional expression, primarily a negative response such as crying or anger. The Ease of Management Through Distraction scale measures the ease with which the parent

can move the child's attention from inappropriate to more appropriate behavior through distraction. Therefore, a high score on this scale indicated the child was more easily distracted away from inappropriate behavior. A high score on the Persistence scale indicated a longer attention span and a tendency to continue difficult tasks.

Reliability and Validity

To date, no attempt has been made to provide national normative data for the TABC-P (Martin, 1988). However, data from studies have been combined to allow comparisons with existing information. For the TABC-P, data are available on 1,381 children from the Northeast, Southeast, and Rocky Mountain regions of the country.

As reported in the TABC manual (Martin, 1988), internal consistency reliability estimates for each scale of the TABC-P were obtained for two different samples. Estimates ranged from .57 to .87. The test-retest reliabilities of the TABC-P were assessed for 1- and 2-year periods for both mothers and fathers. The 1-year stability was in the .43 to .70 range for mothers, and .37 to .62 range for fathers. The 1- and 2-year stabilities were not substantially different. Interrater reliabilities for the TABC-P were calculated by correlating corresponding scores for the six temperament scales for both parents. Coefficients were reported for both referred and nonreferred

samples. There was much less agreement for referred versus nonreferred children. Coefficients for referred children ranged from $-.21$ to $.35$, while those for nonreferred children ranged from $.30$ to $.64$.

Several validity studies were reported in the TABC manual (Martin, 1988). Concurrent validity has been studied through examining relationships between the TABC and intelligence and psychopathology (Gridley, 1991; Martin, 1988). In relationship to intelligence, one study found samples of gifted children were significantly different from the non-gifted group on the Persistence scale. The gifted group was significantly more persistent. Martin (1988) reported on a sample which used a wider intelligence range and found maternal ratings of Activity level ($-.39$), Adaptability ($.20$), Distractibility ($-.21$), and Persistence ($.40$) were significantly related to IQ. Paternal ratings for the same sample were significant for activity level ($-.37$) and persistence ($.33$).

In relationship to psychopathology, Pfeffer and Martin (1983) studied the differences in parental temperament ratings of (a) preschool children who were referred for a psychological evaluation because their parents were concerned about the possibilities of emotional disturbance and (b) children who had never been referred for a psychological evaluation. The referred group was rated more active, less adaptable, less persistent, and less distractible (less easily

managed). Children referred for possible emotional disturbance were rated as exhibiting significantly more negative behaviors. In another study, Matthews-Morgan (1984) found a significant relationship between temperament and maladjustment.

RESULTS

Descriptive Statistics

Means, standard deviations, and T-score ranges (mean=50, standard deviation=10) for the six temperamental scales on the TABC-P are shown in Table 4 for each group and the entire sample. Based on the descriptive labels given by Martin (1988, p. 46) in the TABC manual, the normal group scored within the average range (T 46--T 54) on all six scales. The ADHD group scored within the average range on Approach/Withdrawal, high average (T 55--T 59) on Emotional Intensity, high (T 60--T 69) on Activity, and low (T 31--T 40) on Adaptability, Ease of Management Through Distraction, and Persistence. The E/BD group scored within the average range on Approach/Withdrawal, high in Activity and Emotional Intensity, and low in Adaptability, Ease of Management Through Distraction, and Persistence.

Both the ADHD and E/BD groups scored high on Activity level. Both groups also scored low on the same scales of Adaptability, Ease of Management Through Distraction, and Persistence. However, where the ADHD group was within the high average range on Emotional Intensity, the E/BD group scored high on this scale.

Table 4

Summary of T-Score Ranges, Means, and Standard Deviations for Six Temperamental Scales by Group and for Entire Sample

Scale	Group											
	Normal			ADHD			E/BD			Total Sample		
	Mean	Range	SD	Mean	Range	SD	Mean	Range	SD	Mean	Range	SD
Activity	51.26	32-75	11.46	63.17	42-75	10.86	62.64	40-75	8.92	58.51	32-75	12.01
Adaptability	50.11	30-61	7.73	39.77	25-61	11.78	34.05	25-53	9.28	42.34	25-61	11.68
Approach/Withdrawal	53.34	28-70	10.77	53.63	26-70	12.19	52.86	34-70	10.49	53.34	26-70	11.15
Emotional Intensity	52.09	32-74	11.69	57.77	32-75	13.51	61.77	35-75	12.70	56.57	32-75	13.09
Ease of Management Through Distraction	48.09	29-68	9.20	39.63	25-61	11.77	33.55	25-58	10.61	41.39	25-68	11.94
Persistence	50.71	25-71	10.46	37.37	25-58	9.96	38.55	25-60	9.03	42.73	25-71	11.68

Note. N = 92

Intercorrelations among the scales are shown in Table 5. The correlations, in general, were in the medium range (.30 to .50) and significant, indicating that a multivariate analysis was warranted. The highest significant relationship among the scales was between Emotional Intensity and Ease of Management Through Distraction ($r = -.75, p < .01$). This indicates that as Emotional Intensity increased, Ease of Management Through Distraction decreased.

Adaptability was significantly related to all the scales, and its correlation with Activity ($r = -.46, p < .01$) and Emotional Intensity ($r = -.55, p < .01$) were both negative relationships. This indicates that as Adaptability decreased, Activity and Emotional Intensity would increase. Adaptability and Ease of Management Through Distraction had a correlation of $r = .64, p < .01$. As Adaptability increased, so would the child's Ease of Management Through Distraction. Emotional Intensity was also significantly negatively correlated with Persistence ($r = -.36, p < .01$). Therefore, as Emotional Intensity increased, Persistence decreased.

Negative significant correlations were also noted between Persistence and Activity with $r = -.63, p < .01$ and Ease of Management Through Distraction and Activity with $r = -.45, p < .01$. As the child's Activity level increased, their Persistence and Ease of Management Through Distraction would decrease.

Table 5

Intercorrelations Among the Variables of Temperament for the Entire Sample

Variable	2	3	4	5	6
1. Activity	-.46**	.07	.44**	-.45**	-.63**
2. Adaptability		.31**	-.55**	.64**	.49**
3. Approach/Withdrawal			.03	.03	.13
4. Emotional Intensity				-.75**	-.36**
5. Ease of Management Through Distraction					.43**
6. Persistence					

Note. $N = 92$.

** $p < .01$

With the exception of Adaptability, the Approach/Withdrawal scale was not significantly related to any of the other scales.

A One-Way Analysis of Variance (ANOVA) was calculated for each of the scales to determine if a significant difference existed between the groups. In addition, post-hoc comparisons using t -tests were computed on the significant One-Way ANOVAs to determine where differences existed between the groups on each scale. To

decrease the chance of Type I error when multiple comparisons were made, the Bonferroni procedure was used to control for alpha slippage. The alpha level required for significance was $p < .002$.

Table 6 shows the results of the One-Way ANOVA for the Activity scale. A significant difference was found between the groups ($F(2, 89) = 13.053, p < .001$). Post-hoc comparisons revealed a significant difference between the normal and ADHD groups, $t = -4.46(68), p < .001$, and between the normal and E/BD groups, $t = -3.96(55), p < .001$. This indicates that the ADHD and E/BD groups exhibit greater amounts of motoric movement than the normal group. This would be expected of the ADHD group. No significant difference was found between the ADHD and E/BD groups ($t = .19(55), p < .847$).

Table 6

Analysis of Variance Summary Table for the Activity Scale

	Sum of		Mean		Significance
	Squares	DF	Square	F	of F
Explained	2976.241	2	1488.121	13.053	.001
Residual	10146.748	89	114.008		
Total	13122.989	91	144.209		

The results of the One-Way ANOVA for the Adaptability scale are shown in Table 7. A significant difference existed among the groups with $F(2, 89) = 20.074, p < .001$. Post-hoc comparisons again revealed significant differences between the normal group and each of the two diagnostic groups. For the normal and ADHD groups, $t = 4.34(68), p < .001$ and for the normal and E/BD groups, $t = 7.07(55), p < .001$. The normal group was able to adjust to new social situations more easily than either the ADHD or E/BD groups. No significant difference was found between the ADHD and E/BD groups ($t = 1.93(55), p < .058$).

Table 7

Analysis of Variance Summary Table for the Adaptability Scale

	Sum of		Mean	Significance	
	Squares	DF	Square	F	of F
Explained	3859.886	2	1929.943	20.074	.001
Residual	8556.669	89	96.142		
Total	12416.554	91	136.446		

As Table 8 shows, the One-Way ANOVA for the Approach/Withdrawal scale revealed no significant differences between the groups, $F(2, 89) = .031, p < .969$. No differences were found between the groups in their tendency to approach or withdraw from new social situations. The groups were similar in their tendency to be outgoing versus shy and/or their tendency to enjoy new activities.

Table 8

Analysis of Variance Summary Table for the Approach/Withdrawal Scale

	Sum of Squares	DF	Mean Square	F	Significance of F
Explained	7.906	2	3.953	.031	.969
Residual	11310.648	89	127.086		
Total	11318.554	91	124.380		

The One-Way ANOVA found significant differences between the groups on Emotional Intensity as shown in Table 9 with $F(2, 89) = 4.216, p < .05$. The post-hoc comparisons revealed different results on

this scale than on the other scales. The only significant difference was found between the normal group and the E/BD group with $t = -2.94$ (55), $p < .005$. No significant difference was found between the ADHD and E/BD groups ($t = -1.11$, (55), $p < .270$). This indicates that the E/BD group tends to express more negative emotions than the normal group but not more so than the ADHD group.

Table 9

Analysis of Variance Summary Table for the Emotional Intensity Scale

	Sum of		Mean	Significance	
	Squares	DF	Square	F	of F
Explained	1349.831	2	674.915	4.216	.05
Residual	14246.778	89	160.076		
Total	15596.609	91	171.391		

The results of the One-Way ANOVA for Ease of Management Through Distraction are in Table 10. A significant difference was

found between the groups, $F(2, 89) = 13.555$, $p < .001$. The post-hoc analyses revealed the significant differences were between the normal and ADHD groups with $t = 3.35$ (68), $p < .001$ and between the normal and E/BD groups with $t = 5.47$ (55), $p < .001$. This indicates that the normal group was more easily redirected than either the ADHD or E/BD groups from inappropriate to appropriate activities. No significant difference was found between the ADHD and E/BD groups with $t = 1.97$ (55), $p < .054$.

Table 10

Analysis of Variance Summary Table for the Ease of Management Through Distraction Scale

	Sum of		Mean	Significance	
	Squares	DF	Square	F	of F
Explained	3031.544	2	1515.772	13.555	.001
Residual	9952.369	89	111.824		
Total	12983.913	91	142.680		

Finally, Table 11 shows the results of the One-Way ANOVA for the Persistence scale. Again, significant differences were found between the groups with $F(2, 89) = 18.307, p < .001$. The post-hoc analyses revealed significant differences were between the normal and ADHD groups, $t = 5.47(68), p < .001$, and between the normal and E/BD groups, $t = 4.50(55), p < .001$. No significant differences were found between the ADHD and E/BD groups ($t = -.45(55), p < .655$) on attention span and tendency to stay with a difficult learning situation. However, the normal group was found to be significantly different from the ADHD and E/BD groups on this scale meaning that they were more persistent.

Table 11

Analysis of Variance Summary Table for the Persistence Scale

	Sum of		Mean	Significance	
	Squares	DF	Square	F	of F
Explained	3621.438	2	1810.719	18.307	.001
Residual	8802.769	89	98.908		
Total	12424.207	91	136.530		

Tests of the Null Hypotheses

Null Hypothesis One: Temperament, as measured by the Temperament Assessment Battery for Children-Parent Form, will not differentiate between normal, ADHD, and E/BD children, with 90% accuracy.

A stepwise discriminant analysis was used to determine whether the temperament scales were effective at differentially classifying the normal, ADHD, and E/BD groups. The Box's M statistic was nonsignificant, $F(12, 24704) = 0.65298$, $p < .7978$, indicating that the homogeneity of variance assumption necessary for discriminant analysis was met. The first scale (variable) to enter into the stepwise discriminant analysis was Adaptability (Wilks' Lambda = .69 (2, 89), $p < .001$) which maximized the separation among the three groups the most and had the maximum correlation with the dependent variable. The second scale to enter was Persistence (Wilks' Lambda = .58 (2, 89), $p < .001$) which added the most in further separating the groups and added the next largest amount to the prediction. The last significant variable to enter was Approach/Withdrawal (Wilks' Lambda = .56 (2, 89), $p < .001$). No other scales (variables) were entered into the stepwise analysis. The F's to Enter at step four and beyond did not meet the minimal tolerance level required for submission into the analysis. The remaining scales did

not significantly contribute to the separation of the three groups.

The canonical correlations, eigenvalues, and significance levels for each of the discriminant functions are presented in Table 12. The first discriminant function from the analysis explained 92.86% of the between-groups variability and was significant at the $p < .001$ level of significance. The discriminant function is the uncorrelated linear combinations of the six temperament scales. Function two was not significant. Therefore, the correlations between the discriminating variables and the second discriminant function were not reported.

Table 12

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

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance Level
1	.70	92.86	.64	.001*
2	.05	7.14	.23	.098

* $p < .001$

Table 13 contains the correlations between the discriminant function and the discriminating variables. The Adaptability and Persistence scales have the highest loadings on the discriminant function with correlations of .79 and .74 respectively. Given these relatively high loadings, the Adaptability and Persistence scales primarily define the function. The Activity and Emotional Intensity scales were secondarily involved (correlations of -.53 and -.53) in defining the function. Since the correlations were negative for these scales (variables), the groups (ADHD and E/BD) that scored higher on Activity and Emotional Intensity scored lower on the first discriminant function which was primarily defined by the Adaptability and Persistence scales. Ease of Management Through Distraction also had a relatively high loading (.52) on the discriminant function. The Approach/Withdrawal scale had a very low relationship (.01) with the discriminant function suggesting that this scale is measuring another construct besides temperament.

To improve interpretation of the functions, the matrix was submitted to Varimax rotation. This rotation procedure is often suggested in helping to determine what is primarily being measured by the discriminant function (Stevens, 1986). The correlations between the discriminating variables and rotated discriminant function are given in Table 14. Function 1 consisted of the

Table 13

Correlations Between Discriminating Variables and the
Discriminant Function

	Discriminant Function
Discriminating Variable	1
Adaptability	.79
Persistence	.74
Activity	-.53
Emotional Intensity	-.53
Ease of Management Through Distraction	.52
Approach/Withdrawal	.01

Adaptability, Ease of Management Through Distraction, and Emotional Intensity scales. The Adaptability scale had the highest loading on Function 1. Function 2 was not rotated since it was nonsignificant. The loadings on Function 1 changed after the rotation. This can be expected since the rotated function loses the maximizing property and the maximizing property tends to be evenly distributed across the Functions. However, the Adaptability scale

still had the highest loading on Function 1 and still primarily defined the Function.

Table 14

Varimax Rotated Correlations Between the Discriminating Variables and the Discriminant Function

	Discriminant Function
Discriminating Variable	1
Adaptability	.95
Ease of Management Through Distraction	.54
Emotional Intensity	-.54
Persistence	.31
Activity	-.36
Approach/Withdrawal	.06

The accuracy of the discriminant function in predicting group membership for the three groups is presented in Table 15. Approximately 59% of the subjects were correctly classified by group. The normals (Group 1) had the highest percentage of classified

individuals with 77.1% correctly classified. Group 2, the ADHD subjects, had the highest percentage of misclassified members, with only 34.3% being correctly classified. Group members were approximately evenly distributed. The analysis misclassified 65.7% of the ADHD group. Group 3, the E/BD group, had 68.2% of its members correctly classified with 31.8% misclassified. Based upon the results of the classification matrix, Null Hypothesis One was accepted. The use of the TABC-P as the only criteria in the differential diagnosis of ADHD and E/BD children was not supported. The accuracy of classification of the three groups when using the TABC-P was less than 90% as defined by the Null Hypothesis. Therefore, the Null Hypothesis was not rejected.

Null Hypothesis Two: Temperament, as measured by the Temperament Assessment Battery for Children-Parent Form, will not differentiate between normal children and the diagnostic group of ADHD and E/BD children, with 90% accuracy.

A second stepwise discriminant analysis considered the normal group and the diagnostic group (the ADHD and E/BD groups combined) to determine whether the temperament scales were effective at differentially classifying the normal and diagnostic groups. The Box's M statistic was nonsignificant, $F(21, 19180) = 0.64145$, $p < .8912$, indicating that the homogeneity of variance

Table 15

Classification Matrix Based on Stepwise Discriminant Function
Analysis of the Temperamental Variables in Predicting Group
Membership

Group	Predicted Group Membership		
	1	2	3
Normal n = 35	27 77.1%	6 17.1%	2 5.7%
ADHD n = 35	9 25.7%	12 34.3%	14 40.0%
E/BD n = 22	3 13.6%	4 18.2%	15 68.2%
Percent of "Grouped" cases correctly classified: 58.70%			

assumption necessary for discriminant analysis was met. The first scale (variable) to enter into the stepwise discriminant analysis was Persistence (Wilks' Lambda = .71 (1, 90), $p < .001$) which maximized the separation between the two groups the most and had the maximum correlation with the dependent variable. The second scale to enter was Adaptability (Wilks' Lambda = .62 (1, 90), $p < .001$) which

added the most in further separating the groups and added the next largest amount to the prediction. Approach/Withdrawal entered third (Wilks' Lambda = .60 (1, 90), $p < .001$), Emotional Intensity entered fourth (Wilks' Lambda = .58 (1, 90), $p < .001$), Ease of Management Through Distraction entered fifth (Wilks' Lambda = .56 (1, 90), $p < .001$), and Activity entered sixth (Wilks' Lambda = .56 (1, 90), $p < .001$).

The canonical correlation, eigenvalue, and significance level for the discriminant function is presented in Table 16. The discriminant function accounted for 100% of the between-groups variability and was significant at the $p < .001$ level of significance. The discriminant function is the uncorrelated linear combinations of the six temperament scales. Only one discriminant function was produced since only two groups were utilized in the discriminant analysis.

Table 17 contains the correlations between the discriminant function and the variables. Persistence and Adaptability had primary loadings (correlations of .72 and .69 respectively) on the discriminant function. Activity (-.61) and Ease of Management Through Distraction (.55) also had relatively high loadings. Emotional Intensity (-.31) had a secondary involvement with Approach/ Withdrawal (.00) showing no relationship with the discriminant function. These results were similar to the previous

Table 16

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

Function	Eigenvalue	Percent of Variance	Canonical Correlation	Significance Level
1	.79	100.00	.66	.001*

* $p < .001$

discriminant analysis and indicated that groups scoring higher on Activity and Emotional Intensity scored lower on the discriminant function. Since the correlations for the Activity and Emotional Intensity scales (variables) were negative (-.61 and -.31 respectively), the group (the combined ADHD and E/BD group) which scored higher on Activity and Emotional Intensity scored lower on the discriminant function which was primarily defined by the Persistence and Adaptability scales.

The accuracy of the discriminant function in predicting group membership is presented in Table 18. Approximately 78% of the subjects were correctly classified by group. Overall, prediction of group membership improved when comparing the normal group to

Table 17

Correlations Between Discriminating Variables and the
Discriminant Function

Discriminating Variable	Discriminant Function
	1
Persistence	.72
Adaptability	.69
Activity	-.61
Ease of Management Through Distraction	.55
Emotional Intensity	-.31
Approach/Withdrawal	.00

the remainder of the subjects. Group 1, the normal group, had the highest percentage of correctly classified individuals with 82.9%. Group 2, the ADHD and E/BD subjects combined, had 75.4% correct classification. Based upon the results of the classification matrix, Null Hypothesis Two was accepted. The use of the TABC-P to differentiate between normal children and the diagnostic group of ADHD and E/BD children was not supported. The accuracy of classification of the two groups when using the TABC-P was less

than 90% as defined by the Null Hypothesis. Therefore, the Null Hypothesis was not rejected.

Table 18

Classification Matrix Based on Stepwise Discriminant Function
Analysis of the Temperamental Variables in Predicting Group
Membership

Group		Predicted Group Membership	
		1	2
Normal	n = 35	29 82.9%	6 17.1%
ADHD & E/BD	n = 57	14 24.6%	43 75.4%
Percent of "Grouped" cases correctly classified: 78.26%			

DISCUSSION

Differential diagnosis of children with various behavior disorders has been a persistent challenge for school psychologists. Specifically, the diagnosis of ADHD and E/BD children continues to be difficult. The purpose of this study was to determine whether characteristics of temperament as measured by the TABC-P could enhance the accuracy of the diagnostic process when making a differential diagnosis between normal, ADHD, and E/BD boys between the ages of five and seven.

The results of this study found little difference in temperament between ADHD and E/BD children. The use of temperament in the differential diagnosis between normal, ADHD, and E/BD children was not supported. Therefore, Null Hypothesis One was accepted. When using all three groups, only 58.70% of the subjects were correctly classified with the ADHD group having the highest percentage of misclassifications. However, the prediction improved when comparing the normal group to the diagnostic group (ADHD and E/BD groups combined). The accuracy of classification improved to 78.26%, but was not sufficient to reject Null Hypothesis Two. This comparison between the diagnostic groups (combined) and the normal group, while interesting, provided limited information toward increasing the accuracy in differential diagnosis of ADHD

and E/BD children. However, it does demonstrate the high rate of misclassifications of normal children that would have been misdiagnosed as ADHD or E/BD if only temperament was considered.

The similarity among the ADHD and E/BD groups on temperament found in this study supports previous research where symptoms overlapped between the disorders (Blackman et al., 1991; Cantwell, 1975; Dulcan, 1991; Goldstein & Goldstein, 1990; Hallahan & Kauffman, 1991; Hinshaw, 1987; Kauffman, 1989; Milich et al., 1987; Reeves et al., 1987; Staton & Brumback, 1981; Teeter, 1991; Weinberg & Emslie, 1990; Werry et al., 1987). This overlap has resulted in psychologists feeling uncertain regarding the differential diagnosis of disruptive behavior disorders. In addition, this uncertainty has made it difficult for psychologists to effectively provide differential treatment of these disorders.

Although the lack of difference in temperament found in this study between the groups did not support the differential diagnosis of children with these disorders, and previous research has not supported a direct causal relationship between temperament and behavioral disorders (Thomas & Chess, 1977; Thomas et al., 1968), certain characteristics of temperament have been found to be associated with hyperactivity (Kauffman, 1989) and behavior

disorders (Thomas & Chess, 1977; Thomas et al., 1968). Therefore, even though temperament would be only one aspect of these disorders, the use of temperament, along with other measures, may help explain differences in behavior and improve the process of assessment and diagnoses. While others have suggested that a certain combination of temperamental characteristics increase the risk of some children developing emotional/behavioral disorders (Barron & Earls, 1984; Bates et al., 1985; Carey, 1983; Chess & Thomas, 1984; Thomas & Chess, 1977, 1980; Wolkind & DeSalis, 1982), this study did not find a certain combination of temperament characteristics that would help in the differential diagnosis of ADHD and E/BD children. The discriminant functions (linear combinations of the temperament scales) were not able to separate the two groups with acceptable accuracy.

Individual comparisons of the temperament scales were completed to look for differences among the three groups. One-Way Analysis of Variance computed for each of the six scales of temperament found significant differences between the groups on all scales except Approach/Withdrawal. A significant difference was not found between the normal and ADHD group on Emotional Intensity, but a significant difference was found between the normal and E/BD group on this scale. The normal group was found to be

significantly different from both the ADHD and E/BD groups on Activity, Adaptability, Ease of Management Through Distraction, and Persistence.

The lack of difference between the ADHD and E/BD groups on the Activity scale was not surprising due to the overlap between the groups. Although the DSM-III-R (APA, 1987) does not list a high activity level as a specific symptom of conduct disorder or oppositional defiant disorder, it does state that ADHD may be an associated feature of both disorders. Therefore, parents rating children with ADHD or E/BD would tend to see the same types of behavior related to the activity level of their child, such as fidgeting, difficulty remaining seated, or moving from one uncompleted task to another. Similarities in activity level have been noted by several researchers to be present in both ADHD and E/BD children (Goldstein & Goldstein, 1990; Reeves, Werry, Elkind, & Zametkin, 1987; Werry, Reeves, & Elkind, 1987). This suggests the two groups are probably more similar than they are different in their activity levels. It was not surprising, however, that the normal group was significantly different from the ADHD and E/BD groups on this scale. As noted by Frick and Lahey (1991), high activity level was often the most noticeable and troublesome of the ADHD characteristics for young children.

On the Adaptability scale, it might be predicted that the E/BD group would have had more difficulty than the ADHD group in adjusting to new social situations. However, the results of the analyses did not support this difference. Considering the DSM-III-R (APA, 1987) criteria, several of the features noted for ADHD, conduct disorder, and oppositional defiant disorder are indicative of social difficulties and might lead parents to rate children with these disorders low on the Adaptability scale. The behaviors noted for these three disorders could be considered on a continuum with ADHD being the least severe of the three, oppositional defiant disorder next in level of severity, and conduct disorder the most severe. For example, parents of ADHD children might observe such behaviors as interrupting, failure to follow rules in structured games, failing to await turn, grabbing objects, or excessive talking as contributing to difficulty in adapting to new situations. Children with oppositional defiant disorder are negativistic, hostile, defiant, angry, resentful, and may deliberately annoy others. Parents of a child with a conduct disorder would observe more serious behaviors such as violations of the basic rights of others, destroying property, physical aggression, poor frustration tolerance, or temper outbursts. Since ADHD may be a predisposing factor in both conduct disorders and oppositional defiant disorder, parents may witness similar types of behavior in

new social situations. Poor social skills have also been documented in ADHD children by Barkley (1989), Campbell (1990), Teeter (1991), and Wender (1987). Therefore, the presence of any of these behaviors may have influenced the parent rating of the child's behavior in social situations.

Approach/Withdrawal was found to be nonsignificant on the One-Way ANOVA. None of the groups differed significantly on this scale. This factor may be affected by the type of E/BD children included in the study. Since most E/BD children who were diagnosed and received intervention exhibited more externalizing behaviors, the tendency to be reserved or shy was probably not a common characteristic among the subjects in that group. ADHD children would also have more externalizing behaviors. Children who have internalizing behavior disorders such as depression or anxiety/withdrawal, tend not to be diagnosed or referred for assessment by classroom teachers. Therefore, children in all three groups in the study are probably seen by their parents as being more socially outgoing rather than shy or reserved. In addition, Martin (1988) reported results of exploratory factor analysis in the TABC manual which resulted in a three-factor solution. Approach/Withdrawal and Adaptability loaded heavily on a single factor he called Sociability. Both of these scales relate to ease and speed of adaptation to new

social situations. The Approach/Withdrawal scale may be measuring something different than temperament or may be measuring a construct similar to Adaptability.

Children with E/BD would be expected to have significantly higher scores than the ADHD or normal groups in the area of Emotional Intensity since they tend to exhibit more negative emotions, primarily anger, aggression, hostility, and outbursts of temper (APA, 1987). The results did show E/BD children to be significantly different from only the normal subjects on this scale. Parents may not have rated the ADHD and E/BD children differently on this scale due to some similarities in behaviors exhibited by the ADHD group. The items on the TABC-P which measure Emotional Intensity primarily deal with the expression of anger through crying or yelling. The ADHD children might appear to be similar to the E/BD group on this scale because they, too, exhibit these types of behavior at times. Ross and Ross (1982) noted the appearance of oppositional or aggressive behavior in ADHD children while Barkley (1989) and Teeter (1991) have also reported behavior problems in this group that may lead parents to rate them as similar to E/BD children.

The Ease of Management Through Distraction scale may be somewhat confusing since it did not directly measure distractibility, but rather the ease with which a parent could redirect a child's

behavior from inappropriate to more appropriate behavior. With both the ADHD and E/BD groups having difficulty with attention and persistence, this may preclude redirection of behavior. Again, the similarities between these two groups may explain why no differences were found on this scale between ADHD and E/BD. Ease of Management Through Distraction and Emotional Intensity both had high loadings on Martin's (1988) Emotionality factor in his three-factor solution.

The lack of differences between the ADHD and E/BD groups on the Persistence scale has also been documented in the literature. Schaughency and Rothlind (1991) noted that ADHD, emotional problems, or behavioral problems may be the cause of difficulties in sustaining attention and being persistent on a difficult task. Inattention would be evident in the child's inability to complete tasks, difficulty in following directions, or carelessness. On Martin's factor structure (1988) Persistence and Activity loaded on a factor named Persistence.

This lack of difference found between the ADHD and E/BD groups has been reported in prior research. Hallahan and Kauffman (1991) noted similarities between the groups in the areas of attention, impulsivity, and hyperactivity. Many researchers have noted the difficulty in diagnosis or misdiagnosis due to group similarities

(Dulcan, 1991; Goldstein & Goldstein, 1990; Milich, Widiger, & Landau, 1987; Weinberg & Emslie, 1990). Teeter (1991) and Weinberg and Emslie (1990) have also reported the co-existence of ADHD and E/BD.

The intercorrelations of the variables found Adaptability to be significantly related to all of the other variables. Adaptability and Persistence were both negatively correlated with Activity and Emotional Intensity. Adaptability and Persistence also had primary loadings on the discriminant functions for the three-group and two-group analyses. As the child became more active and expressed more negative emotions, he became less adaptable to new social situations and less persistent. Both Adaptability and Persistence had positive correlations with Ease of Management Through Distraction indicating that the more adaptable a child was to new social situations and the more persistent he was, the easier it became for the parent to redirect the child from inappropriate to more appropriate behavior. Adaptability and Persistence were also positively correlated with each other. The more adaptable the child was, the more persistent he tended to be.

Considering the content of the Persistence and Activity scales, it makes sense that these two scales were negatively correlated. Activity was also negatively correlated with Ease of Management

Through Distraction. As a child's activity level increased, his ability to sustain attention and persist with a difficult task decreased and it became more difficult for the parent to redirect his behavior.

Persistence and Activity both had high loadings on a factor called Persistence in Martin's (1988) three-factor solution.

Approach/Withdrawal was not significantly correlated with any of the scales except Adaptability. This could be an indication that this scale was measuring something other than temperament or that the same concept was being measured by one of the other scales, such as Adaptability. Approach/Withdrawal and Adaptability both loaded high on a factor called Sociability in Martin's (1988) three-factor solution.

Summary

Based on the results of this study, it can be concluded that no significant differences existed in temperament between the ADHD and E/BD groups. However, a significant difference was found in most instances between the normal and diagnostic groups. The use of the TABC-P for the differential diagnosis of ADHD and E/BD children was not supported. Therefore, Null Hypothesis One was accepted. Only 58.70% of the subjects were correctly classified in the three group analysis. However, the prediction improved to 78.26% when comparing the normal group to the diagnostic group but was

still not sufficient to reject Null Hypothesis Two.

Since limited information was found to support the use of temperament in the differential diagnosis of ADHD and E/BD, other factors in addition to temperament should be explored for differential diagnosis. For example, family history and background or parenting style could be studied to determine their contribution to ADHD or E/BD. Several researchers (Werry et al., 1987; Reeves et al., 1987) have noted that ADHD and anxiety disordered children may come from less disturbed, less deprived backgrounds than conduct disordered children. An adverse child-rearing environment may be a key factor in differentiating between the two disorders. Hinshaw (1987) compared ADHD and E/BD (conduct disordered) children and found several differences related to the family structure of the conduct disordered children including antisocial parents, family hostility, and low socioeconomic status.

In addition to investigating family issues, the information from the TABC-P could be used to gain insight into a child's behavior at home. A comparison between the parents' perspectives of the child's behavior versus the teacher's perspectives might also be helpful in making a diagnosis. A child may appear hyperactive or disruptive to the parent, but not to the teacher. Of course, the reverse of the situation could also occur. Looking at factors such as Adaptability

and Emotional Intensity may provide insight into a child's reaction to different situations.

The limitations for this study have influenced the generalizability of the results. It was difficult to find subjects in the chosen age range that were diagnosed as only E/BD. Approximately half of the E/BD group was also diagnosed with ADHD. For future research, it may be unrealistic to expect a total separation between these two groups. ADHD and E/BD may be too closely related to differentiate. Also, the diagnostic criteria used in each school district included in the study may require further exploration. The criteria used to diagnose the children may not have been consistent.

Recommendations for Further Research

Based upon the findings of this study, further research would appear to be warranted. The following recommendations are offered:

1. A larger sample size should be used to improve generalizability of results.
2. The subjects in the E/BD group should not also be diagnosed as ADHD.
3. Teacher versus parent perspective of the child's temperament could be examined to determine if similar profiles of temperament are obtained.
4. Further explore the Goodness of Fit concept to study the

relationship between environmental expectations (i.e., teacher expectations or temperament) and diagnosis of ADHD or E/BD. For example, do environmental demands which exceed a child's capacity for performance result in the eventual diagnosis of emotional or behavioral problems?

5. Further studies should include other variables (e.g., behavior rating scales, locus of control, self-esteem, etc.) along with temperament to determine whether the differential diagnosis of ADHD and E/BD can be enhanced.

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Appendix
Temperament Assessment Battery for Children
Parent Form

TEMPERAMENT ASSESSMENT BATTERY FOR CHILDREN

Parent Form

Child's Name _____ Age (In Months) _____ Date _____

Sex M F Ethnicity Caucasian, Black, Hispanic, Oriental,
 (Circle) Other _____
 (circle one)

Respondent's Name _____ Relation: Father, Mother
 Other _____
 (circle one)

This questionnaire is designed to gather information on the way your child behaves in different situations. Each statement asks you to judge whether that behavior occurs "hardly ever, infrequently, once in a while, sometimes, often, very often, or almost always." Please circle the number "1" if the behavior hardly ever occurs, the number "2" if it occurs infrequently, etc. Please try to make this judgment to the best of your ability, based on how you think your child compares to other children about the same age. Also, please make these judgments based on your child's behavior during the last 3 months.

	1	2	3	4	5	6	7
	hardly ever	infrequently	once in a while	sometimes	often	very often	almost always
1. My child is shy with adults he/she does not know.	1	2	3	4	5	6	7
2. When my child starts a project such as a model, puzzle, painting, he/she works at it without stopping until completed, even if it takes a long time.	1	2	3	4	5	6	7
3. My child can sit quietly through a family meal without fidgeting in his/her chair or getting out of his/her chair.	1	2	3	4	5	6	7
4. When a new family rule is made for my child, he/she adjusts fairly quickly to it.	1	2	3	4	5	6	7
5. My child cries and screams so hard he/she gets red in the face and short of breath.	1	2	3	4	5	6	7
6. If my child is in a bad mood, he/she can easily be joked out of it.	1	2	3	4	5	6	7

7.	When first meeting new children, my child is bashful.	1	2	3	4	5	6	7
8.	When my child is read a story, he/she becomes bored or distracted in a half hour or less.	1	2	3	4	5	6	7
9.	My child is uncomfortable showing off or performing in front of new visitors to the home.	1	2	3	4	5	6	7
10.	My child is at ease within a few visits when visiting at someone else's home.	1	2	3	4	5	6	7
11.	When upset or annoyed with a task, my child whines briefly rather than yelling or crying.	1	2	3	4	5	6	7
12.	If my child wants a toy or candy (while shopping), he/she will easily accept something else offered instead.	1	2	3	4	5	6	7
13.	When my child moves about in the house or outdoors, he/she runs rather than walks.	1	2	3	4	5	6	7
14.	If desired outdoor activity must be postponed due to bad weather, my child stays disappointed for most of the day.	1	2	3	4	5	6	7
15.	My child prefers active games involving running and jumping, etc., rather than games in which he/she must sit.	1	2	3	4	5	6	7
16.	If my child resists some procedure, such as having hair cut, brushed, or washed, he/she will continue to resist it for at least several months.	1	2	3	4	5	6	7
17.	When taken away from an activity my child enjoys, he/she tends to protest strongly, by intense fussing.	1	2	3	4	5	6	7
18.	When my child is promised something in the future, he/she constantly keeps reminding parents.	1	2	3	4	5	6	7
19.	When in the park, at a party, or visiting, my child will go up to strange children and join in their play.	1	2	3	4	5	6	7
20.	If my child is shy with a strange adult, he/she quickly (within a half hour or so) gets over this.	1	2	3	4	5	6	7
21.	My child sits still to have a story told or read, or a song sung.	1	2	3	4	5	6	7
22.	When scolded or reprimanded by parents, my child reacts mildly, such as whining or complaining, rather than strongly, with crying or screaming.	1	2	3	4	5	6	7
23.	When my child becomes angry about something, it is difficult to sidetrack him/her.	1	2	3	4	5	6	7
24.	When learning a new physical activity (such as hopping, skating, bike riding), my child will spend long periods of time practicing.	1	2	3	4	5	6	7
25.	When my child and a playmate are together, the other child gets more upset about things (sharing toys, taking turns, etc.) than my child.	1	2	3	4	5	6	7
26.	When the family takes a trip, my child immediately makes himself/herself at home in the new surroundings.	1	2	3	4	5	6	7
27.	When shopping together and mother does not buy candy, toys, or clothing that child wants, he/she cries and yells.	1	2	3	4	5	6	7
28.	If my child is upset, it is hard to comfort him/her.	1	2	3	4	5	6	7

- | | | | | | | | |
|---|---|---|---|---|---|---|---|
| 29. When the weather is bad and my child is confined to the house, he/she runs around and cannot be entertained by quiet activities. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 30. My child is immediately friendly with and approaches unknown adults who visit our home. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 31. When in the doctor's office for some uncomfortable procedure, my child is difficult to manage despite reassurance or promises of rewards for good behavior. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 32. When a toy or game is difficult, my child will quickly turn to another activity. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 33. In a new situation such as a nursery school, my child is still uncomfortable even after a few days. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 34. Although my child dislikes some procedures (such as nail cutting or hair brushing), he/she will easily allow it if watching television or being entertained while it is done. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 35. My child can sit quietly through an entire children's movie, baseball game, or a long TV program. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 36. When my child objects to wearing certain clothing, he/she argues loudly, yells, cries. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 37. My child tends to give up when faced with a puzzle or a block structure that is difficult. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 38. When there is a change in daily routine, such as not being able to go to school, change of usual daily activities, etc., my child easily goes along with the new routine. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 39. When sitting, my child swings his/her legs, fidgets, or generally has his/her hands in constant motion. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 40. The first time my child is left in a new situation without mother (such as school, nursery), he/she gets upset. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 41. If my child starts to play with something and I want him/her to stop, it is hard to turn his/her attention to something else. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 42. My child gets involved in quiet activities such as crafts, watching television, reading, or looking at picture books. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 43. My child feels free to smile and laugh when around people for the first time. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 44. When away from home (for example, on vacation), my child has difficulty in adjusting to routines and schedules that are different from those at home. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 45. My child seems to take things matter-of-factly, accepts events in stride without getting very excited. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 46. When playing with a friend, my child gets bored with one activity sooner than the other child. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 47. My child can be stopped from pestering if he/she is given something else to do. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
| 48. My child can be happy for a car ride of an hour or more if he/she has a favorite toy or game to play with. | 1 | 2 | 3 | 4 | 5 | 6 | 7 |

Thank You
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VITA

Angela Sue Cole Love

Candidate for the Degree of

Doctor of Philosophy

**Thesis: DIFFERENTIAL DIAGNOSIS OF ATTENTION DEFICIT
HYPERACTIVITY DISORDERED AND EMOTIONALLY/
BEHAVIORALLY DISORDERED CHILDREN USING THE
TEMPERAMENT ASSESSMENT BATTERY FOR
CHILDREN**

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