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Social Skills in Mentally Retarded Children With Symptoms of Attention Deficit Hyperactivity Disorder.

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SOCIAL SKILLS IN MENTALLY RETARDED CHILDREN
WITH SYMPTOMS OF ATTENTION DEFICIT-HYPERACTIVITY DISORDER

A Dissertation

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Louisiana State University and
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in

The Department of Psychology

by

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This dissertation is dedicated to my family and Geneva Ward.
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ABSTRACT

One hundred forty-five boys ages 6 to 11 were administered the Social Skills Rating System and the Matson Evaluation of Social Skills with Youngsters. Subjects were divided into the following groups based on IQ, adaptive behavior, and score on a checklist of ADHD symptoms: normal IQ comparison, normal IQ high-activity-level, normal IQ medicated, mentally retarded comparison, mentally retarded high-activity-level, and normally retarded medicated. For both normal IQ and mentally retarded children, high-activity-level resulted in higher levels of negative social behavior. Both groups of high-activity level subjects also scored lower on classroom-related social behaviors. Medicated normal IQ subjects displayed social behavior patterns which resembled high-activity-level normal IQ subjects. The scores of medicated mentally retarded subjects, on the other hand, tended to fall in between scores of mentally retarded high-activity-level and comparison subjects. The mentally retarded comparison group displayed lower levels of positive social behavior than the normal IQ comparison group. There appears to be a relationship between ADHD symptoms and higher levels of negative social behavior.
INTRODUCTION

Throughout history, the distinction between mental retardation and mental illness has been minimal. At the beginning of the 18th century, however, John Locke distinguished between mental retardation and mental illness by observing that the potential for reason and complex thought did not exist in mentally retarded persons (Lewis & McLean, 1982). Yet is was not until the 19th century that the concepts of mental retardation and mental illness were differentiated. Intellectual deficit was considered the primary characteristic of mental retardation, whereas emotional impairment was considered the primary characteristic of mental illness (Ollendick & Ollendick, 1982).

By the early 20th century, several reports documented the co-occurrence of mental retardation and emotional disorders (Penrose, 1938; Potter, 1922; Tredgold, 1908). Yet, professionals frequently viewed mentally retarded individuals as immune to mental illness because they were delayed in psychological development (Gardner, 1967). This viewpoint is an example of “diagnostic overshadowing,” which refers to the tendency for the presence of mental retardation to reduce the diagnostic significance of psychopathology (Reiss, Levitan & Szysko, 1982). “Diagnostic overshadowing” occurs because the intellectual deficits are so salient that pathological behaviors are overshadowed in importance. As a result, these pathological behaviors are thought to characterize mental retardation rather than mental illness. However, this view has started to change, and now the concept of dual diagnosis is being
recognized by mental health professionals. "Dual diagnosis" refers to the occurrence of mental disorders in persons with mental retardation (Reiss, 1990). Mentally retarded persons are more vulnerable to dual diagnosis than their nonretarded counterparts; according to Menolascino (1989), these individuals are twice as likely to develop mental illness than the general population. Pollock (1944) stated that this is because mentally retarded people have a reduced capacity to withstand stress, poor ability to resolve mental and emotional conflicts, lack of social competence, and emotional instability.

Prevalence studies and etiologic theories of psychopathology in mentally retarded persons will be presented in this paper, as well as the definition of mental retardation employed by the present study.

**Prevalence of Psychopathology in Mentally Retarded Persons**

Prevalence of mental illness in mentally retarded individuals has been reported in several studies. Early studies, focusing on institutionalized individuals, quoted prevalence estimates ranging from 16% to 40% of the population being diagnosed with a psychotic or neurotic disorder (Pollock, 1944; Penrose, 1966). Rutter’s Isle of Wight Studies found that 30% of mentally retarded children ages 9 to 11 were rated as disturbed by parents and 42% by teachers (Rutter, Tizard & Whitmore, 1970). Jacobson (1982) studied mentally retarded children and adults from the state of New York and found that 15% were diagnosed with a psychiatric disorder. Borthwick-Duffy and Eyman (1990) evaluated mentally retarded persons participating
in community-based day programs, and found that 39% met criteria for psychiatric disorders. However, only 11.7% actually had a psychiatric diagnosis.

There are several explanations for differences in prevalence rates. First, as previously mentioned, "diagnostic overshadowing" may result in lower prevalence rates, as professionals consider pathological behavior characteristic of mental retardation rather than a psychiatric disorder. In addition, the definition of mental retardation has changed several times as these studies have been published. The American Association of Mental Retardation has published three revisions of diagnostic criteria for mental retardation since 1973, so different prevalence studies may have actually been using different populations. For example, Rutter, et al. (1970) included subjects identified as mentally retarded using an IQ score, whereas Borthwick-Duffy and Eyman (1990) included subjects identified as mentally retarded using both IQ and adaptive behavior measures. Similarly, different diagnostic criteria for psychiatric disorders were also utilized. Reiss (1990) used a rating scale designed for identification of mental disorders, the Reiss Screen for Maldaptive Behavior (Reiss, 1988), whereas Borthwick-Duffy and Eyman (1990) utilized subjects who met DSM-III-R (American Psychiatric Association, 1987) criteria for psychiatric disorders.

Models of Psychopathology in Mentally Retarded Persons

Several models have been proposed to explain psychopathology in dually diagnosed persons. These include organic, behavioral, and developmental models.
Organic. According to Crome and Stern (1972), virtually all children in the severe/profound range of mental retardation have abnormal brain structures. In addition, biological abnormalities are frequently reported in children with borderline or mild mental retardation (Bregman & Hodapp, 1991). Organic models of psychopathology in mentally retarded persons emphasize the presence of genetic and biochemical causes of brain dysfunction.

Genetic. Researchers have attempted to determine associations between genetic disorders and psychopathology. Genetic disorders which have received the most research attention include Down syndrome and Fragile X syndrome. Affective disorders, including mania and major depression, have been reported in persons with Down syndrome (Sovner, Hurley & Labrie, 1985; Warren, Holroyd & Folstein, 1989). In addition, a number of researchers have determined that individuals with Down syndrome are at risk for developing Alzheimer's disease (Bregman & Hodapp, 1991; Wisniewski, Wisniewski & Wen, 1985; Karlinsky, 1986; Schellenberg, Bird, Wijisman, Moore & Martin, 1989). It has been suggested that the development of dementia may be universal in persons with Down syndrome (Evenhuis, 1990). However, although these studies report an association between Down syndrome and affective disorders and dementia, no specific causal factors related to Down syndrome have been isolated.

Fragile X syndrome is another genetic disorder which has been associated with psychopathology. Researchers have found an association between Fragile X and
attention deficit-hyperactivity disorder (Bregman, Leckman & Ort, 1988; Hagerman, Murphy & Wittenberger, 1988). Anxiety disorders have also been reported in persons with Fragile X syndrome (Bregman, et al., 1988; Hagerman & Sobesky, 1989). Again, these results are preliminary, as more studies are necessary to determine possible genetic causes.

Biochemical. Biochemical models of psychopathology have been developed for the general population, and researchers have recently begun to extend these models to mentally retarded persons. These models include the dopamine hypothesis of schizophrenia and the catecholamine hypothesis of affective disorders. These models have gained support through the successful use of pharmacological agents in treating these forms of psychopathology.

According to the dopamine hypothesis of schizophrenia, psychotic symptoms are associated with an overactive dopaminergic system. This results in the release of excessive amounts of dopamine. Neuroleptics, which decrease dopamine levels, have proven effective with persons with mental retardation (Menolascino, Wilson, Golden & Reudrich, 1986).

According to the catecholamine model, affective disorders result from a deficiency of catecholamines (e.g. norepinephrine). Mentally retarded persons have been treated with tricyclic antidepressants, which increase catecholamine levels. These studies have yielded mixed results. Using a single-case methodology, Field, Aman, White and Vaithianathan (1986) found that imipramine, a tricyclic
antidepressant, decreased depressive symptoms in a mentally retarded woman. Aman, White, Vaithianathan and Teehan (1986), however, found that imipramine worsened depressive symptoms in a population of profoundly mentally retarded persons. Studies using sound methodology, including double-blind and placebo procedures, still need to be conducted.

**Behavioral.** Behavioral models of psychopathology in mentally retarded persons emphasize environmental influences over the individual. Specific models include classical conditioning, social learning, and operant conditioning.

**Classical Conditioning.** This model was postulated to explain the development of anxiety disorders. According to this model, a neutral stimulus, when paired with a stimulus evoking a particular response, becomes a conditioned stimulus for this response. With regard to anxiety disorders, environmental, sensory, or cognitive stimuli can be classically conditioned to elicit fears. Ollendick and Ollendick (1982) state that the classical conditioning model applies to persons with mental retardation in the same manner as for the general population. However, there is a need for researchers to evaluate this model empirically with mentally retarded persons.

**Social Learning.** Social learning principles have also been used to account for anxiety disorders. According to the social learning model, a fear response to an object or situation is learned by observing another person engaging in the response (Bandura, 1977). According to Ollendick and Ollendick (1982), mentally
retarded persons are capable of observational learning, so this model should apply to this population. Again, this is an area for future research.

**Operant Conditioning.** According to Bijou (1966), operant conditioning procedures may account for behavior problems in mentally retarded individuals. He described several possible explanations which incorporate operant conditioning. These include inadequate reinforcement, inappropriate reinforcement, and inappropriate punishment.

Bijou stated that mentally retarded persons may suffer from inadequate reinforcement of prosocial behaviors. This includes situations in which reinforcement for appropriate behavior is delivered infrequently or withheld completely, resulting in extinction of the behavior. It has been documented that mentally retarded individuals often encounter limited opportunities for positive reinforcement (DeVellis, 1977).

Another possible operant cause of psychopathology described by Bijou was reinforcement of aversive behavior. This may occur when inappropriate behaviors emitted by the mentally retarded person are reinforced by others. These inappropriate behaviors may include symptoms of psychopathology, including hallucinations, pica (ingesting inedible objects), self-injurious behavior and tantrums. Occurrences of such problem behaviors may be inadvertently increased by family members and staff as they provide contingent attention to these behaviors.

Bijou also stated that inappropriate punishment may be another cause of psychopathology in mentally retarded persons. Socially appropriate behaviors may be
punished. For example, the mentally retarded individual may be punished for interacting with others, and as a result may stop talking altogether. In addition, the mentally retarded person may be punished noncontingently. This may cause helplessness. According to Seligman (1975), learned helplessness results from situations in which individuals believe they have no control over the environment. Learned helplessness is one explanation for the onset of depressive symptoms in mentally retarded persons. In support of the learned helplessness theory, Reynolds and Miller (1985) found that mentally retarded adolescents received higher scores on measures of depression and helplessness when compared to normal controls.

**Developmental.** According to the developmental model, the cognitive development of mentally retarded persons occurs at slower rates than normal IQ persons (Zigler, 1973; Hodapp, Burack & Zigler, 1990). With regards to psychopathology, certain behaviors may be considered abnormal at a given chronological age. However, the same behaviors may be normal for a younger individual. For a high school-age student, though, this behavior may be considered pathological. Because mentally retarded persons have slower rates of development, they may emit behaviors considered pathological for normally developing people of the same age.

**Definition of Mental Retardation**

For the purposes of this paper, mental retardation refers to “significantly subaverage general intellectual functioning existing concurrently with deficits in
adaptive behavior, and manifested during the developmental period" (Grossman, 1977). "Subaverage general intellectual functioning" refers to performance on standardized intelligence tests which is greater than two standard deviations below the mean (IQ of 70 or below). "Adaptive behavior" refers to the degree of independent functioning skills, physical development, language development, and academic competency expected for age and cultural group. "Developmental period" refers to the time before birth and age 18; onset of mental retardation must occur before age 18.

Attention deficit-hyperactivity disorder (ADHD) is one form of psychopathology which has been investigated in mentally retarded children. A number of researchers have studied assessment (e.g. Fee, Matson & Benavidez, 1994) and treatment (e.g. Aman, Kern, McGhee & Arnold, 1993) of ADHD symptoms in this population. ADHD is a disorder with an extensive body of research, which has addressed etiology, epidemiology, assessment and treatment. These components of ADHD will be reviewed in the next section.
ATTENTION DEFICIT-HYPERACTIVITY DISORDER

Definitions of attention deficit-hyperactivity disorder (ADHD), as well as diagnostic criteria, have undergone many changes since the syndrome was first described by Still in 1902. He described children who were aggressive, defiant, excessively emotional, cruel and dishonest. He also observed that these children were overactive and impaired in attention. Subsequent researchers described children who had recovered from encephalitis, characterizing these children with impairments in attention, high activity levels, and poor impulse control (Ebaugh, 1923; Stryker, 1925). As a result, these symptoms were attributed to brain damage, and the term "hyperkinetic impulse disorder" was popularized (Laufer, Denhoff & Solomons, 1957). Clements and Peters (1962) observed that the evidence for brain damage in behaviorally disordered children was not sufficiently strong to refer to all children with hyperkinetic syndrome as brain damaged. They introduced the term "minimal brain dysfunction" to stress central nervous system dysfunction rather than brain injury.

During the 1960's, the concept of minimal brain dysfunction was questioned, for researchers felt it was inappropriate to refer to children with only neurological problems as having minimal brain damage (e.g. Birch, 1964). A new concept, the hyperactive child syndrome, was created. Activity level was the defining characteristic of this syndrome (Chess, 1960). In addition, objective evaluation of symptoms was stressed and the concept of a brain damage syndrome was not
emphasized. Attention deficits took prominence in the 1970's. Researchers found that the greatest difficulties experienced by hyperactive children were in tasks assessing sustained attention or vigilance (Freibergs & Douglas, 1969). Douglas (1983) presented an attentional model to account for the behavioral characteristics of ADHD. According to this model, symptoms of ADHD may be accounted for by four deficits: (1) deficits in the environment, organization, and maintenance of attention and effort; (2) inability to inhibit impulsive responding; (3) inability to modulate arousal levels to meet situational demands; and, (4) an unusually strong inclination to seek immediate reinforcement.

This new attention-oriented view of the disorder led to its revised classification in DSM-III (American Psychiatric Association, 1980). The terms “hyperkinetic,” “hyperactive,” and “minimal brain dysfunction” were replaced by “Attention Deficit Disorder” (ADD). In this revised conceptualization, the disorder can take two forms: Attention Deficit Disorder with Hyperactivity (ADD/H) and Attention Deficit Disorder without Hyperactivity (ADD/WO). This distinction resulted from clinical observations of children exhibiting attention problems without concurrent hyperactivity (Wender, 1971). However, this point of view shifted as subsequent researchers argued that this distinction is not important (Kinsbourne, 1983). Therefore in 1987 the two subtypes were joined in DSM-III-R (American Psychiatric Association, 1987) and Attention Deficit-Hyperactivity Disorder came into being. DSM-III-R criteria for ADHD are shown in Figure 1.
A. A disturbance of at least six months during which at least eight of the following are present:

1. Often fidgets with hands or feet or squirms in seat
2. Has difficulty remaining seated when required to do so
3. Is easily distracted by extraneous stimuli
4. Has difficulty awaiting turn in games or group situations
5. Often blurts out answers to questions before they have been completed
6. Has difficulty following through on instructions from others (not due to oppositional behavior or failure of comprehension)
7. Has difficulty sustaining attention in tasks or play activities
8. Often shifts from one uncompleted activity to another
9. Has difficulty playing quietly
10. Often talks excessively
11. Often interrupts or intrudes on others (e.g., butts into other children's games)
12. Often does not seem to listen to what is being said to him or her
13. Often loses things necessary for tasks or activities at school or at home (e.g., toys, pencils, books, assignments)
14. Often engages in physically dangerous activities without considering possible consequences (not for the purpose of thrill-seeking)

B. Onset before age seven

C. Does not meet the criteria for a Pervasive Developmental Disorder

Figure 1. DSM-III-R Criteria for Attention Deficit-Hyperactivity Disorder (APA, 1987).
A number of other controversies remain, however. It has been found that other developmental and behavior disorders exist with ADHD, notably conduct disorder and learning disabilities. There has been some question as to whether or not these disorders are actually symptoms of ADHD. However, researchers have distinguished subgroups of children who exhibit these disorders and others who do not (Schaughency, Walker & Lahey, 1988). Also, given the abundance of labels assigned to this syndrome, it is unclear whether or not researchers reporting results obtained with children with one diagnostic label (e.g. “minimal brain dysfunction”) would apply to children diagnosed with a different label (e.g. ADD/H). This heterogeneity of subjects does suggest that comparisons between studies using different diagnostic labels should be interpreted with caution.

For the purposes of this paper, Attention Deficit Hyperactivity Disorder will be referred to as ADHD. If researchers for a particular study have used another label, that label will be stated when reporting the results of the study. This paper will address etiology, epidemiology, assessment, and treatment of ADHD.

**Etiological Models of ADHD**

Several etiological models have been proposed to explain ADHD. According to Whalen (1989) and Lorys-Vernon, Hynd, Lytinen and Hern (1993) these factors include biological, environmental and psychosocial models.

**Biological.** A number of biological theories have been proposed to explain the etiology of attention deficit-hyperactivity disorder. These include genetic theories,
which incorporate family and twin studies, physiological theories, which evaluate effects of damaged brain functions, and biochemical theories, which focus on neurotransmitters.

**Genetic Theories.** Family studies have been conducted in order to determine if there is a genetic component to ADHD. Researchers have found that a large number of parents of children with ADHD also have ADHD symptoms or other psychiatric disorders. There is also a high likelihood of children with ADHD having siblings who are hyperactive. In addition, full siblings of ADHD children are more likely to have ADHD symptoms than half-siblings (Biederman, et al., 1987; Cadoret, Cunningham, Loftus & Edwards, 1975; Morrison & Stewart, 1974; Nichols & Chen, 1981; Pauls, Shaywitz, Kramer, Shaywitz & Cohen, 1983; Safer, 1973; Welner, Welner, Stewart, Palkes & Wish, 1977). Twin studies have also been conducted, reporting higher concordance rates for activity level (Buss & Plomin, 1975; Matheny & Dolan, 1980; Torgerson & Kringlen, 1978). However, there have been no twin studies evaluating children diagnosed with ADHD.

**Physiological Theories.** These models focus specifically on pathological brain functions resulting from dysfunction in either specific brain structures or groups of structures. Excessive motor activity and difficulties in concentration have been attributed to brain damage, especially damage in the brainstem (Kahn & Cohen, 1934). Specific physiological theories include overarousal, underarousal and localization theories.
Two overarousal theories have been proposed. Laufer, Denhoff and Solomons (1957) and Knobel, Wolman and Mason (1959) hypothesized that hyperactivity results from a state of overarousal caused by a dysfunction in the diencephalon. As a result, hyperactive children may suffer from deficits in selective filtering of information. These researchers also suggested that the cortex overcompensates for this dysfunction by entering into a state of hyperarousal, resulting in hyperactivity and inappropriate behaviors. Subsequent researchers have found evidence to contradict this theory by finding that hyperactive and normal children performed equally well on tasks of selective attention (Douglas & Peters, 1979).

Another theory of overarousal was proposed by Dykman, Ackerman, Clements and Peters (1971), who hypothesized that there is an attentional inhibitory system in the forebrain which controls the reticular formation and the thalamus. Damage to this system results in inefficient transfer of attention. As a result, the hyperactive child becomes overly aroused and attentive to his environment, resulting in excessive distraction and motor activity.

The theory of underarousal was then proposed (Satterfield, Cantwell, Lesser & Podosin, 1972; Satterfield, Cantwell & Satterfield, 1974). According to this theory, the hyperactive child experiences lower levels of excitation in the Reticular Activating System. As a result, the child engages in increased amounts of motor activity in order to increase sensory input. When developing this theory, Satterfield
and colleagues measured arousal using electrodermal responses. However, these researchers found that when measuring arousal with evoked potentials, hyperactive children could not be distinguished from normals (Satterfield & Dawson, 1971; Satterfield & Braley, 1977).

Localization theories which refer to damage to specific areas of the brain have also been proposed. Damage to the “Arousal System II,” a group of structures in the frontal cortex and limbic system, has been hypothesized as another possible cause of hyperactivity (Rosenthal & Allen, 1978). According to this hypothesis, damage to this system may result in poorly controlled activity in the Reticular Activating System. These researchers noted that lesions in the structures forming the Arousal System II result in symptoms resembling those of ADHD, including hyperactivity, impulsivity, and poor attention span. The ventral tegmental area was implicated by LeMoal, Stinus and Galey (1976), who found that rats with lesions in the ventral tegmental areas (VTA) exhibited behaviors resembling symptoms of hyperactivity. Also, Oades (1982) found that rats with VTA lesions performed poorly on a visual search task, producing response patterns similar to those exhibited by hyperactive children. Mason (1980) proposed the Dorsal Bundle Extinction Effect (DBEE) as another potential cause of attention deficits. The DBEE refers to a disruption of the frontal lobe dorsal bundle fibers. Mason (1980) hypothesized that when this disruption occurs, attention is impaired and inappropriate behaviors, such as excessive motor activity, is resistant to extinction. Finally, Voeller and Heilman (1988) reported that
damage to the right hemisphere may also be responsible for attention deficits, for children diagnosed with attention deficit disorder performed errors on cognitive tasks which were highly similar to those performed by adults with right hemisphere dysfunction.

**Biochemical Theories.** These theories have focused on the influences of neurotransmitters. Given the fact that many drugs used to treat ADHD affect neurotransmitter levels, researchers such as Wender, Epstein, Kopin and Gordon (1970), have hypothesized that ADHD may be related to a biochemical imbalance involving one or more of the neurotransmitters. Based on the results of research done in children diagnosed with Minimal Brain Dysfunction, Wender (1972) hypothesized that there was a relationship between this disorder and low serotonin levels. However, subsequent studies did not support this finding.

Subsequent researchers began to evaluate the effects of the catecholamines. Wender (1976) hypothesized that symptoms of ADHD were associated with decreases in dopaminergic activity. Shaywitz, Yager and Klopper (1976) evaluated this theory by decreasing dopamine levels in rates. They found that this process induced hyperactivity. Other researchers have evaluated the effects of norepinephrine depletion. Kornetsky (1970) found that amphetamine, a drug used to treat ADHD, may increase norepinephrine levels. According to Zametkin and Rapoport (1986), several factors support the norepinephrine hypothesis. First, ADHD children have decreased levels of MHPG, a norepinephrine metabolite, when compared to normal
controls. And, methylphenidate, a drug used to treat ADHD, alters MHPG levels. Finally, other drugs which decrease ADHD symptoms also appear to affect norepinephrine. Kostowski (1980) suggested a dual catecholamine hypothesis based on research which showed that both norepinephrine and dopamine are involved in the regulation of motor activity. Wender (1984) hypothesized that dopamine, norepinephrine and serotonin are involved in the etiology of ADHD, for amphetamines prevent release of all three of these neurotransmitters.

Many biological hypotheses have received empirical support, but no firm conclusions can be made at present. Although family studies have yielded promising results, it is necessary to conduct twin studies with children diagnosed with ADHD to determine concordance rates for symptoms. With regard to physiological theories, it is difficult to draw any definite conclusions about specific pathways, as it has not been possible to directly examine the neural structures of ADHD children. Neuroimaging techniques (e.g. CT scan, magnetic resonance imaging) may prove useful in providing a closer examination of brain structures and neural pathways (Lorys-Vernon, et al., 1993). Studies evaluating neurotransmitter theories abound with confounding variables, as it is unclear as to whether a change in functioning of one neurotransmitter alters others (Zametkin & Rapoport, 1986). Each of these biological theories will require further empirical validation.
Environmental Influences. Toxins originating from the environment have also been proposed as etiologies of ADHD. These toxins include environmental lead and food additives.

Environmental Lead. Lead poisoning has been widely documented as the cause of severe cognitive and behavioral problems (Ratcliffe, 1981). High amounts of lead in the body can cause encephalopathy and damage to the immune system, kidneys, liver, blood, and gastrointestinal tract. Researchers have also examined the effects of elevated but “subclinical” body lead levels, which do not produce overt signs of lead poisoning in children. Needleman, et al. (1979) reported a relationship between subclinical body lead levels and cognitive and attentional functioning in children. However, this study is limiting, as the researchers did not control for age and socioeconomic status among subjects (Marshall, 1983). Subsequently, researchers controlling for these variables were able to replicate this finding (Yule, Millar & Urbanowicz, 1981; Bellinger, Levitan, Waternaux, Needleman & Rabinowitz, 1987).

Gittelman and Eskenazi (1983) evaluated lead levels in hyperactive children and found that these children had higher lead levels than their siblings. They also found a connection between elevated lead levels and decreased cognitive performance. Although preliminary research findings have found increased lead levels in hyperactive children, it is not clear whether or not the increased lead levels actually
caused the hyperactive behavior. This is a research question which should be investigated.

**Food Additives.** Dietary factors have also been implicated as a possible cause of hyperactivity. Feingold (1976) reported that 30 to 50% of the population of hyperactive children showed significant improvement in behavior problems when fed a diet free of artificial food colors and flavors. He hypothesized that this occurred because these food additives may cause adverse physical reactions, including problems in the respiratory, skeletal and gastrointestinal systems, skin problems, and neurological symptoms (Feingold, 1976). Feingold (1976) proposed that a restricted diet containing no food additives would remediate the child’s behavior. However, subsequent studies challenging this proposal have yielded mixed results. Some researchers reported improvements in symptoms (Conners, Goyette & Southwick, 1976; Harley, Matthews & Eichman, 1978; Weiss, Williams & Margen, 1980), some reported worsening of symptoms (Goyette, Conners & Petti, 1976; Swanson & Kinsbourne, 1980) and others reported no differences (Levy & Hobbes, 1978). Studies yielding positive results have been shown to be methodologically flawed. One of the studies lacked adequate controls. In the Conners, et al. (1976) study parents were not blind to which diet was being implemented. The other two positive studies utilized a procedure to “disguise” the diets. However, only one subject in each study improved and this was observed only by the parents. As a
result, it has been accepted by many researchers that artificial foods and colors have little effect on the behavior problems of hyperactive children (Wender, 1986).

Sugar, another food additive, has also been evaluated as a possible cause of hyperactivity. This substance has been evaluated for several reasons. Sugar has been implicated in medical disorders such as diabetes and obesity. In addition, a medical disorder related to sugar ingestion, “reactive hypoglycemia” (Harris, 1924) has been proposed, which reportedly causes behavior and personality changes in adults. However, the existence of this disorder and accompanying behavior and personality changes has not received significant empirical support (Milich, Wolraich & Lindgren, 1986). Researchers correlating amount of sugar intake and measures of hyperactive behavior have found modest relationships between the two variables (Prinz, Roberts & Hantman, 1980; Prinz & Riddle, in press; Wolraich, Milich, Stumbo & Schultz, 1985). Other researchers have conducted dietary challenge studies where subjects ingest sugar or a placebo under controlled conditions before undergoing behavioral assessment. Researchers using this design have yielded both positive (e.g. Conners, 1983; Behar, et al., 1984) and negative results (e.g. Gross, 1984; Wolraich, et al., 1985). In some studies with positive results, sugar ingestion tended to improve performance (e.g. Behar, et al., 1984). Given these inconsistencies, it is unclear as to whether sugar has a general negative effect on the behavior of hyperactive children.

Taken together, the results of studies evaluating environmental factors as possible causes of hyperactivity are inconclusive. There is no strong evidence to
support either environmental lead or food additives as etiologies of attention-deficit hyperactivity disorder.

**Psychosocial Influences.** Researchers have also evaluated relationships between hyperactivity and adverse social conditions. An association between hyperactivity and parental distress has been reported (Gillberg, Carlstrom & Rasmussen, 1983; McGee, Williams & Silva, 1987; Paternite & Loney, 1980). Researchers have also found a greater likelihood for children to be labeled “hyperactive-impulsive” when they come from homes where the father is absent (Werner & Smith, 1977). However, there is no evidence that these factors cause hyperactivity (Whalen, 1989). Researchers have begun to take a more ecological perspective, which focuses on specific situations which may elicit hyperactive behaviors from children. Whalen (1989) states that psychosocial factors such as family adaptability and tolerance, psychological and socioeconomic resources, and stressful life events may interact with biological stressors to produce hyperactivity. In addition, according to Whalen, Henker, Collins, Finck and Dotemoto (1979), classroom organization and structure may also influence the behavior of hyperactive children, either facilitating or impeding academic progress. Research evaluating psychosocial factors in the etiology of hyperactivity has so far shown positive results. However, psychosocial factors tend to be complex and interrelated, and longitudinal study is needed in order to clarify their influences.
Of the models discussed, biological and genetic approaches appear to have the strongest empirical support. Researchers such as Rappoport and Quinn (1975) have stated that it is likely that symptoms of ADHD are best explained by a combination of these approaches.

Epidemiology

Epidemiological studies of ADHD have primarily focused on prevalence rates and gender differences.

Prevalence. In studies evaluating prevalence of childhood disorders, hyperactivity appears to be the disorder occurring most frequently (Anderson, Williams, McGee & Silva, 1987; Weiss, 1985). Rates of hyperactivity vary widely across studies. Most prevalence estimates in North America range from 1 to 15% in the general population (Sandoval, Lambert & Sassone, 1980; Gillberg, et al., 1983; Anderson, et al., 1987; Offord, et al., 1987; Whalen, 1989; Szatmari, Offord & Boyle, 1989; Barkley, 1990). However, a few studies have reported rates as high as 20 to 24% of the general population (Huessy & Gendron, 1970; Trites, 1979; Trites, Dugas, Lynch & Ferguson, 1979). According to Whalen (1989) and Barkley (1990), 2 to 9% is probably the most accurate range, as this appears to be the range where prevalence rates are reported by most researchers.

Discrepancy in prevalence rates may be due to several factors. First, prevalence rates may vary according to the way the disorder is defined. Not all researchers used the same symptoms to define the disorder. Many of these studies
agree that short attention span and overactivity are necessary for the diagnosis of ADHD. Other researchers include symptoms which are characteristic of other disorders in addition to ADHD, such as irritability, temper tantrums and low frustration tolerance (Szatmari, et al., 1989). Many studies utilized cutoff scores on criteria assessed by interviews or checklists, measuring the number of standard deviations above the mean (e.g. Trites, 1979; Trites, et al., 1979). However, researchers have found that this criterion can result in as much as 14% of the population being identified as hyperactive (Barkley, 1990). Other researchers have used the cutoff criterion of 2 standard deviations above the mean, producing the more acceptable range of 2 to 9% of the population (e.g. DuPaul, 1990).

Another reason for the discrepancy in prevalence rates is that researchers have used different methods and different sources of information when evaluating symptoms of ADHD. Differing methods include questionnaires and checklists, clinical interviews, and direct observation. Prevalence rates may differ according to which technique or combination of techniques was used. For example, Trites, et al. (1979) reports a prevalence rate of 14.3% for children diagnosed according to a teacher checklist, whereas Nichols and Chen (1981) report a prevalence rate of 7.9% for children diagnosed using a questionnaire. The source of information may influence the prevalence rates reported. Sources may include parent, teacher and physician reports. Lambert, Sandoval and Sassone (1978) report prevalence rates which differed from 1% to 13%, differing on the source of information used.
Finally, differences in sample characteristics may have influenced prevalence rates reported. Rutter, et al. (1970) conducted their study on rural children ages 10 and 11, reporting a prevalence rate of .09%. Nichols and Chen (1981), on the other hand, used a birth cohort of 7-year-old children from urban areas, reporting a prevalence rate of 7.9%.

**Gender Differences.** The prevalence of ADHD has been found to differ significantly among boys and girls (Whalen, 1989; Barkley, 1990). Specifically, three to six boys with ADHD are reported for every girl (Anderson, et al., 1987; Berry, Shaywitz & Shaywitz, 1985). Hyperactive girls tend to have more positive outcomes than hyperactive boys (Battle & Lacey, 1972). Girls with ADHD also tend to have problems with social skills, but their behaviors are less visible and they tend to be less unruly and physically aggressive than boys with ADHD (Berry, et al., 1985). In samples of children referred to psychology or psychiatry clinics and subsequently diagnosed with ADHD, no significant sex differences were found on measures of intelligence and academic achievement (Breen, 1989; Horn, Wagner & Ialongo, 1989; McGee, Williams & Silva, 1987).

**Assessment of ADHD**

Several assessment techniques have been developed for ADHD. These include informant ratings, self-report ratings, direct observation, and laboratory tests and measures. Because ADHD is a pervasive, cross-situational disorder, researchers
such as Barkley (1988) advise assessing the child across different situations (e.g. home, school), using different informants (e.g. parent, teacher).

**Informant Ratings.** In assessing ADHD in children, behavior rating scales and checklists are useful sources of information. There are many advantages associated with using rating scales and checklists according to Barkley (1990). They can be used with more than one informant, therefore ratings of the child can be obtained for different settings. In addition, these measures enable data to be collected on behaviors that occur infrequently and may not be directly observed. Rating scales and behavior checklists generally take little time to complete. And, for certain populations, the child’s behavior may be compared to normative data. Finally, rating scales and checklists may be used to evaluate treatment effectiveness. There are several rating scales and checklists which are designed to be completed by informants. With regards to ADHD informant measures are generally completed by parents and teachers, because behaviors related to hyperactivity are usually more evident in settings where the child spends most of his or her time, such as home and school (Edelbrock & Rancurello, 1985). The Achenbach Child Behavior Checklist (Achenbach & Edelbrock, 1983) has both parent and teacher report versions. The parent version has normal for boys and girls ages 4 to 16 years. For all editions except boys ages 4 and 5, there is a Hyperactive subscale which contains symptoms of ADHD, including impulsive and overactive. The teacher version has norms for boys and girls ages 6 to 16 years. This version has 2 subscales, Inattentive and Nervous-
Overactive, which have items containing ADHD symptoms. Both versions of the scale have adequate reliability (one week test-retest across subscale scores: parent, .84 to .99; teacher, .74 to .96) (Barkley, 1990). Validity of the parent version has been examined through significant correlations with other checklists measuring ADHD symptoms (Edelbrock & Rancurello, 1985). Validity of the teacher version has been evaluated through correlations with direct observations of behavior.

Checklists and rating scales have also been developed specifically for assessing ADHD. One such rating scale is the Conners Parent Rating Scale-Revised (CPRS-R) (Goyette, et al., 1978). This scale has 48 items measuring symptoms of hyperactivity, conduct problems, psychosomatic and anxiety problems. Normative data have been reported for boys and girls ages 3 to 17 years. Interrater reliability coefficients were determined for mother’s and father’s ratings, ranging between .46 and .57 across factor scores (Goyette, Conners & Ulrich, 1978). With regards to validity, the CPRS-R was been shown to correlate significantly with other measures assessing behavior problems (Barkley, 1990). There is also a teacher version, the Conners Teacher Rating Scale-Revised (CTRS-R), which has 39 items (Goyette, et al., 1978). This measure contains normative data for children ages 3 to 17 years. One week test-retest reliability was found to be .97 for total score. This version also correlates significantly with the teacher report of the Achenbach Child Behavior Checklist (Edelbrock & Reed, 1984). Another rating scale is the Attention Deficit Disorder Comprehensive Teacher Rating Scale (ACTeRs: Ullman, Sleator & Sprague, 1984).
Normative data have been collected on 5- to 12-year-olds. This measure has been shown to differentiate ADHD children from normal IQ and learning-disabled children. A relatively new measure, the ADHD Rating Scale (DuPaul, 1990), has also been developed. This measure was designed specifically to measure DSM-III-R symptoms of ADHD. Two week test-retest reliability of this instrument was reported to be .93 (DuPaul, 1990). Preliminary evaluations of validity show that the ADHD Rating Scale correlates significantly with direct observations of classroom behavior (DuPaul, 1990). Many researchers have stated that it is important to assess the child’s behavior across different settings and informants (Morris & Collier, 1987; Barkley, 1988). However, it has been shown that correlations between parent and teacher reports of the child rarely exceed .50 (Achenbach, McConaghy & Howell, 1987; Barkley, 1990). However, according to Barkley (1990) this may be due to the fact that children behave differently in different settings and opinions of the child’s behavior may be confounded by personality characteristics and mental status of the informants.

**Self-Report Ratings.** Researchers such as Barkley (1990) recommend using self-report measures when assessing adolescents. This is because parent and teacher reports may not be as valid with adolescents as with children, for these informants may not be aware of covert emotions (e.g. depression) and actions (e.g. sexual activity, drug use) of the adolescent. With regards to self-report, the Achenbach Child Behavior Checklist Youth Self-Report (Achenbach & Edelbrock, 1987) has been developed for older children. The Youth Self-Report may be administered to
children and adolescents ages 11 to 18. The scale contains items related to ADHD (e.g. attention problems), but they do not comprise a separate ADHD factor. Normative data have been collected and test-retest reliability estimates are adequate. Examinations of validity have revealed that the measure discriminates adolescents with ADHD from normal adolescents (Fischer, Edelbrock, Barkley & Smallish, 1990). Researchers have found that correlations between self-report and informant measures tend to be very low, approximating .22 (Achenbach, et al., 1987).

Direct Observation. Direct observation procedures have also been developed for the assessment of behaviors characteristic of ADHD. Jacob, O’Leary and Rosenblad (1978) developed the Hyperactive Behavior Code which is used to record ADHD behaviors in the classroom. An interval sampling procedure is used to record these behaviors. Behaviors recorded are from the following categories: solicitation, aggression, refusal, change of position, daydreaming and weird sounds. These researchers have found that this recording procedure differentiates ADHD children from normal children. In addition, the procedure correlates highly with ratings on the Hyperactivity, Conduct Problem, and Daydream/Attention Problem factors of the Conners Teacher Rating Scale. Abikoff, Gittelman-Klein and Klein (1977) also developed an observational system for recording ADHD behavior in the classroom. This system also uses an interval sampling recording procedure for 14 categories of behaviors, including off-task behavior and noncompliance. Twelve of these 14 categories were found to discriminate ADHD children from normals. Milich, Loney
and Landau (1982) developed an observation procedure for clinic playroom settings. Observations are conducted during two situations, free play, in which the child is permitted to play with toys, and restricted academic playroom, in which the child participates in a series of structured activities. This observation procedure has been shown to differentiate ADHD children from aggressive children and psychiatric controls.

**Laboratory Tests/Measures.** A number of objective laboratory tests and instruments have been developed to assess attention span and impulse control. The Continuous-Performance Test (CPT) is a measure of impulse control and vigilance. In this procedure, the child is required to push a button contingent upon certain target stimuli projected on a screen. The number correct and number of omissions are measured. In the Gordon Diagnostic System, the child is required to observe a particular number sequence projected on a screen and press a button when this sequence occurs (GDS: Gordon, 1983). The numbers of correct responses and errors are taken. Both measures have been shown to discriminate ADHD children from normal children (CPT: Douglas, 1983; GDS: Gordon, 1985). In addition, both measures demonstrate sensitivity to stimulant drug treatment (CPT: Barkley, 1977; GDS: Barkley, Fisher, Newby & Breen, 1987), although this is inconsistent (Barkley, 1977; Barkley, 1988).

Measures of impulse control have also been developed. In the Matching Familiar Figures Test (MFFT: Kagan, 1966) the child is shown a picture of an object,
then the child chooses which one of the six pictures most closely resembles the object in the picture. The child earns two scores, mean time taken to respond to the first picture and number of errors. One task from the GDS, the Delay task, also measures impulse control. In this task, the child is told to wait before he or she presses the button. The number of correct responses, total number of responses, and ratio of the two are taken. Both measures have been shown to discriminate normal from ADHD children (MFFT: Campbell, Douglas & Morganstern, 1971; GDS: Gordon, 1979).

Although the aforementioned techniques may prove useful for assessing ADHD symptoms, several areas warrant further research. Checklists and rating scales show promise by targeting specific behaviors for treatment and providing norm groups. However populations included in these norm groups are limited. Further research is necessary to establish norms for more diverse populations, including children with learning disabilities and mental retardation. Laboratory techniques also show potential for measuring attention span and impulse control, but more research is necessary to evaluate their effectiveness in distinguishing between children with and without treatment. In addition, the reliability of these instruments over repeated administrations needs to be established, as many children are evaluated before and during treatment.

Treatment of ADHD

Behavioral, cognitive-behavioral and pharmacological treatments have been developed for ADHD symptoms. In order to evaluate the effectiveness of a particular
treatment strategy, O'Leary (1980) and Sprague (1983) have delineated several criteria, including: (1) the child’s academic performance; (2) the child’s interactions within the family; (3) a cost analysis of the treatment strategy; (4) consumer satisfaction; and (5) the child’s subjective experience of the treatment.

Behavioral. Behavioral treatments have been implemented both as an alternative to pharmacological treatment, and as an additional component. Specific behavioral techniques involve implementing contingency management procedures in the classroom and at home.

Classroom Interventions. Positive reinforcement has been incorporated in classroom treatment techniques. Reinforcement programs incorporating token reinforcers, rather than praise, have proven most effective (Pfiffner, Rosen & O'Leary, 1985). Treatments utilizing these positive reinforcement techniques to increase attention span and to reduce activity level have also proven effective (Schulman, Stevens, Suran, Kupst & Naughton, 1978). However, reinforcement of these behaviors has not been shown to increase classwork productivity or accuracy (Marholin & Steinman, 1977). Therefore, researchers have found that reinforcing classroom work behavior increases productivity and accuracy, and also results in decreases in hyperactive behavior (Ayllon, Layman & Kandel, 1975; Ayllon & Rosenbaum, 1977; Marholin & Steinman, 1977; Pfiffner, et al., 1985; Robinson, Newby & Ganzell, 1981).
Piffner and O’Leary (1987) found, though, that improvements gained by positive reinforcement were not maintained unless punishment was added to the treatment program. These researchers found that adding a response cost procedure increased on-task behavior and academic accuracy to levels above those achieved by positive reinforcement alone. Another behavioral procedure combining positive reinforcement and punishment involves the use of a transmitter and a receiver/counter as part of a token system. This device is known as the “Attention Trainer.” The teacher holds the transmitter and the receiver is placed on the student’s desk. The child is awarded a point every minute and these points may be exchanged later for rewards. If the child is off-task or disruptive, the teacher deducts a point. Rapport, Murphy & Bailey (1982) found that this procedure was superior to stimulant medication in increasing attention span and academic productivity.

**Home-Based Interventions.** The use of home-based contingencies for classroom behavior has also shown to be a promising technique (Atkeson & Forehand, 1979). This procedure involves having a teacher rate the child’s performance one or more times daily, and sending these ratings home with the child. The parent then rewards or punishes the child, contingent upon the content of the reports. O’Leary, Pelham, Rosenbaum and Price (1976) found that this method resulted in significant improvements in classroom behavior.

Parent training in behavior management is another treatment method for ADHD. This method is potentially useful because parents frequently report
difficulties in child management at home (Cohen, Sullivan, Minde, Novak & Keens, 1983); frequently the effects of the medication have worn off by the time the child returns home from school, and parents must manage the child's hyperactive behavior. Pollard, Ward and Barkley (1983) implemented a treatment program containing components of a parent training program outlined by Barkley (1990) and Forehand and McMahon (1981). Pollard, et al. (1983) studied the effects of this program on children with ADHD and found that parent training improved the interactions between mother and child. Specifically the program resulted in decreases in number of commands given by the mother, increases in the child's compliance to these commands, and increases in mother's use of positive attention following compliance. Parents' ratings of deviant child behavior in the home improved.

Cognitive-Behavioral. Cognitive-behavioral techniques have also been developed. These techniques were derived from the combination of cognitive strategies to enhance learning and self-administered behavioral techniques (Barkley, 1989). These strategies include self-monitoring, self-reinforcement, and self-instruction.

Self-monitoring. this is a technique in which children observe and record their own behavior (Barkley, 1989). Specifically, a target behavior is selected (e.g. on-task behavior) and the child is required to record daily occurrences of that behavior. This technique may be used to decrease problem behavior and increase appropriate behavior. Harris (1986) trained children with ADHD to monitor either
on-task behavior or number of problems completed. Specifically, children monitoring on-task behavior were periodically interrupted in their work and asked to record whether they had been attending to their work during that time interval. Children monitoring number of problems completed kept a written record of the amount of work completed during a specified time interval. Results indicated that both types of self-monitoring produced significant increases in both target behaviors.

**Self-reinforcement.** This is a method in which children are taught both to monitor their behavior and award themselves reinforcers (Barkley, 1989). Bowers, Clement, Fantuzzo and Sorenson (1985) compared the effects of teacher-administered and self-administered reinforcement for improvements in attention to classwork in ADHD children. These researchers found that both methods increased attention to classwork, but the self-administered reinforcement produced greater increases. Hinshaw, Henker and Whalen (1984) trained boys with ADHD to self-monitor and self-reinforce appropriate behaviors (sharing, not fighting, obeying adults). They compared this method with reinforcement by others, and found that the self-reinforcement procedure produced greater increases in appropriate behaviors. The researchers also compared self-reinforcement, stimulant medication and both procedures combined, and found that both procedures combined produced greater increases than each individual procedure.

**Self-instruction.** This is a technique in which children are taught to follow a set of self-directed instructions (Barkley, 1989). Meichenbaum and
Goodman (1971) taught children to follow a set of self-directed instructions in completing laboratory tasks, and achieved improvement in performance of these tasks. However, more recent research has failed to replicate these effects in the classroom (Billings & Wasik, 1985). Friedling and O'Leary (1979) hypothesized that reinforcement may be necessary for treatment effects, rather than self-instruction.

**Pharmacological.** The literature on pharmacological treatment of ADHD is quite extensive. However, the research focuses on the behavioral effects of psychotropic drugs on children with ADHD, and according to Gadow (1988), there is little research on the effects of specific treatment techniques on therapeutic response and outcome. There appears to be a disparity between treatment procedures recommended by researchers and those utilized in actual practice (Gadow, 1983).

The drugs most often used to treat children with ADHD include stimulants and neuroleptics.

**Stimulants.** Stimulants, including methylphenidate (Ritalin), dextroamphetamine (Dexedrine), and pemoline (Cylert), are used with people of all ages diagnosed with ADHD (Gadow, 1988). These drugs tend to be short-acting, with effects being observed after 30 minutes of ingestion. Children's best performance tends to be approximate 1 1/2 to 2 hours after taking the methylphenidate or dextroamphetamine (Bradley & Bowen, 1941). Typically, children take medication before and during school. Researchers have demonstrated an inverse relationship between dosage of methylphenidate and cognitive
performance: as the dosage increases, the number of correct responses on tasks assessing short-term memory decreases. However, lower doses produce more effective responding than a placebo (Sprague & Sleator, 1977). In the same study, the researchers found that the opposite holds true for classroom behavior: as the dosage increases, the lower the rating of inappropriate classroom behavior. Accordingly, it is important to monitor medication dosages carefully, in order to minimize cognitive impairment and maximize appropriate behavior. Besides cognitive impairment, other side effects observed in children taking stimulants include mood alterations resembling depression (Schain & Reynard, 1975), abnormally low levels of motor activity (Rapoport, et al., 1978), decreased social interactions (Schleifer, et al., 1975), and changes in temperament (Ounsted, 1955).

**Neuroleptics.** This class of drugs has also been used to treat ADHD in children. These include thioridazine (Mellaril), chlorpromazine (Thorazine) and haloperidol (Haldol). They have been shown to reduce behavior problems when stimulants were ineffective (Gadow, 1988). Side effects include drowsiness, lethargy and apathy, enuresis, increased appetite and cognitive and academic impairment (Gadow, 1988). These usually decrease as the child develops a tolerance for the medications. In addition, another side effect sometimes reported in children is tardive dyskinesia, which causes spasms in skeletal muscles which usually take the form of changes in body posture and unusual facial and limb movements. These symptoms may be alleviated by gradually decreasing the dosage of the neuroleptic.
A number of studies have found that behavioral and pharmacological
treatments alone and in combination appeared to have significant positive effects on
the behavior of children with ADHD (Barkley, 1989). However, Abikoff (1987)
states that there is not as much support for the efficacy of cognitive-behavioral
interventions.

Social skills comprise one class of behaviors which is frequently assessed and
treated in children with ADHD. Models of social skills, definitions of social skills vs.
social competence, definitions of social skill problems, and assessment and treatment
of social skill problems will be reviewed in the next section.
SOCIAL SKILLS

Models of Social Skills

Two different approaches have been taken in order to conceptualize social skills. According to McFall (1982), these include the trait model, which views social skills as a hypothetical personality trait or an underlying cross-situational response predisposition, and the molecular model, which views social skills as discrete, situation-specific behaviors.

Trait Model. According to the trait model, social skills are not readily observable. Rather, a person's social skillfulness is inferred from behavior. In addition, the trait model assumes that the level of an individual's social skills will be relatively stable over time, and will be relatively consistent across situations (McFall, 1982). However, measures of social skills as traits have shown little relationship to behavior in naturalistic or simulated situations (Bellack, 1977; Bellack, Hersen & Lamparski, 1979).

Molecular Model. This model views social skills as consisting of specific, observable units of behavior which put together comprise the individual's overall performance in interpersonal situations (McFall, 1982). As opposed to the trait model, social skills are conceptualized as learned behaviors which are emitted during specific situations. McFall (1982) states that although this specificity may be an improvement over the trait model, it can be very complicated, because of the number of variables which must be selected and classified. These variables include
appropriate units of behavior, social situations in which these behaviors are elicited and outcomes or consequences of these behaviors.

### Social Competence vs. Social Skills

In response to the problems of the trait model and the molecular model, McFall (1982) reconceptualized social skills by introducing the concept of social competence. According to McFall (1982), social skills and social competence are different constructs. Social competence refers to criteria which determine whether or not an individual's social behaviors were adequate for a given situation. Social skills, which comprise one component of social competence, refer to the specific behaviors an individual exhibits in social situations.

**Social Competence.** Gresham (1983) stated that social competence may be understood in the context of social validity, the determination of acceptability of certain behaviors in social situations (Kazdin, 1977). According to Gresham (1985), social competence consists of two components: adaptive behavior and social skills. Adaptive behavior includes independent functioning skills, physical development, language development and academic competency. Social skills, according to Gresham (1985), consists of interpersonal behaviors (accepting authority, conversation skills, cooperative behaviors, and play behaviors), self-related behaviors (expressing feelings, ethical behavior, and positive attitude toward self) and task-related behaviors (attending, completing tasks, following directions, doing independent work).
Social Skills. The literature on children's social skills abounds with definitions of this construct. However, three definitions of social skills can be extracted from this literature. These include the peer-acceptance definition, the behavioral definition and the social validity definition.

**Peer-acceptance Definition.** According to this definition, individuals who are accepted by their peers may be considered socially skilled (Gresham, 1985). This approach has been endorsed by a number of researchers who have conducted studies evaluating social skills in children (e.g. Gottman, Gonso & Rasmussen, 1975) and evaluating social skills training programs (Oden & Asher, 1977; LaGreca & Santogrossi, 1980). However, the meaning of "accepted" is not specifically defined, nor are the behaviors the individual must perform in order to be accepted.

**Behavioral Definition.** This definition refers to behaviors specific to social situations which maximize reinforcement and minimize punishment (Gresham, 1985). A number of researchers have adopted this approach in social skills training studies, including O'Connor (1969), Rogers-Warren and Baer (1976), Warren, Rogers-Warren and Baer (1976), Bornstein, Bellack and Hersen (1977), Combs and Slaby (1977), Gottman (1977), Strain (1977) and Greenwood, Todd, Hops and Walker (1982). According to Gresham (1985), studies utilizing the behavioral definition can identify the antecedents and consequences of social behaviors and subsequent treatments can be developed to remediate social skills problems. However, this model does define which behaviors are socially skilled or socially appropriate.

**Social Validity Definition.** According to this definition, social skills are behaviors which predict important social outcomes for children (Gresham, 1985). These outcomes include peer acceptance, significant others' judgments of social skill
and other social behaviors related to peer acceptance and judgments. This definition has received empirical support from researchers such as Gresham (1981), who found evaluated children using sociometric assessment techniques (peer nominations, in which children named children they considered best friends, and peer ratings, in which children rated how much they liked to play with particular children) and direct observation (observing positive and negative peer interactions). Gresham (1981) found that although some children received few nominations, they received high peer ratings, and were observed having predominantly positive peer interactions. Other children, on the other hand, received peer nominations and low peer ratings and were observed as having predominantly negative peer interactions. Therefore ratings by peers were predictive of quality of interactions particular children had with these peers. These results support the social validity definition, which states that social skills are behaviors which predict social outcomes, as may be determined by peer ratings.

Social Skill Problems

Although the prevailing definitions of social skill may have provided means for description of the construct and classification of related behaviors, these definitions do not provide much information about specific types of social skills problems. This is important, since there is an abundance of research on the remediation of these problems. Gresham (1982) classified social skills problems into four general categories, which were intended to provide information essential to the assessment and treatment of these problems. These categories include skill deficits, performance deficits, self-control skill deficits and self-control performance deficits.

Skill Deficits. Individuals with social skill deficits do not possess the social skills which are necessary for interacting appropriately with peers. For example, the
individual may not know how to initiate a conversation or greet peers appropriately. Assessment of skill deficits requires determination of whether the person has the knowledge to perform the skill and whether the person has performed this skill successfully in the past.

**Performance Deficits.** Persons with performance deficits may know how to perform a particular social skill, but do not perform them at acceptable rates. This may result from lack of motivation or opportunity to perform the behavior. Assessment of this type of deficit requires determining whether the person is able to perform the behavior. If the person has performed the behavior successfully in the past, then he or she may be suffering from a performance deficit.

**Self-Control Skill Deficits.** This type of social skill problem refers to people who have not learned a social skill because they experience an emotional arousal response that interferes with it. Fear is such a response. People who experience fear may be prevented from engaging in approach behaviors. Criteria for determining whether or not an individual has this deficit include the presence of an emotional arousal response and no history of the person performing the target behavior.

**Self-Control Performance Deficits.** Individuals with this problem are capable of performing a particular social skill, but they do not do so because of an emotional arousal response. Fear is such a response, which results in the person performing the skill infrequently or inconsistently. To determine whether or not there is a self-control performance deficit, it must be determined whether the individual has an emotional arousal response and whether the individual performs the target social skill inconsistently.
Assessment of Social Skills

A number of techniques have been used to assess social skills, including rating scales and checklists, peer behavior ratings and direct observation. As with ADHD, authors recommend using multiple methods for assessing children with social skills problems (Hops & Greenwood, 1988).

Rating Scales/Checklists. Behavioral rating scales and checklists are commonly completed by informants (parents and teachers) and the children themselves. Scores are then compared to normative data to determine if the child's social skills differ from other children of the same age.

The Scale of Social Competence and School Adjustment (SSCSA: Walker & McConnell, 1988) is a rating scale to be completed by teachers which contains items to be scored on a Likert-type scale. This rating scale is composed of three subscales, teacher-preferred social behavior, peer-preferred social behavior and school adjustment behavior. Coefficient alpha estimates of this scale are above .90, and test-retest reliability estimates range from .67 to .89 (Walker & McConnell, 1988). Two of the three subscales have been shown to differentiate antisocial from normal fourth-grade boys (Walker & McConnell, 1988).

The Walker Problem Behavior Identification Checklist (WPBIC: Walker, 1983) is a behavior checklist to be completed by parents or teachers. Target children may range in age from kindergarten to sixth grade. This measure consists of the following subscales: acting out, distractibility, disturbed peer relations, withdrawal and immaturity. The total score has been shown to discriminate between children with behavior problems and normal children (Walker, 1983).

Other scales have self-report versions, in addition to informant versions. The Social Skills Rating System (SSRS: Gresham & Elliott, 1990) is an instrument which
measures social skills, problem behaviors and academic competence. This scale has teacher-, parent-, and self-report versions. Items in this scale are rated on a Likert-type scale. The self-report form contains four factors: cooperation, assertion, responsibility and self-control. The parent and teacher forms also contain four factors: cooperation, assertion, empathy and self-control. Internal consistency estimates range from .83 to .94 (Gresham & Elliott, 1990). The scale has been shown to identify social skills problems in mildly handicapped groups (Gresham, Elliott & Black, 1987). Finally, the Matson Evaluation of Social Skills with Youngsters (MESSY: Matson, Rotatori & Helsel, 1983) assesses social behavior in children. This scale has a parent/teacher- and self-report forms, and items are rated from 1 to 5 on a Likert-type scale. The self-report version contains five factors: appropriate social skill, inappropriate assertiveness, impulsive/recalcitrant, overconfident and jealousy/withdrawal. The parent/teacher-report version contains two factors, appropriate social skill and inappropriate assertiveness. Test-retest reliability estimates range from .50 to .55.

**Peer Behavior Ratings.** Social skills may also be assessed through peer behavior ratings, also known as sociometrics. The peer nomination method (Moreno, 1953), involves asking students to name their friends and the peers they prefer to work and play with. Individuals are given scores corresponding to the number of nominations received, which represent the level of the person's acception or rejection within a peer group (Andrasik & Matson, 1985).

The Peer Evaluation Inventory (PEI: Pekarik, Prinz, Liebert, Weintraub & Neale, 1976) is a 35-item scale consisting of behavioral descriptions. Children are required to determine whether any of the behavioral descriptions corresponds to each of their classmates. This instrument has three factors: likeability, aggression and peer
withdrawal. Reliability and validity of this measure have been established (McConnell & Odom, 1986).

**Direct Observation.** Several coding systems for the direct observation of social behavior have been developed. According to Hops and Greenwood (1988) these systems have been developed empirically and contain adequate reliability and validity. The Consultant Social Interaction Code (CSIC: Hops & Greenwood, 1988) is a system designed for observing social behavior in playground settings. This procedure provides information on percentage of positive social behavior, percentage of talking, rate of initiations, rate of responses, rate of interactions and rate of initiations to responses. The Observer Impression Assessment Scale (OIAS: Moses & McConnell, 1982) is designed for observers to rate general impressions of children's interactions during free play. This instrument contains items rated on a Likert-type scale to be completed after a six-minute observation in school free-play settings. A total score and three factor scores, verbal and social competence, cooperative play and social participation, are produced.

The aforementioned assessment techniques may all be used together or separately. Hops and Greenwood (1988) state that the assessment process may be conceptualized as consisting of several levels. These assessment techniques may first be used to screen children for social skills problems. Then once specific children have been referred, assessment methods may be used to determine specific excesses and deficits and to target specific behaviors for treatment. And finally, rating scales, peer behavior ratings, and direct observation may be used to determine treatment effectiveness and follow-up.
Treatment of Social Skills Problems

Treatment techniques have been developed to remediate social skills problems. These techniques are based on learning and cognitive models.

Learning. The learning model consists of operant and social learning techniques.

Operant Techniques. Operant techniques involve using behavior modification to treat excesses and deficits in social behavior. A number of researchers have targeted socially withdrawn children, using operant techniques to increase the rate of social interactions. Allen, Hart, Buell, Harris and Wolf (1964) implemented contingent attention in response to a young girl's interaction attempts, and found an increase in interactions from 20% to 60%. Other researchers were interested in improving the quality of interactions, rather than just the number, by increasing specific behaviors which comprise social interactions. Walker, Hops, Greenwood and Todd (1979) implemented contingent reinforcement to increase initiating interactions, responding to peers, and continuing interactions beyond initiation. These researchers obtained positive effects, significant increases in all behaviors. Finally, researchers have used operant techniques to decrease aggressive behaviors. Drabman and Spitalnik (1973) applied contingent time-out to aggressive inpatient boys. They found a marked decrease in aggressive behaviors.

Unfortunately, generalization and maintenance with this technique has also been low (Dodge, 1990). This is the case even when fading (intervention is gradually removed) and booster training sessions (re-introducing intervention after a specified period of time) are implemented (Dodge, 1990).

Social Learning Techniques. These techniques utilize modeling and role-play, as well as operant techniques, such as positive reinforcement. Matson, et
al. (1980) used this approach to treat emotionally disturbed hospitalized children, comparing social learning (instructions, feedback, modeling, role-play and social reinforcement) and direct training of social behaviors using operant techniques. These researchers found that the direct training was more effective. Gresham and Nagle (1980) implemented a procedure which utilized coaching and modeling with isolated children. This procedure was shown to be effective.

**Cognitive.** Cognitive techniques involve the use of procedures which consider internal events, primarily cognition. It is believed that learning may be improved if treatment strategies involve internal events as well as external behaviors. Social problem-solving is one such technique. The child is taught social cognitive-interpersonal problem-solving skills, and it is assumed that acquisition of these new skills will result in improvements in social behavior (Matson & Ollendick, 1988). Children are taught specifically problem definition and formulation, determining alternatives to problem behaviors, predicting consequences of a new behavior and evaluation of the new behavior (Matson & Ollendick, 1988). Christoff, et al. (1985) implemented this strategy with adolescents and found improvements in problem-solving and conversation skills. Another approach is to teach the child self-control strategies. Children are taught to modify their own behavior through self-monitoring, self-recording, and/or self-reinforcement. Camp, Blom, Hebert and Van Doorninck (1977) implemented this procedure with aggressive children and reported decreases in aggressive behavior and improvements in social behavior.

Each of these models has associated techniques which have shown promising results. A few conclusions may be drawn. According to Schneider and Byrne (1985), operant techniques utilizing direct reinforcement produces the largest improvements in specific social behaviors in specific settings (e.g. increasing the number of social
initiations in the playground). However, these techniques do not appear to significantly alter the quality of peer relationships. Social learning and cognitive techniques have also produced some success, but they appear to be most effective with older children. This is because these children are at a higher developmental level. In order for these techniques to be effective, subjects must be capable of representational thought (Dodge, 1990).

Social Skills in Children with ADHD

It has been well-established in the literature that children with ADHD have poor social skills. According to Whalen and Henker (1985), these children tend to display irritating and aggressive social behaviors, resulting in poor peer evaluations and low sociometric ratings. However, peer ratings may be sensitive to medication effects (Pelham & Bender, 1982; Whalen, Henker, Castro and Granger, 1987). These researchers treated hyperactive children with stimulant medication and evaluated the effectiveness of the medication on social behaviors. Researchers found that aggression towards peers by hyperactive children was significantly decreased when they were on the medication.

Social skills and ADHD are topics which have been researched extensively in normal IQ children. There is a growing literature base on ADHD and social skills in mentally retarded children. There are several reasons why research evaluating ADHD in mentally retarded children is important. One reason is that these studies may help to decrease the occurrence of diagnostic overshadowing. This may be done by showing that ADHD can be diagnosed in mentally retarded children using valid and reliable measures. Another reason for the importance of this research is that studies may aid in the development of effective treatments of ADHD symptoms in mentally retarded children. To date, the majority of treatment approaches (e.g. behavioral,
pharmacological) have been researched with normal IQ children as subjects. However, in order for treatments to be effective with mentally retarded children, they need to take into account the lower cognitive functioning and adaptive skills of this population. And finally, it is important to develop reliable assessment techniques for mentally retarded children so that these techniques may be used to monitor effects of subsequent treatments. Research addressing ADHD and social skills in mentally retarded children will be reviewed in the next section.
RESEARCH WITH MENTALLY RETARDED CHILDREN

This section will review research evaluating assessment and treatment of ADHD symptoms and social skills problems in mentally retarded children.

ADHD Symptoms in Mentally Retarded Children

To date, little empirical research has been conducted on the assessment and treatment of ADHD symptoms in mentally retarded children. The few published studies will be reviewed.

Assessment. Epstein, Cullinan and Gadow (1986) had teachers rate mentally retarded, emotionally disturbed, and nonhandicapped students on the Abbreviated Teacher Rating Scale (Sprague & Sleator, 1973), a short version of the ACTeRs. These authors found that mentally retarded children received higher mean scores than the emotionally disturbed or nonhandicapped students. There are several possible interpretations of this finding. These scores may have resulted from the poor intellectual ability of the mentally retarded children, and therefore the ADHD symptoms may be an attribute of these children in general. Another interpretation is that mentally retarded children may be more susceptible to psychopathology, so a greater number of subjects were displaying ADHD symptoms. In addition, the incidence of ADHD symptoms may be the same for mentally retarded and normal IQ children, but the mentally retarded children may display more severe symptomatology than the normal IQ children.
In order to determine if mentally children with ADHD symptoms differ from normal IQ children with ADHD symptoms, both groups must be directly compared. Fee, et al. (1994) assessed ADHD symptoms in mentally retarded and normal IQ children using the Conners Teacher Rating Scale-Revised (CTRS-R) and direct observation. These researchers found that mentally retarded and normal IQ children with ADHD symptoms significantly differed from non-ADHD controls on the Hyperactivity, Conduct Problem, Daydream-Attention Problem factors of the CTRS-R and behavioral observations. Mentally retarded children with ADHD symptoms significantly differed from normal IQ children with ADHD symptoms on the Asocial factor of the CTRS-R. These researchers concluded that a subset of mentally retarded children show a pattern of behavior resembling ADHD as it occurs among normal IQ children, although there may be differences in social skills.

Fee, Matson, Moore and Benavidez (1993), using this same population, also found that mentally retarded and normal IQ children with ADHD symptoms significantly differed from non-ADHD controls on the Conners IOWA-IO (a factor on the CTRS-R measuring inattention and overactivity) and IOWA-A (a factor on the CTRS-R measuring aggressive behavior) scales. On the IOWA-A scale, normal IQ children with ADHD symptoms were significantly different from normal IQ non-ADHD controls. On the other hand, mentally retarded children with ADHD symptoms were not significantly different from the mentally retarded non-ADHD
controls. The researchers concluded that conduct problems are more strongly associated with ADHD in normal IQ children than in mentally retarded children.

**Treatment.** A number of studies have evaluated pharmacological treatments of ADHD in mentally retarded children. The first studies evaluated stimulants. Payton, Burkhart, Hersen and Helsel (1989) compared the effects of methylphenidate and dextroamphetamine on three mentally retarded children diagnosed with ADHD, and found that both medications reduced excessive movement and increased on-task behavior. In addition, Aman, Marks, Turbott, Wilsher and Merry (1991a, 1991b) compared the effects of methylphenidate and thioridazine in mentally retarded children with ADHD, finding that methylphenidate and thioridazine sustained attention and motivation and improved in-seat behavior. The effects of thioridazine were clinically significant, but marginally so. Handen et al. (1992) administered methylphenidate to mentally retarded ADHD children and found that 64% of the children experienced significant gains in on-task behavior and attentional skills. These researchers observed no improvements in social behavior. Finally, Handen, Feldman, Gosling, Breaux and McAuliffe (1991) evaluated side effects of methylphenidate associated with mentally retarded children with ADHD. These included high activity, staring, motor movements, drowsiness, sadness, social withdrawal, irritability, poor appetite, anxiety, dizziness, moodiness and stomachache. Researchers have also evaluated the effects of fenfluramine in mentally retarded children with ADHD. Aman, et al. (1993) compared fenfluramine and methylphenidate in mentally retarded
ADHD children, finding that both drugs had useful but different clinical effects. Both drugs produced improvements in parent ratings of hyperactivity, motor excess, and conduct problems. However, methylphenidate caused improvements in attention, whereas fenfluramine produced improvements in irritability, inappropriate speech, and in scores on the Conners Abbreviated Symptom Questionnaire. Aman, Kern, Arnold and McGhee (1991) evaluated side effects of fenfluramine in mentally retarded children with ADHD, including drowsiness, elevated heart rate and blood pressure, significant weight loss, enuresis, encopresis, and stereotypy.

Social Skills in Mentally Retarded Children

Researchers have conducted studies evaluating assessment and treatment of social skills problems in mentally retarded persons.

**Assessment.** Researchers have reported using several techniques in the assessment of social skills in this population. Social validation is one technique. Behavioral inventories are used to identify specific components of behaviors which are subjectively judged to contribute to acceptable behavior, and which may be targeted for treatment (Kazdin & Matson, 1981). Another popular technique is task analysis, in which specific behaviors are broken down into components. This assessment technique is limited by the fact that specific behaviors may only occur in specific situations. If a problem behavior is treated in one situation, it may continue to occur in a different situation (Kazdin, 1977).
Treatment. With regards to treatment, operant techniques have been studied with this population. Hopkins (1968) used positive reinforcement to increase smiling in mentally retarded children. He was able to obtain significant differences in behavior. Whitman, Mercurio and Caponigri (1970) increased ball-playing in two mentally retarded boys by using prompts, instruction and positive reinforcement. Social learning techniques have also been implemented with this population. Nelson, Gibson and Cutting (1973) compared modeling, instruction and feedback and a combination of the two procedures, and found that the combination was most effective in increasing social behavior in a mildly mentally retarded child.

Social Skills in Mentally Retarded Children with ADHD

There have been no studies specifically addressing social skills in this population. However, a number of studies have evaluated social skills when addressing treatment effectiveness. Handen et al. (1992) found that methylphenidate did not produce any differences in social behavior, including rough and tumble play and peer interactions.

The current study examined social skills in mentally retarded children with ADHD symptoms. By doing so, this study added to the preliminary results obtained by Fee et al. (1994) by providing further comparisons of normal IQ and mentally retarded children with ADHD symptoms. Fee et al. (1994) found that normal IQ children with ADHD differed from mentally retarded children with ADHD only on the Asocial factor of the Conners Teacher Rating Scale-Revised (CTRS-R). Normal IQ
children with ADHD had a higher mean score on this factor than mentally retarded children with and without ADHD, suggesting that normal IQ children with ADHD had more social skills difficulties. This finding is interesting, given that one of the diagnostic criteria for mental retardation is deficiencies in adaptive behavior, which encompasses excesses and deficits in social behavior (Reschly & Gresham, 1988). Nevertheless, researchers have found that normal IQ children with ADHD tend to have social skills problems (deHaas, 1986; Johnson, Pelham & Murphy, 1985).

Given the results of the Fee, et al. (1994) study, there are questions which may be considered. Only five items comprised the CTRS-R Asocial factor. Therefore it is premature to draw any definite conclusions about differences in social skills, as the domain needs to be sampled more extensively. Although Fee et al. (1994) found a significant difference between normal IQ and mentally retarded subjects with ADHD symptoms, it is unclear as to whether or not there is a specific domain of social skills the groups differ on. For example, children in one group may have deficits in certain types of prosocial behaviors. Alternatively, the children may demonstrate behavior problems which may interfere with appropriate social behaviors. To ensure the domain of social skills was adequately sampled the current study utilized two standardized social skills rating scales.

The Fee et al. (1994) study raises several questions with mentally retarded subjects, as well. Given that mentally retarded children are characterized by social skills difficulties, it is not clear as to how the social skills of mentally retarded children
with ADHD symptoms differ from those of mentally retarded children without ADHD symptoms. Fee et al. (1994) reported no significant differences between these two groups on the CPRS-R Asocial factor. However, rating scales utilizing more detailed descriptions of social skills may reveal more subtle types of social behaviors these groups differ on. In addition, many children with ADHD are receiving treatment for their behaviors. Fee et al. (1994) excluded children being treated with medication. But if mentally retarded children with ADHD symptoms are being treated for their behaviors, this treatment may have a positive impact on their social behaviors. To address this issue, the current study included both mentally retarded and normal IQ children taking medication for their ADHD symptoms. By using a more inclusive sample and detailed social skills checklists it was intended to evaluate the single construct that differentiated the normal IQ and mentally retarded ADHD groups, and thereby add to the growing literature base on assessment of mentally retarded children with ADHD.

One purpose of the present study was to address the question of whether or not ADHD symptoms affect social skills. This was done by obtaining factor scores on social skills measures and comparing those of normal IQ subjects with and without ADHD symptoms. The same was done for mentally retarded subjects with and without ADHD symptoms. It was hypothesized that for normal IQ and mentally retarded subjects with ADHD symptoms, factor scores measuring positive social behaviors would be significantly lower than subjects without ADHD symptoms and
factor scores measuring negative social behaviors would be significantly higher than subjects without ADHD symptoms.

The current study also evaluated differences in social skills of normal IQ children and those of mentally retarded children. Factor scores of normal IQ children without ADHD symptoms were compared to those of normal IQ children without ADHD symptoms. It was hypothesized that normal IQ children would score significantly higher than mentally retarded children on factor scores measuring positive social behaviors and significantly higher on factor scores measuring negative social behaviors.

The present study evaluated differences in social skills of normal IQ subjects with ADHD symptoms and mentally retarded subjects with ADHD symptoms. Factor scores of both subject groups were compared. It was hypothesized that normal IQ subjects with ADHD symptoms would score higher on factor scores measuring positive social behaviors and lower on factor scores measuring negative social behaviors.

This study addressed the question of how medication affected the social skills of subjects with ADHD symptoms. Medicated normal IQ subjects were compared to normal IQ subjects with ADHD symptoms. The same was done for mentally retarded subjects. It was hypothesized that for normal IQ and mentally retarded subjects, factor scores of medicated children would be significantly higher than subjects with
ADHD symptoms on factors measuring positive social behaviors and factor scores measuring negative social behaviors would be significantly lower.
METHOD

Subjects

One hundred forty-five males ages 6 to 11 years from South Louisiana were studied. Males were only included in the study because reported prevalence rates for males diagnosed with ADHD are significantly higher (approximately 3 to 6 males for every female).

Subjects were recruited through regular and special education classrooms in public elementary schools. A parent consent form (See Appendix A) and a background information form (See Appendix B) were sent home with each child. Approximately 40% consent forms were returned signed by a parent with the background information form completed. Approximately 74% of the children returning signed consent forms qualified for inclusion in the study.

Subjects were divided into groups so that comparisons could be made between mentally retarded children and normal IQ comparison subjects, children with and without ADHD symptoms, and children with ADHD who were medicated and unmedicated. These groups were included to determine the effects of intelligence, activity level, and medication on social skills. To assign group membership, children were assessed for mental retardation and ADHD symptoms.

With regards to mental retardation, full-scale IQ scores were obtained using the Wechsler Intelligence Scales for Children - Revised (Wechsler, 1974) or the Wechsler Intelligence Scales for Children - Third Edition (Wechsler, 1991). Adaptive
behavior scores using the Vineland Adaptive Behavior Scales - Classroom Edition were also derived. If scores from previously administered IQ and adaptive behavior measures were available, they were utilized.

With regards to ADHD symptoms, scores from the ADHD Rating Scale (See Appendix C) were used to determine whether children met DSM-III-R criteria for ADHD, using the cutoff criteria as described by DuPaul (1990). If the child was taking medication for behavior problems, the teacher completed an ADHD checklist for when the child was taking the medication and when the child was not taking the medication. Teachers were specifically asked to consider the child’s behavior before the medication was prescribed and when the medication was wearing off (e.g. immediately before the child’s next dose). This procedure was followed to control for the effects of medication on ADHD symptoms. Children were included if they met DSM-III-R criteria for ADHD when they were not taking medication.

Sample size was determined by power analysis, according to Kirk (1982). A medium effect size was selected for power analysis; this is in accordance with previous studies evaluating assessment of mentally retarded children with ADHD (e.g. Fee, et al., 1993; Fee, et al., 1994). Using an alpha value of .05 and an effect size of .50, 25 subjects per group was deemed sufficient for a power value of .80.

To control for the effects of age and IQ test subjects were matched according to age (# years) and IQ test administered (WISC-R or WISC-III). Subjects were then
assigned to groups based on scores from the ADHD Rating Scale and the IQ and adaptive behavior scores. The following groups were included in this study:

**Normal IQ Comparison Subjects (n = 25).** A comparison group of normal IQ children without ADHD symptoms was included in the study. The mean age for subjects in this group was 109.76 months, and the standard deviation was 17.08 months. Racial backgrounds of these subjects included 14 Whites, 10 African-Americans, and 1 Asian. These subjects received IQ (as measured by the WISC-R or WISC-III) and adaptive behavior scores (as measured by the Vineland Adaptive Behavior Scales-Classroom Edition) above the cut-off for mental retardation (mean IQ: 102.30; standard deviation: 10.72; mean adaptive behavior score: 102.76; standard deviation: 17.22). Children in this group were rated positively on fewer than 8 symptoms on the ADHD Rating Scale (mean # items endorsed: 1.40; standard deviation: 2.29).

**Normal IQ High-Activity-Level (n = 24).** The mean age for subjects in this group was 110.13 months, and the standard deviation was 17.06 months. Racial backgrounds of these subjects included 14 Whites and 10 African-Americans. IQ scores of children in this group were above the cutoff for mental retardation (as measured by the WISC-R or WISC-III), as were adaptive behavior scores (as measured by the Vineland Adaptive Behavior Scales-Classroom Edition) (mean IQ: 88.19; standard deviation: 13.68; mean adaptive behavior score: 86.04; standard deviation: 11.09). These children received positive ratings on 8 or more symptoms
of the ADHD Rating Scale (mean # items endorsed: 11.50; standard deviation: 2.11).

**Normal IQ Medicated (n = 24).** The mean age for subjects in this group was 107.79 months, and the standard deviation was 17.76 months. Racial backgrounds of these subjects included 18 Whites and 6 African-Americans. These children had IQ (measured by the WISC-R or WISC-III) and adaptive behavior scores (measured by the Vineland Adaptive Behavior Scales-Classroom Edition) above the cutoff for mental retardation (mean IQ: 89.90; standard deviation: 10.85; mean adaptive behavior score: 87.58; standard deviation: 14.11). Parents indicated that these children were taking medication for behavior problems and the children were rated positively on 8 or more symptoms on the ADHD Rating Scale (mean # items endorsed when off medication: 12.50; standard deviation: 1.91; mean # items endorsed when on medication: 6.33; standard deviation: 4.96).

**Mentally Retarded Comparison Subjects (n = 24).** The mean age for subjects in this group was 110.46 months, and the standard deviation was 17.28 months. Racial backgrounds of subjects included 6 Whites and 18 African-Americans. Subjects in this group received IQ estimates at least two standard deviations below the mean on the WISC-R or WISC-III. Scores of these subjects were within the mild to moderate ranges of mental retardation (mean IQ: 53.77; standard deviation: 11.11). Additionally, these subjects received adaptive behavior scores at least two standard deviations below the mean on the Vineland Adaptive Behavior Scales-
Classroom Edition (mean adaptive behavior score: 62.92; standard deviation: 9.11). Children in this group were rated positively on fewer than 8 symptoms listed on the ADHD Rating Scale (mean # items endorsed: 3.50; standard deviation: 2.52).

**Mentally Retarded High-Activity-Level (n = 23).** The mean age for subjects in this group was 106.74 months, and the standard deviation was 14.23 months. Racial backgrounds of these subjects included 6 Whites and 17 African-Americans. Subjects in this group received IQ estimates at least two standard deviations below the mean on the WISC-R or WISC-III. Scores of these subjects were within the mild to moderate ranges of mental retardation (mean IQ: 47.63; standard deviation: 8.64). These children received adaptive behavior scores at least two standard deviations below the mean on the Vineland Adaptive Behavior Scales-Classroom Edition (mean adaptive behavior score: 59.61; standard deviation: 7.64). Children in this group were rated positively on 8 or more of the symptoms listed on the ADHD Rating Scale (mean # items endorsed: 10.70; standard deviation: 2.84).

**Mentally Retarded Medicated (n = 25).** The mean age for subjects in this group was 109.44 months, and the standard deviation was 18.00 months. Racial background of these subjects included 13 Whites and 12 African-Americans. These children received IQ estimates at least two standard deviations below the mean on the WISC-R or WISC-III, within the mild to moderate ranges of mental retardation (mean IQ: 50.63; standard deviation: 10.21). Adaptive behavior scores were at least two standard deviations below the mean on the Vineland Adaptive Behavior
Scales-Classroom Edition (mean adaptive behavior score: 61.64; standard deviation: 7.19). Parents indicated that these children were taking medication for behavior problems, and they were rated positively on 8 or more of the symptoms listed on the ADHD Rating Scale (mean # items endorsed when off medication: 11.52; standard deviation: 2.24; mean # items endorsed when on medication: 6.16; standard deviation: 4.15).

Assessment

Background Information Form. This instrument was completed by the parents and returned with the consent form. Information obtained included date of birth, gender, whether the child was diagnosed with ADHD or mental retardation, who provided this diagnosis, and whether the child was taking any medication. If the child was taking medication, information about type, dosage, and duration was obtained.

ADHD Rating Scale. This instrument was designed by DuPaul (1990) to assess DSM-III-R (American Psychiatric Association, 1987) symptoms of ADHD. The scale has 14 items, which are rated on a Likert scale from 0 to 3. A cutoff point of 8 out of 14 items endorsed was established, which matches the criteria recommended by DSM-III-R. Three scores are calculated: total score, Inattention-Restlessness, and Impulsivity-Hyperactivity. Test-retest reliability over a 2-week period was reported to be .93 (DuPaul, 1990) and the measure correlates significantly with direct observations of classroom behavior (DuPaul, 1990). The ADHD Rating
Scale has been shown to discriminate ADHD children from learning-disabled and normal IQ children (Barkley, DuPaul, & McMurray, 1990).

**Matson Evaluation of Social Skills in Youngsters (MESSY).** The MESSY is a rating scale designed to assess social behavior in children (Matson, et al., 1983). This instrument has a 62-item self-report form and a 64-item parent/teacher form. Items are rated on a Likert scale from 1 to 5. The MESSY is presented in Appendix D. The normative sample for the MESSY consisted of children ages 4 to 18; the self-report version was completed by 422 children and the teacher report version was completed by 322 teachers. Factor analysis of this instrument produced 5 factors for the self-report version (Appropriate Social Skill, Inappropriate Assertiveness, Impulsive/Recalcitrant, Overconfident, and Jealousy/Withdrawal) and 2 factors for the parent/teacher report version (Inappropriate Assertiveness/Impulsiveness, Appropriate Social Skills). Items comprising factors for the parent/teacher version are presented in Figure 2. Two-week test-retest reliability measures of .50 (self-report) and .55 (teacher/parent-report) were obtained. The MESSY successfully identifies social skills deficits in a number of populations, including deaf and hearing-impaired children (Macklin & Matson, 1985; Matson, Macklin and Helsel, 1985; Raymond & Matson, 1989), autistic children (Matson, Compton & Sevin, 1991), psychiatric inpatients (Kazdin, Matson & Esveldt-Dawson, 1984), depressed children (Helsel & Matson, 1984), and visually-impaired children (Matson, Heinze, Helsel, Kapperman & Rotatori, 1986).
<table>
<thead>
<tr>
<th>Inappropriate Assertiveness/Impulsiveness</th>
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<tbody>
<tr>
<td>2. Threatens people or acts like a bully</td>
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<tr>
<td>3. Becomes angry easily</td>
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<tr>
<td>4. Is brassy (talks people what to do instead of asking)</td>
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<tr>
<td>5. Grabs or complains often</td>
</tr>
<tr>
<td>6. Speaks (breaks in) when someone else is speaking</td>
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<tr>
<td>7. Takes or uses things that are not his/hers without permission</td>
</tr>
<tr>
<td>8. Brags about self</td>
</tr>
<tr>
<td>9. Slaps or hits when angry</td>
</tr>
<tr>
<td>10. Gives other children dirty looks</td>
</tr>
<tr>
<td>11. Feels angry or jealous when someone else does well</td>
</tr>
<tr>
<td>12. Picks out other children's faults/mistakes</td>
</tr>
<tr>
<td>13. Always wants to be first</td>
</tr>
<tr>
<td>14. Breaks promises</td>
</tr>
<tr>
<td>15. Lies to get what he/she wants</td>
</tr>
<tr>
<td>16. Makes fun of others</td>
</tr>
<tr>
<td>17. Blames others for their own problems</td>
</tr>
<tr>
<td>18. Thinks he/she knows it all</td>
</tr>
<tr>
<td>19. Is stubborn</td>
</tr>
<tr>
<td>20. Acts as if he/she is better than others</td>
</tr>
<tr>
<td>21. Shows feelings</td>
</tr>
<tr>
<td>22. Thinks people are picking on him/her when they are not</td>
</tr>
<tr>
<td>23. Makes sounds that bother others (e.g. burping, sniffing)</td>
</tr>
<tr>
<td>24. Speaks too loudly</td>
</tr>
<tr>
<td>25. Defends self</td>
</tr>
<tr>
<td>26. Always thinks something bad is going to happen</td>
</tr>
<tr>
<td>27. Tries to be better than everyone else</td>
</tr>
<tr>
<td>28. Gets upset when he/she has to wait for things</td>
</tr>
<tr>
<td>29. Likes to be the leader</td>
</tr>
<tr>
<td>30. Gets into fights a lot</td>
</tr>
<tr>
<td>31. Is jealous of other people</td>
</tr>
<tr>
<td>32. Tries to get others to do what he/she wants</td>
</tr>
<tr>
<td>33. Stays with others too long (wears out welcome)</td>
</tr>
<tr>
<td>34. Explains things more than necessary</td>
</tr>
<tr>
<td>35. Hurts others to get what he/she wants</td>
</tr>
<tr>
<td>36. Talks a lot about problems or worries</td>
</tr>
<tr>
<td>37. Feels that winning is everything</td>
</tr>
<tr>
<td>38. Hurts others' feelings when teasing them</td>
</tr>
<tr>
<td>39. Wants to get even with someone who hurts him/her</td>
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</tbody>
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<table>
<thead>
<tr>
<th>Aggressive Social Skills</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Makes other people laugh (tells jokes, funny stories, etc.)</td>
</tr>
<tr>
<td>10. Helps a friend who is hurt</td>
</tr>
<tr>
<td>18. Walks up to people and starts a conversation</td>
</tr>
<tr>
<td>19. Says &quot;thank you&quot; and is happy when someone does something for him/her</td>
</tr>
<tr>
<td>25. Sticks up for friends</td>
</tr>
<tr>
<td>26. Looks at people when they are speaking</td>
</tr>
<tr>
<td>28. Smiles at people he/she knows</td>
</tr>
<tr>
<td>33. Thinks good things are going to happen</td>
</tr>
<tr>
<td>34. Works well on a team</td>
</tr>
<tr>
<td>37. Takes care of others' property as if it were his/her own</td>
</tr>
<tr>
<td>39. Calls people by their names</td>
</tr>
<tr>
<td>40. Asks if he/she can be of help</td>
</tr>
<tr>
<td>41. Feels good if he/she helps others</td>
</tr>
<tr>
<td>45. Asks questions when talking to others</td>
</tr>
<tr>
<td>47. Feels sorry when he/she hurts others</td>
</tr>
<tr>
<td>50. Joins in games with other children</td>
</tr>
<tr>
<td>51. Plays by the rules of a game</td>
</tr>
<tr>
<td>54. Does nice things for others who are nice to him/her</td>
</tr>
<tr>
<td>56. Asks others how they are, what they have been doing, etc.</td>
</tr>
<tr>
<td>59. Is friendly to new people he/she meets</td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Miscellaneous Items</th>
</tr>
</thead>
<tbody>
<tr>
<td>20. Is afraid to speak to people</td>
</tr>
<tr>
<td>46. Feels lonely</td>
</tr>
</tbody>
</table>

Figure 2. MESSY Factors.
Social Skills Rating System (SSRS). The SSRS is a measure comprising a group of subscales designed to assess social skills, problem behaviors, and academic competence (Gresham & Elliott, 1990). In this study, the social skills and problem behaviors subscales were utilized. This instrument has self-report and parent/teacher report versions, in which the frequency and importance of each item (delineating a particular social skill or problem behavior) are rated on a Likert scale from 1 to 3. Data for the normative sample for the self-report SSRS were collected on 4,170 children and adolescents, and data for the teacher-report SSRS were collected on 1,264 teachers. Internal consistency estimates (coefficient alpha) ranged from .83 to .94 (Gresham & Elliott, 1990). Factor analysis produced 4 factors for the self-report form (Cooperation, Assertion, Responsibility, Self-Control) and 4 factors for the parent/teacher report form (Cooperation, Assertion, Empathy, Self-Control) (Gresham & Elliott, 1990). This measure identifies social skills problems in children who are mentally retarded, behavior disordered, and learning disabled (Gresham, et al., 1987). Items comprising factors for the parent/teacher form are presented in Figure 3.

Procedure

For each child who returned a signed consent form, teachers completed an ADHD Rating Scale (DuPaul, 1990), the Vineland Adaptive Behavior Scale-Classroom Edition (Sparrow, Balla & Cicchetti, 1985), the SSRS - Teacher Form (Gresham & Elliott, 1990), and the MESSY - Teacher Form (Matson, Rotatori &
Figure 3. SSRS Factors.
Helsel, 1983). Teachers were paid ten dollars for each set of questionnaires completed.
RESULTS

Demographic Characteristics

Demographic characteristics for subject groups, including age, race, Vineland Adaptive Behavior Scales score, IQ score, ADHD Rating Scale scores, classroom type, teacher sex, and teacher race, are presented in Table 1.

There were no significant differences between the groups regarding age. There was a significant difference between groups on race [χ²(5) = 18.61, p < .002]. Subsequent data should therefore be interpreted in light of this finding, as the different racial compositions of the groups may have contributed to significant differences in mean scores. Because race is a nominal variable and the dependent variables (MESSY and SSRS total and factor scores) are continuous, a non-parametric procedure would be appropriate for evaluating the effects of race on the dependent variables. See Appendix E for Point-Biserial Correlations between race and MESSY and SSRS total and factor scores.

Reliability of Diagnosis

To ensure that subjects' levels of ADHD symptoms were reliably measured by the teachers, teachers' aides completed the ADHD checklist for 30 subjects. For unmedicated children, the aides completed one ADHD checklist. For medicated children, the aides completed an ADHD checklist for when the children were taking the medication and another ADHD checklist for when the children were not taking the medication or when the medication was wearing off. The Pearson Product
Table 1. Demographic Characteristics for Subjects by Group.

<table>
<thead>
<tr>
<th></th>
<th>Normal IQ</th>
<th>Normal IQ</th>
<th>Normal IQ</th>
<th>MR</th>
<th>MR</th>
<th>MR</th>
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</thead>
<tbody>
<tr>
<td>Age (Months)</td>
<td>Comparison</td>
<td>HAL</td>
<td>HAL</td>
<td>Med</td>
<td>HAL</td>
<td>HAL</td>
</tr>
<tr>
<td>M</td>
<td>109.76</td>
<td>110.13</td>
<td>107.79</td>
<td>110.46</td>
<td>106.74</td>
<td>109.44</td>
</tr>
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<td>SD</td>
<td>17.08</td>
<td>17.66</td>
<td>17.76</td>
<td>17.28</td>
<td>14.23</td>
<td>18.00</td>
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<tr>
<td>Race</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>White (%)</td>
<td>56</td>
<td>58</td>
<td>76</td>
<td>25</td>
<td>29</td>
<td>52</td>
</tr>
<tr>
<td>African-American (%)</td>
<td>40</td>
<td>42</td>
<td>24</td>
<td>75</td>
<td>71</td>
<td>48</td>
</tr>
<tr>
<td>Asian-American (%)</td>
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<td>0</td>
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<td>Vinelyand Score</td>
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<tr>
<td>M</td>
<td>102.76</td>
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<td>59.79</td>
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<td>M</td>
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<td>10.85</td>
<td>11.11</td>
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<td>ADHD Rating Scale</td>
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<td>Off medication</td>
<td></td>
<td></td>
<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>1.40</td>
<td>1.50</td>
<td>1.92</td>
<td>3.50</td>
<td>11.13</td>
<td>11.52</td>
</tr>
<tr>
<td>SD</td>
<td>2.29</td>
<td>2.11</td>
<td>2.72</td>
<td>2.52</td>
<td>4.60</td>
<td>2.24</td>
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<td>On medication</td>
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<td>M</td>
<td>6.08</td>
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<tr>
<td>SD</td>
<td></td>
<td></td>
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<td>Classroom Type</td>
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<tr>
<td>Regular Ed (%)</td>
<td>100</td>
<td>54</td>
<td>68</td>
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<td>0</td>
<td>12</td>
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<tr>
<td>Resource (%)</td>
<td>0</td>
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<td>16</td>
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<td>20</td>
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<tr>
<td>Self-Contained (%)</td>
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<td>17</td>
<td>16</td>
<td>88</td>
<td>96</td>
<td>68</td>
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<tr>
<td>Teacher Sex</td>
<td></td>
<td></td>
<td></td>
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<tr>
<td>Female (%)</td>
<td>100</td>
<td>100</td>
<td>100</td>
<td>96</td>
<td>83</td>
<td>96</td>
</tr>
<tr>
<td>Male (%)</td>
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<td>0</td>
<td>4</td>
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<td></td>
<td></td>
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<tr>
<td>White (%)</td>
<td>92</td>
<td>87</td>
<td>88</td>
<td>79</td>
<td>79</td>
<td>68</td>
</tr>
<tr>
<td>African-American (%)</td>
<td>8</td>
<td>13</td>
<td>12</td>
<td>21</td>
<td>21</td>
<td>32</td>
</tr>
</tbody>
</table>

Note. MR = mentally retarded; HAL = high-activity-level; Med = medicated; No Med = unmedicated.
Moment Correlation was used to examine the association between teacher and teacher’s aide ratings. A correlation of .87 was found. Within this subsample, 25 of 30 students were similarly classified by their teacher and the teachers’ aides.

**Equivalence of ADHD Symptoms**

Groups in this study consisted of high-activity-level subjects, as well as medicated subjects rated on and off medication. Statistical analyses were performed to determine if the level of ADHD symptoms endorsed for high-activity-level subjects and medicated subjects when off medication were comparable. For normal IQ and mentally retarded subjects, one-way analyses of variance (ANOVAs) were performed to compare number of items endorsed on the ADHD checklist for unmedicated subjects and medicated subjects rated when they were off medication. With regard to normal IQ subjects, the mean number of items endorsed for high-activity-level subjects (*M* = 11.50) was not significantly different from medicated subjects off medication (*M* = 12.50). For mentally retarded subjects, the mean number of items endorsed for high-activity-level subjects (*M* = 11.13) was not significantly different from medicated subjects off medication (*M* = 11.52). The levels of ADHD symptoms endorsed for high-activity-level subjects and medicated subjects when off medication are similar.

**Medication Effectiveness**

To determine the effectiveness of medication in reducing ADHD symptoms, two one-way ANOVAs were performed on number of items endorsed on the ADHD
checklist for medicated normal IQ and mentally retarded subjects, both when they were taking medication and when they were off their medication. Significant differences were found for normal IQ children, as fewer items on the ADHD checklist were endorsed when subjects were on medication (mean number of items: 6.33) than when subjects were off medication (mean number of items: 12.50) \(F(1,46) = 32.33, p<.0001\). Results were similar for mentally retarded children; again, fewer items on the ADHD checklist were endorsed when subjects were on medication (mean number of items: 6.30) than when subjects were off medication (mean number of items: 11.52) \(F(1,46) = 28.66, p<.0001\).

Differences Between Groups

Total Scores. To determine if subject groups differed in level of social skills and problem behaviors, a one-way multivariate analysis of variance (MANOVA) was performed on total scores for the MESSY and SSRS. A significant multivariate effect emerged \(F(5,139) = 9.30, p<.0001\). Follow-up ANOVAs were then performed on each total score to determine which were significant. A Bonferroni correction (.05/2 = .025) was used to control for the experiment-wise error rate. Significant differences between groups were analyzed with pairwise comparisons using the Tukey method \(p<.05\). Means and standard deviations for total scores are presented in Table 2.

A significant main effect of group emerged for the MESSY total score. High-activity-level normal IQ (mean score: 168.04) and mentally retarded (mean score:}
Table 2. Means and Standard Deviations for Dependent Measures.

<table>
<thead>
<tr>
<th>Measure</th>
<th>Normal IQ Comparison</th>
<th>Normal IQ HAL No Med</th>
<th>Normal IQ HAL Med</th>
<th>MR Comparison</th>
<th>MR HAL No Med</th>
<th>MR HAL Med</th>
<th>Comments Between Means</th>
</tr>
</thead>
<tbody>
<tr>
<td>MESSY</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td>110.38(22.29)</td>
<td>168.04(38.63)</td>
<td>159.58(30.74)</td>
<td>139.42(23.04)</td>
<td>179.21(36.15)</td>
<td>154.60(33.80)</td>
<td>1 &lt; 2,4,5,6*</td>
</tr>
<tr>
<td>Inappropriate Assertiveness</td>
<td>62.04(18.01)</td>
<td>108.67(33.13)</td>
<td>100.13(27.44)</td>
<td>75.71(18.70)</td>
<td>108.65(30.02)</td>
<td>87.88(32.51)</td>
<td>1 &lt; 2,3,**</td>
</tr>
<tr>
<td>Appropriate Social Skills</td>
<td>74.24(13.37)</td>
<td>63.96(15.91)</td>
<td>64.79(12.00)</td>
<td>60.83(13.70)</td>
<td>54.39(11.54)</td>
<td>57.08(13.14)</td>
<td>1 &gt; 4,5,**</td>
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<tr>
<td>SSRS</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total Score</td>
<td>53.84 (6.54)</td>
<td>48.79 (7.23)</td>
<td>49.46 (10.03)</td>
<td>43.96 (8.33)</td>
<td>45.4 (7.33)</td>
<td>43.72 (9.14)</td>
<td>1 &gt; 4,5,**</td>
</tr>
<tr>
<td>Cooperation</td>
<td>17.20 (3.22)</td>
<td>9.58 (3.36)</td>
<td>11.79 (4.24)</td>
<td>11.92 (4.60)</td>
<td>7.91 (1.91)</td>
<td>9.32 (4.19)</td>
<td>1 &gt; 3,4,5,**</td>
</tr>
<tr>
<td>Assertion</td>
<td>14.12 (4.54)</td>
<td>11.96 (3.73)</td>
<td>11.25 (3.97)</td>
<td>8.67 (4.41)</td>
<td>8.09 (3.59)</td>
<td>7.72 (4.13)</td>
<td>1 &gt; 4,5,**</td>
</tr>
<tr>
<td>Self-Control</td>
<td>16.40 (2.32)</td>
<td>9.63 (2.93)</td>
<td>10.25 (4.17)</td>
<td>11.25 (2.01)</td>
<td>8.57 (3.06)</td>
<td>9.68 (3.68)</td>
<td>1 &gt; 3,4,5,**</td>
</tr>
<tr>
<td>Externalizing Problems</td>
<td>88 (4.42)</td>
<td>5.79 (3.41)</td>
<td>4.42 (2.48)</td>
<td>3.38 (2.65)</td>
<td>6.61 (3.47)</td>
<td>4.80 (2.14)</td>
<td>1 &lt; 2,3,4,5,**</td>
</tr>
<tr>
<td>Internalizing Problems</td>
<td>2.68 (3.12)</td>
<td>4.00 (2.99)</td>
<td>4.96 (2.48)</td>
<td>3.96 (2.54)</td>
<td>4.91 (2.76)</td>
<td>4.16 (2.64)</td>
<td>1 &lt; 2,3,4,5,**</td>
</tr>
<tr>
<td>Hyperactivity</td>
<td>2.56 (2.47)</td>
<td>7.83 (2.24)</td>
<td>6.79 (2.38)</td>
<td>4.88 (2.29)</td>
<td>9.25 (1.97)</td>
<td>8.04 (2.46)</td>
<td>1 &lt; 2,3,4,5,**</td>
</tr>
</tbody>
</table>

Note. MR = mentally retarded, HAL = high-acuity level; Med = medicated; No Med = unmedicated; M = mean; SD = standard deviation.

** p < .006

* p < .025
178.22) subjects scored significantly higher than normal IQ (mean score: 110.88) and mentally retarded (mean score: 139.42) comparison subjects \[F(5,139) = 14.18, \quad p<.0001\]. A significant main effect of group was also found for the SSRS total score. Normal IQ comparison subjects (mean score: 53.84) scored significantly higher than all mentally retarded subjects (mean scores: mentally retarded comparison subjects, 43.96; high-activity-level mentally retarded, 45.43; medicated mentally retarded, 43.72) \[F(5,139) = 5.66, \quad p<.0001\].

**Factor Scores.** Eight one-way ANOVAs were run on MESSY and SSRS factor scores to determine differences between groups on specific dimensions of social skills and problem behaviors. Given the large number of comparisons, the Bonferroni correction (.05/8=.006) was used to decrease the experiment-wise error rate. Significant differences between groups were analyzed with pairwise comparisons using the Tukey method \(p<.05\). Means and standard deviations for MESSY and SSRS factor scores are presented in Table 2.

Significant differences were found between groups on both MESSY factors. On the Inappropriate Assertiveness/Impulsiveness factor, normal IQ comparison subjects (mean score: 62.04) scored significantly lower than medicated (mean score: 100.13) and high-activity-level normal IQ (mean score: 108.67) subjects, as well as high-activity-level (mean score: 108.65) and medicated (mean score: 87.88) mentally retarded subjects \[F(5,139) = 10.73, \quad p<.0001\]. Mentally retarded comparison subjects (mean score: 75.71) scored significantly lower than high-activity-level...
normal IQ, high-activity-level mentally retarded, and medicated mentally retarded subjects. On the Appropriate Social Skills factor, normal IQ comparison subjects (mean score: 74.24) scored significantly higher than mentally retarded comparison subjects (mean score: 60.83), as well as medicated (mean score: 57.08) and high-activity-level (mean score: 54.39) mentally retarded subjects \[F(5,139) = 5.96, p<.0001\].

Significant differences between groups were found on five of the six SSRS factors. On the Cooperation factor, normal IQ comparison subjects (mean score: 17.20) scored significantly higher than medicated (mean score: 11.79) and high-activity-level (mean score: 6.58) normal IQ subjects, as well as all mentally retarded subjects (mean scores: mentally retarded comparison subjects, 11.92; high-activity-level mentally retarded, 7.91; medicated mentally retarded, 9.32) \[F(5,139) = 18.05, p<.0001\]. High-activity-level mentally retarded subjects scored significantly lower than mentally retarded comparison subjects and normal IQ medicated subjects. On the Assertion factor, normal IQ comparison subjects (mean score: 14.12) scored significantly higher than all mentally retarded subjects (mean scores: mentally retarded comparison subjects, 8.67; high-activity-level mentally retarded, 8.09; medicated mentally retarded, 7.72) \[F(5,139) = 9.61, p<.0001\]. High-activity-level normal IQ subjects (mean score: 11.96) scored significantly higher than medicated and high-activity-level mentally retarded subjects. Medicated normal IQ subjects (mean score: 11.25) scored significantly higher than medicated mentally retarded
subjects. On the Self-Control factor, normal IQ comparison subjects (mean score: 16.40) scored significantly higher than medicated (mean score: 9.63) and high-activity-level (mean score: 10.25) normal IQ subjects, as well as all mentally retarded subjects (mean scores: mentally retarded comparison subjects, 11.25; high-activity-level mentally retarded, 8.57; medicated mentally retarded, 9.68) \[ F(5, 139) = 15.30, \ p < .0001 \]. On the Externalizing Problems factor, normal IQ comparison subjects (mean score: .88) scored significantly lower than medicated (mean score: 4.42) and high-activity-level (mean score: 5.79) normal IQ subjects, as well as all mentally retarded subjects (mean scores: mentally retarded comparison subjects, 3.38; high-activity-level mentally retarded, 6.61; medicated mentally retarded, 4.80) \[ F(5, 139) = 12.04, \ p < .0001 \]. Mentally retarded comparison subjects (mean score: 3.38) scored significantly lower than high-activity-level normal IQ and mentally retarded subjects. On the Hyperactivity factor, normal IQ comparison subjects (mean score: 2.56) scored significantly lower than medicated (mean score: 6.79) and high-activity-level (mean score: 7.83) normal IQ subjects, as well as all mentally retarded subjects (mean scores: mentally retarded comparison subjects, 4.88; high-activity-level mentally retarded, 9.35; medicated mentally retarded, 8.04) \[ F(5, 139) = 27.78, \ p < .0001 \]. Mentally retarded comparison subjects scored significantly lower than high-activity-level normal IQ subjects, as well as medicated and high-activity-level mentally retarded subjects. Medicated normal IQ subjects scored significantly lower
than medicated mentally retarded subjects. No significant differences were found for the Internalizing Problems factor.

Significant differences in some of the SSRS factors are consistent with results obtained by Fee, et al. (1994). Using the Conner's Teacher Report Scale - Revised (CTRS-R), these researchers compared factor scores of normal IQ and mentally retarded children with ADHD symptoms to scores of normal IQ and mentally retarded comparison subjects without ADHD symptoms. Fee, et al. (1994) found that scores of subjects with ADHD symptoms (both normal IQ and mentally retarded) were significantly higher than scores of comparison subjects (both normal IQ and mentally retarded) on the CTRS-R Hyperactivity and Conduct Problems factors. In the present study, normal IQ and mentally retarded high-activity-level subjects scored significantly higher than normal IQ and mentally retarded comparison subjects on the SSRS Hyperactivity and Externalizing Problems factors, which contained items corresponding to those included in the CTRS-R Hyperactivity and Conduct Problems factors, respectively. In addition, significant differences in the MESSY Inappropriate Assertiveness/Impulsiveness factor were consistent with the results obtained by Fee, et al. (1994). Normal IQ and mentally retarded high-activity-level subjects obtained significantly higher mean scores than normal IQ and mentally retarded comparison subjects on this factor. This factor contains items corresponding to items on both the SSRS Hyperactivity and Conduct Problems factors, in which Fee, et al. (1994) obtained comparable results with similar subject groups. It should be noted, however,
that in the current study, mentally retarded comparison subjects scored significantly higher than normal IQ comparison subjects on the SSRS Hyperactivity, SSRS Externalizing Problems, and MESSY Inappropriate Assertiveness/Impulsiveness factors. In the Fee, et al. (1994) study, there were no significant differences in mean scores of mentally retarded comparison subjects and normal IQ comparison subjects on the CTRS-R Hyperactivity and Conduct Problem factors.

Classification. Discriminant analysis was conducted to determine whether the MESSY and SSRS factors could accurately classify subjects according to group. As indicated in Table 3, the SSRS Cooperation, SSRS Externalizing Problems, and SSRS Hyperactivity factors were able to correctly classify 48.28% of subjects according to group ($p < .00001$), compared to 16.6% that would be correctly classified by chance alone.

Item Analysis

A preliminary item analysis was conducted in order to provide a preliminary indication of which specific behaviors the groups differ on. Mean scores for each item of the MESSY and SSRS were derived for each subject group. Items with the five highest and five lowest mean scores were then obtained for each group. MESSY items for normal IQ subjects are presented in Table 4 and for mentally retarded subjects are presented in Table 5.

For both normal IQ and mentally retarded comparison groups, the highest mean items were from the Appropriate Social Skills factor and the lowest mean items
### Table 3. Discriminant Analysis Classification Table for Subjects by Group as Predicted by MESSY and SSRS Factors.

<table>
<thead>
<tr>
<th>Actual Group</th>
<th>Normal IQ Control</th>
<th>Normal IQ HAL/No Med</th>
<th>Normal IQ HAL/Med</th>
<th>MR Control</th>
<th>MR HAL/No Med</th>
<th>MR HAL/Med</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>N    %</td>
<td>N     %</td>
<td>N    %</td>
<td>N         %</td>
<td>N     %</td>
<td>N         %</td>
</tr>
<tr>
<td>Normal IQ/Control</td>
<td>18   72.0</td>
<td>0      0</td>
<td>2  8.0</td>
<td>5  20.0</td>
<td>0      0</td>
<td>0      0</td>
</tr>
<tr>
<td>Normal IQ/HAL/No Med</td>
<td>0      0</td>
<td>14    58.3</td>
<td>4  12.5</td>
<td>2  8.3</td>
<td>4    16.7</td>
<td>1    4.2</td>
</tr>
<tr>
<td>Normal IQ/HAL/Med</td>
<td>2 8.3</td>
<td>6 25.0</td>
<td>10 41.7</td>
<td>4 16.7</td>
<td>0      0</td>
<td>2    8.3</td>
</tr>
<tr>
<td>MR/Control</td>
<td>2  8.3</td>
<td>2  8.3</td>
<td>4  16.7</td>
<td>12  50.0</td>
<td>1  4.2</td>
<td>3    12.5</td>
</tr>
<tr>
<td>MR/HAL/No Med</td>
<td>0      0</td>
<td>6  26.1</td>
<td>1  4.3</td>
<td>1  4.3</td>
<td>9 39.1</td>
<td>6    26.1</td>
</tr>
<tr>
<td>MR/HAL/Med</td>
<td>0      0</td>
<td>2  8.0</td>
<td>3  12.0</td>
<td>6 24.0</td>
<td>7  28.0</td>
<td>7    28.0</td>
</tr>
</tbody>
</table>

**Note.** MR = mentally retarded; HAL = high-activity-level; Med = medicated; No Med = unmedicated.
Table 4. Highest and Lowest Mean MESSY Items for Normal IQ Subjects.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Item</th>
<th>Factor</th>
<th>Item</th>
<th>Factor</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td>Normal IQ Normal IQ Normal IQ</td>
<td>Comparison HAL H A L No Med</td>
<td>HAL HAL Med</td>
<td>No Med</td>
<td>HAL HAL Med</td>
<td>No Med</td>
</tr>
<tr>
<td>Factor</td>
<td>Item</td>
<td>Factor</td>
<td>Item</td>
<td>Factor</td>
<td>Item</td>
</tr>
<tr>
<td>Highest Mean Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASS</td>
<td>Plans by the rules of a game</td>
<td>ASS</td>
<td>Calls people by their names</td>
<td>ASS</td>
<td>Calls people by their names</td>
</tr>
<tr>
<td>ASS</td>
<td>Joins in games with others</td>
<td>IAI</td>
<td>Defends self</td>
<td>IAI</td>
<td>Defends self</td>
</tr>
<tr>
<td>ASS</td>
<td>Fears good if helps others</td>
<td>ASS</td>
<td>Sensitive to people he/she knows</td>
<td>ASS</td>
<td>Fears good if helps others</td>
</tr>
<tr>
<td>ASS</td>
<td>Calls people by their names</td>
<td>ASS</td>
<td>Joins in games with others</td>
<td>ASS</td>
<td>Joins in games with others</td>
</tr>
<tr>
<td>ASS</td>
<td>Works well on a team</td>
<td>IAI</td>
<td>Breaks in when someone is speaking</td>
<td>IAI</td>
<td>Likes to be the leader</td>
</tr>
<tr>
<td>Lowest Mean Items</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAI</td>
<td>Hurts others feelings on purpose</td>
<td>Misc</td>
<td>Afraid to speak to people</td>
<td>IAI</td>
<td>Acts as if he/she is better than others</td>
</tr>
<tr>
<td>IAI</td>
<td>Lies to get what he/she wants</td>
<td>IAI</td>
<td>Talks about problems/worries</td>
<td>IAI</td>
<td>Brags about self</td>
</tr>
<tr>
<td>IAI</td>
<td>Threatens people, acts like bully</td>
<td>IAI</td>
<td>Hurts others to get what he/she wants</td>
<td>Misc</td>
<td>Afraid to speak to people</td>
</tr>
<tr>
<td>IAI</td>
<td>Blames others for own problems</td>
<td>Misc</td>
<td>Feels lonely</td>
<td>IAI</td>
<td>Hurts others feelings on purpose</td>
</tr>
<tr>
<td>IAI</td>
<td>Sorts issues</td>
<td>IAI</td>
<td>wore out welcome</td>
<td>IAI</td>
<td>Talks about problems/worries</td>
</tr>
</tbody>
</table>

Note: MR = mentally retarded. HAL = high-activity-level; Med = medicated; No Med = unmedicated; IAI = Inappropriate Assertiveness/Impulsiveness Factor; ASS = Appropriate Social Skills Factor; Misc = Miscellaneous Items.
Table 5. Highest and Lowest Mean MESSY Items for Mentally Retarded Subjects.

<table>
<thead>
<tr>
<th>MR Comparison</th>
<th>MR HAL No Med</th>
<th>MR HAL Med</th>
</tr>
</thead>
<tbody>
<tr>
<td>Factor Item</td>
<td>Factor Item</td>
<td>Factor Item</td>
</tr>
<tr>
<td>Highest Mean Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>ASS Joins in games with others</td>
<td>IAI Is stubborn</td>
<td>ASS Calls people by their names</td>
</tr>
<tr>
<td>ASS Plays by rules of a game</td>
<td>ASS Smiles at people he/she knows</td>
<td>ASS Smiles at people he/she knows</td>
</tr>
<tr>
<td>ASS Feels good if helps others</td>
<td>IAI Shows feelings</td>
<td>ASS Helps a friend who is hurt</td>
</tr>
<tr>
<td>ASS Smiles at people he/she knows</td>
<td>ASS Calls people by their names</td>
<td>IAI Shows feelings</td>
</tr>
<tr>
<td>ASS Calls people by their names</td>
<td>IAI Likes to be the leader</td>
<td>ASS Feels good if helps others</td>
</tr>
<tr>
<td>Lowest Mean Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IAI Acts as if he/she is better than others</td>
<td>IAI Talks about problems/worries</td>
<td>IAI Acts as if he/she is better than others</td>
</tr>
<tr>
<td>IAI Hurts others to get what he/she wants</td>
<td>IAI Acts as if he/she is better than others</td>
<td>IAI Tries to be better than everyone else</td>
</tr>
<tr>
<td>IAI Brags about self</td>
<td>IAI Seeks something bad will happen</td>
<td>IAI Talks about problems/worries</td>
</tr>
<tr>
<td>IAI Thinks he/she knows it all</td>
<td>IAI Explains things more than necessary</td>
<td>IAI Brags too much when he/she wins</td>
</tr>
<tr>
<td>IAI Explains things more than necessary</td>
<td>IAI Brags about self</td>
<td>IAI Hurts others' feelings on purpose</td>
</tr>
</tbody>
</table>

Note: MR = mentally retarded, HAL = high-activity-level, Med = medicated, No Med = unmedicated, IAI = Inappropriate Assertiveness/Impulsiveness Factor, ASS = Appropriate Social Skills Factor
were from the Inappropriate Assertiveness/Impulsiveness factor. For high-activity-level mentally retarded and normal IQ subjects, highest mean items originated from both factors. The lowest mean items for high-activity-level mentally retarded subjects were exclusively from the Inappropriate Assertiveness/Impulsiveness factor. For the high-activity-level normal IQ subjects, however, two of the lowest mean items were from the Miscellaneous Items factor. These items described internalizing behaviors, including social anxiety and loneliness. There was a high degree of similarity between medicated and unmedicated high-activity-level normal IQ subjects, as three of the highest mean items from medicated subjects were the same as their unmedicated high-activity-level counterparts. With regard to mentally retarded subjects, medicated and unmedicated high-activity-level subjects had three of their highest mean items in common. The mentally retarded comparison group shared three of the highest mean items with the medicated mentally retarded group and three of the lowest mean items with the high-activity-level mentally retarded group. It appears that, for both normal IQ and mentally retarded comparison subjects, raters gave the highest ratings to appropriate social behaviors and the lowest ratings to inappropriate social behaviors. For high-activity-level and medicated normal IQ subjects, both appropriate and inappropriate behaviors received the highest ratings and inappropriate and internalizing social behaviors received the lowest ratings.

SSRS items for normal IQ subjects are presented in Table 6 and for mentally retarded subjects are presented in Table 7.
### Table 6. Highest and Lowest Mean SSRS Items for Normal IQ Subjects.

<table>
<thead>
<tr>
<th>Normal IQ Comparison</th>
<th>Normal IQ HAL</th>
<th>Normal IQ HAL</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>No Med</td>
<td>Med</td>
</tr>
<tr>
<td>Factor</td>
<td>Item</td>
<td>Factor</td>
</tr>
<tr>
<td>Highest Mean Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>SC</td>
<td>Cooperates with peers without prompts</td>
<td>HY</td>
</tr>
<tr>
<td>CO</td>
<td>Uses free time in acceptable way</td>
<td>AS</td>
</tr>
<tr>
<td>CO</td>
<td>Puts work materials away</td>
<td>AS</td>
</tr>
<tr>
<td>SC</td>
<td>Gets along with people who are different</td>
<td>AS</td>
</tr>
<tr>
<td>CO</td>
<td>Finishes assignments on time</td>
<td>HY</td>
</tr>
<tr>
<td>Lowest Mean Items</td>
<td></td>
<td></td>
</tr>
<tr>
<td>EX</td>
<td>Has temper tantrums</td>
<td>IN</td>
</tr>
<tr>
<td>EX</td>
<td>Talks back when corrected</td>
<td>CO</td>
</tr>
<tr>
<td>EX</td>
<td>Threatens/bullies others</td>
<td>EX</td>
</tr>
<tr>
<td>EX</td>
<td>Gets angry easily</td>
<td>IN</td>
</tr>
<tr>
<td>EX</td>
<td>Fights with others</td>
<td>IN</td>
</tr>
</tbody>
</table>

Table 7. Highest and Lowest Mean SSRS Items for Mentally Retarded Subjects.

<table>
<thead>
<tr>
<th>Factor</th>
<th>Item</th>
<th>Factor</th>
<th>Item</th>
<th>Factor</th>
<th>Item</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Highest Mean Items</td>
<td></td>
<td>Highest Mean Items</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR  Companion</td>
<td>HY Easily distracted</td>
<td>MR  HAL</td>
<td>HY Easily distracted</td>
<td>MR  Med</td>
<td>HY Easily distracted</td>
</tr>
<tr>
<td>SC</td>
<td>Gets along with people who are different</td>
<td>SC</td>
<td>Gets along with people who are different</td>
<td>SC</td>
<td>Gets along with people who are different</td>
</tr>
<tr>
<td>CO</td>
<td>Follows your direction</td>
<td>CO</td>
<td>Follows your direction</td>
<td>CO</td>
<td>Follows your direction</td>
</tr>
<tr>
<td>SC</td>
<td>Controls temper in conflicts with adults</td>
<td>SC</td>
<td>Controls temper in conflicts with peers</td>
<td>SC</td>
<td>Controls temper in conflicts with peers</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Lowest Mean Items</td>
<td></td>
<td>Lowest Mean Items</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MR  Companion</td>
<td>EX Gets angry easily</td>
<td>MR  HAL</td>
<td>EX Gets angry easily</td>
<td>MR  Med</td>
<td>EX Gets angry easily</td>
</tr>
<tr>
<td>EX</td>
<td>Has temper tantrums</td>
<td>AS</td>
<td>Appropriately questions unfair rules</td>
<td>SC</td>
<td>Compromises by changing ideas</td>
</tr>
<tr>
<td>AS</td>
<td>Appropriately questions unfair rules</td>
<td>AS</td>
<td>Appropriately questions unfair rules</td>
<td>AS</td>
<td>Appropriately questions unfair rules</td>
</tr>
<tr>
<td>IN</td>
<td>Shows anxiety about being with a group</td>
<td>AS</td>
<td>Introduces self without being told</td>
<td>AS</td>
<td>Says when has been treated unfairly</td>
</tr>
<tr>
<td>AS</td>
<td>Introduces self without being told</td>
<td>CO</td>
<td>Ignores distractions when doing work</td>
<td>CO</td>
<td>Ignores distractions when doing work</td>
</tr>
</tbody>
</table>

Note: MR = mentally retarded, HAL = high-activity-level, Med = medicated, No Med = unmedicated, CO = Cooperation Factor, AS = Assertion Factor, SC = Self-Control Factor, EX = Externalizing Problem Factor, IN = Internalizing Problem Factor, HY = Hyperactivity Factor.
For both mentally retarded and normal IQ comparison subjects, the highest mean items originated from the Cooperation and Self-Control factors. But for normal IQ comparison subjects, lowest mean items were exclusively from the Externalizing Problems factor, whereas for mentally retarded comparison subjects, lowest mean items were from the Externalizing Problems, Assertion, and Internalizing Problems factors. For high-activity-level mentally retarded subjects, the highest mean items originated solely from the Hyperactivity factor, whereas for high-activity-level normal IQ subjects, the highest mean items originated from the Hyperactivity and Assertion factors. For high-activity-level mentally retarded subjects, the lowest mean items were from the Cooperation, Self-Control, and Assertion factors, whereas for high-activity-level normal IQ subjects, the lowest mean items were from the Internalizing, Externalizing, and Cooperation factors. For normal IQ subjects, high-activity-level and medicated subjects shared three of the highest mean items endorsed; these consisted of behaviors from the Hyperactivity and Assertion factors. From these ratings, it appears that teachers tended to rate high-activity-level and normal IQ subjects highest in social skills and problem behaviors. For mentally retarded subjects, high-activity-level and medicated subjects shared four of the highest mean items endorsed, from the Hyperactivity factor, and they shared all five of the lowest mean items endorsed, from the Cooperation, Assertion and Self-Control factors. According to these ratings, it appears that teachers viewed high-activity-level and
medicated mentally retarded subjects similarly, assigning the majority of highest and lowest mean scores to the same items.
DISCUSSION

This study was conducted in order to evaluate the relationship between ADHD symptoms and social skills difficulties in normal IQ and mentally retarded children. Specific issues were addressed by the study, including the relationship between ADHD and social skills problems, whether there are differences in social skills in normal IQ and mentally retarded children, whether there are differences in social skills of normal IQ children with ADHD symptoms and mentally retarded children with ADHD symptoms, and how medication affects social skills of mentally retarded and normal IQ children with ADHD symptoms. This section will discuss these issues, as well as implications for viewing ADHD as a form of psychopathology existing in mentally retarded children and appropriate assessment procedures with this population. Possible confounding variables, as well as areas for future research, will also be discussed.

One purpose of this study was to determine whether ADHD symptoms affect social skills. Data from this study provide further support for the relationship between ADHD symptoms and social skills difficulties. Specifically, ADHD symptoms were found to significantly affect social skills in both normal IQ and mentally retarded children. For normal IQ subjects, children with ADHD symptoms scored significantly higher than comparison subjects on five of eight factors measured. These included factors measuring negative social behaviors, including the MESSY Inappropriate Assertiveness/Impulsiveness and SSRS Externalizing Problems factors.
This is not surprising, as research has shown that children with ADHD symptoms have consistently higher levels of problem behavior (Battle & Lacey, 1972; Barkley, DuPaul & McMurray, 1990). According to Barkley, et al. (1990), these behavior problems may result from disinhibition and difficulties with behavioral organization. Normal IQ subjects with ADHD symptoms also scored significantly higher on the SSRS Hyperactivity factor, reflecting the fact that these children tended to have higher activity levels. With regard to positive social behavior, normal IQ children with ADHD symptoms scored significantly lower than comparison subjects on the SSRS Cooperation factor. This factor contained items describing social behaviors necessary for classroom success, including on-task behavior, attending, and compliance. Deficits in classroom-related social behaviors may be especially problematic for children with ADHD symptoms, as researchers have found that teachers value academic-related social behavior more highly than other types of social behavior (Gresham & Elliott, 1988). Normal IQ children with ADHD symptoms also scored significantly lower than comparison subjects on the SSRS Self-Control factor, which measured ability to behave appropriately in negative social situations. It is not surprising that these subjects scored lower on this factor, as it has been well-documented that children with ADHD symptoms appear unable to regulate behavior in accordance with ongoing activity (Buhrmester, MacDonald & Heller, 1989); this may translate into aggression and poor impulse control in negative social situations. Interestingly, normal IQ children with ADHD symptoms did not significantly differ
from comparison subjects on the SSRS Assertion and MESSY Appropriate Social Skills factors. Rather, their scores reflected nonsignificant decreases. Other researchers have found no significant differences between subjects with ADHD symptoms and comparison subjects on frequency of positive verbal or nonverbal social behavior (Pelham & Bender, 1982). This was apparent in the item analyses, which revealed that highest mean items endorsed by teachers of normal IQ children with ADHD symptoms and comparison subjects included items from the SSRS Assertion factor. Two items were similarly endorsed for both groups (calls people by their names, joins in games with others).

Data also provide support for the association between ADHD symptoms and social skills difficulties in mentally retarded children. Whereas mentally retarded children often have behavior problems to begin with (Hops & Greenwood, 1988), behavior problems appear more prevalent in mentally retarded children with ADHD symptoms. These children scored significantly higher than comparison subjects on factors measuring negative social behavior, including MESSY Inappropriate Assertiveness/Impulsiveness, SSRS Externalizing Problems, and SSRS Hyperactivity. This finding is in accordance with results obtained with normal IQ children with ADHD symptoms, suggesting that regardless of intellectual level, increased behavior problems may be associated with ADHD symptoms. With regard to positive social behaviors, mentally retarded children with ADHD symptoms scored significantly lower than comparison subjects on the factor measuring cooperation. This is not
surprising, as the hyperactivity and behavior problems of children in this group may preclude appropriate classroom functioning (Milich & Landau, 1982). However, these subjects did not significantly differ from comparison subjects on the other factors measuring positive social behavior, including the SSRS Assertion, SSRS Self-Control and MESSY Appropriate Social Skill factors. In general, researchers have found that mentally retarded children as a whole tend to display few positive social behaviors and show less initiative in social interactions (Gottlieb, Semmel & Veldman, 1978; Morrison, Forness & McMillan, 1983). This fact does not appear to change with mentally retarded children evidencing ADHD symptoms. Their scores on each of these factors reflected slight but nonsignificant decreases from the scores of comparison subjects. In addition, highest mean items for mentally retarded children with ADHD symptoms included two from the MESSY, measuring positive social behavior; these items were similarly endorsed for mentally retarded comparison subjects (smiles at people he knows, shows feelings).

In summary, normal IQ and mentally retarded children with ADHD symptoms have higher amounts of behavior problems and higher activity levels than their comparison groups. They also appear to have difficulty functioning socially in the classroom. Nevertheless, it was found that normal IQ and mentally retarded children with ADHD symptoms do demonstrate positive social behaviors. It is possible that behavior problems and high activity level may interfere with positive behaviors, making positive behaviors less salient to teachers and peers. Normal IQ subjects with
ADHD symptoms significantly differed from normal IQ comparison subjects on the SSRS Self-Control factor, whereas mentally retarded subjects with ADHD symptoms did not significantly differ from mentally retarded comparison subjects on this factor. In normal IQ subjects, there appears to be a negative relationship between ADHD symptoms and maintaining self-control in negative social situations. This does not appear to be the case for mentally retarded subjects.

A second purpose of the study was to compare social skills of normal IQ children without ADHD symptoms to social skills of mentally retarded children without ADHD symptoms. It has been established that mentally retarded children have social skills deficits, as this is a criteria for diagnosis of mental retardation. Accordingly, mentally retarded comparison subjects scored significantly lower than normal IQ comparison subjects on factors measuring positive social behavior (MESSY Appropriate Social Skills, SSRS Cooperation, SSRS Assertion, SSRS Self-Control). None of the mentally retarded subject groups significantly differed from each other on the factor measuring assertiveness. This suggests that regardless of activity level, mentally retarded children tend to be less assertive than normal IQ children. The same is evident for the factor measuring self-control; mentally retarded children appear to have less self-control than normal IQ children, regardless of activity level. With regards to cooperation, mentally retarded children tend to have lower levels of classroom-related social skills. This is not surprising, as the learning problems of mentally retarded children may cause them to have fewer positive
classroom experiences than normal IQ children. As a result, they may not be provided with the opportunities to learn positive behaviors in this setting. With regard to negative social behaviors, mentally retarded comparison subjects scored significantly higher than normal IQ comparison subjects on the MESSY Inappropriate Assertiveness/Impulsiveness, SSRS Externalizing Problems, and SSRS Hyperactivity factors. It appears that mentally retarded children tend to have more behavior problems than normal IQ children, which may negatively impact appropriate social functioning. In addition, mentally retarded children, even those not displaying ADHD symptoms, tend to have higher activity levels than normal IQ children. This may result from the fact that mentally retarded children are functioning at a lower mental age than their same-age normal IQ peers. Because children at lower mental ages tend to have higher activity levels (Routh, Schroeder & O’Tuama, 1974), mentally retarded children would be expected to receive higher scores on the SSRS Hyperactivity factor.

Another purpose of the study was to determine effects of medication on the social skills of mentally retarded and normal IQ children with ADHD symptoms. With regard to normal IQ subjects, medicated subjects and subjects with ADHD symptoms significantly differed from comparison subjects on the same factors. For these subjects, there were no significant differences between medicated and unmedicated subjects with ADHD symptoms on factors measuring positive social behaviors. However, scores of medicated subjects on the MESSY Appropriate Social
Skills, SSRS Cooperation, and SSRS Self-Control factors reflected slight, nonsignificant increases from scores of unmedicated subjects with ADHD symptoms. This suggests that medication may have slight effectiveness in increasing positive social behavior. The effectiveness of medication on positive social behavior has been evaluated by other researchers. Using a double-blind crossover design, Hinshaw, Henker, Whalen, Erhardt & Dunnington (1989) found no evidence of medication-related increases in prosocial initiations and engagements. In fact, the medicated children decreased their number of prosocial initiations. Although increases in positive social behavior were obtained in this study, the results provide support for the conclusions reported by Hinshaw, et al. (1989). In the present study, scores of medicated children on the SSRS Assertion factor (which includes items measuring frequency of prosocial initiations) were lower than both subjects with ADHD symptoms and comparison subjects. Although differences in social skills between medicated subjects and subjects with ADHD symptoms were not statistically significant, these differences may be clinically significant. Specifically, factor scores may reflect clinically important changes. Medication may have beneficial effects on a few key behaviors which are more salient to teachers and viewed as more important. Consequently it is possible that teachers consider social skills of medicated children more appropriate than unmedicated children with ADHD symptoms, despite minimal increases in factor scores.
With regard to mentally retarded children, medicated subjects significantly differed from comparison subjects on the SSRS Hyperactivity factor, with medicated subjects scoring significantly higher. Therefore medication does not appear to normalize activity level of mentally retarded children with ADHD symptoms. Nevertheless scores of medicated subjects were slightly lower than those of subjects with ADHD symptoms. There were no significant differences between medicated subjects and comparison subjects or subjects with ADHD symptoms on factors measuring behavior problems (MESSY Inappropriate Assertiveness/Impulsiveness, SSRS Externalizing Problems) or classroom social behavior (SSRS Cooperation). On the MESSY Inappropriate Assertiveness/Impulsiveness and SSRS Externalizing Problems factors, subjects with ADHD symptoms received significantly higher mean scores than comparison subjects. The medicated subjects, on the other hand, received mean scores which were midway between those of subjects with ADHD symptoms and comparison subjects. These scores may reflect medication-related decreases in behavior problems. A similar phenomenon, although in reverse, was noted for the SSRS Cooperation factor. Subjects with ADHD symptoms received significantly lower mean scores on this factor than comparison subjects. Medication appears to have slightly diminished the behavior problems of children with ADHD symptoms, although it did not reduce behavior problems to the level of comparison subjects. No significant differences between medicated subjects and subjects with ADHD symptoms were noted on the factors measuring assertion and self-control.
Consequently it appears that medication does not significantly increase assertiveness or self-control. In fact, mean scores on the SSRS Assertion factor decreased slightly, which is in line with results obtained with normal IQ subjects obtained by Hinshaw, et al. (1989). Nevertheless, a number of studies have reported that pharmacological treatments for mentally retarded children with ADHD symptoms result in increases in positive behaviors, including attention and time spent on-task, as well as decreases in negative behavior, including conduct problems and excessive movement (Payton, et al., 1989; Aman, et al., 1991; Handen, et al., 1992; Aman, et al., 1993). These findings resemble the overall pattern of results reported in this study.

In summary, the effectiveness of medication on the social skills of normal IQ and mentally retarded children with ADHD symptoms appears slight at best. Mean factor scores of medicated normal IQ children were similar to those of normal IQ children with ADHD symptoms. However, medicated normal IQ children evidenced nonsignificant increases in positive social behavior, with the exception of assertion, and nonsignificant decreases in negative social behavior. Medicated mentally retarded children displayed a significant decrease in hyperactivity, as compared to mentally retarded children with ADHD symptoms. For the most part, their scores tended to fall in between those of mentally retarded children with ADHD symptoms and mentally retarded comparison children. Aman, et al. (1991) reported that medication produced more dramatic changes in activity level and attention span with normal IQ children. However, results of this study indicated that medicated mentally retarded
children evidenced more dramatic changes in activity level than medicated normal IQ children.

Another purpose of the study was to determine if there are differences in social skills of normal IQ children with ADHD symptoms and mentally retarded children with ADHD symptoms. Fee, et al. (1994) compared normal IQ and mentally retarded children with ADHD symptoms on the CTRS-R and found no significant differences between these groups with regards to hyperactivity. Results were similar in this study, as mean scores of the groups on the factor measuring hyperactivity were not significantly different. Fee, et al. (1994) found significantly more social problems in normal IQ children with ADHD symptoms than in mentally retarded children with ADHD symptoms. In the current study, mentally retarded subjects with ADHD symptoms significantly differed from normal IQ subjects with ADHD symptoms on only one factor, SSRS Assertion. This is not surprising, for as previously mentioned, mentally retarded children as a whole tended to be less assertive than their normal IQ peers. There was a tendency for mentally retarded children with ADHD symptoms to have lower scores on the other factors measuring positive social behaviors and higher scores on factors measuring negative social behaviors, although these differences were not statistically significant.

The pattern of results is opposed to the concept of “diagnostic overshadowing,” or that mentally retarded persons are immune to mental illness because of their decreased intellectual abilities. First, although selection criteria for
mentally retarded subjects did not require that they be diagnosed with ADHD, subjects in the high-activity-level group met DSM-III-R criteria for ADHD. The present study also included a comparison group of mentally retarded subjects who did not meet DSM-III-R criteria for ADHD. This study provides support for the fact that although some mentally retarded children meet diagnostic criteria for a form of psychopathology, ADHD, this is not a characteristic of mentally retarded children as a whole. Results from this study, Fee, et al. (1993), and Fee, et al. (1994) indicate that within the population of mentally retarded children, children meeting DSM-III-R criteria for ADHD look very different from children who do not. Consequently there is evidence that ADHD is a form of psychopathology which exists in a subgroup of children with mild and moderate mental retardation. However, this psychopathology is not characteristic of all mentally retarded children. In addition, results of the present study indicated that ADHD symptoms affect the social skills of mentally retarded children in ways very similar to normal IQ children. Although mentally retarded children tend to have more social skills difficulties than normal IQ children, these difficulties are magnified in mentally retarded children with ADHD symptoms. This occurs in a pattern very similar to what occurs in normal IQ children with ADHD symptoms. For both groups of children, ADHD symptoms appear to exacerbate behavior problems, which interfere with classroom functioning and manifestation of positive social behaviors. Consequently this study supports the idea that mentally retarded children experience a form of psychopathology in a manner
very similar to normal IQ children. Finally, this study provides evidence, along with previous studies, that pharmacological treatments may be effective in reducing the severity of ADHD symptoms in mentally retarded children. In this study, the mean number of ADHD symptoms rated by teachers for subjects taking medication was significantly lower than the mean number of ADHD symptoms rated for the same subjects when not taking the medication. This indicates that medication may be effective in reducing the number of ADHD symptoms displayed by these children. Other double-blind, placebo-controlled studies have also concluded that medication is effective in treating ADHD symptoms in mentally retarded children (Payton, et al., 1989; Handen, Breaux, Gosling, Ploof & Feldman, 1990; Aman, Kern, et al., 1991; Aman, Marks, et al., 1991a; Aman, Marks, et al., 1991b; Handen, Feldman, et al., 1991; Handen, et al., 1992; Aman, et al., 1993). However, the concept of "diagnostic overshadowing" may deny these effective treatments to mentally retarded children with ADHD. If the ADHD symptoms are attributed to mental retardation instead of a treatable mental disorder, medication may be viewed as inappropriate for these children. Therefore it appears more likely that the concept of "diagnostic overshadowing" should be replaced with the concept of "dual diagnosis," or that mentally retarded persons may be diagnosed with a mental disorder in addition to a pre-existing diagnosis of mental retardation. By acknowledging that mentally retarded children may be diagnosed with ADHD, researchers may continue to develop and evaluate effective assessment and treatment procedures with this population.
In this study, mentally retarded children were compared to normal IQ children of the same chronological age. However, as indicated previously, mentally retarded children tend to function at a lower mental age than normal IQ children matched on chronological age. Because the mentally retarded children are functioning at a lower mental age, they would be expected to have higher activity levels than their normal IQ counterparts. Results of this study provide support for this conclusion, as mentally retarded children without ADHD symptoms scored significantly higher on the SSRS Hyperactivity factor than normal IQ children without ADHD symptoms. These results also lend support to Barkley (1990) and the DSM-III-R (American Psychiatric Association, 1987), who indicated that when assessing mentally retarded children for ADHD, their behavior should be compared with norms corresponding to their mental ages, rather than their chronological ages. Pearson and Aman (1994) evaluated mentally retarded children referred for evaluation of ADHD on subscales of several rating scales for hyperactivity. They also derived mental ages from IQ scores. The researchers then correlated subscale scores with mental age and chronological age. They found that in mentally retarded children, both mental age and chronological age were significantly negatively correlated with hyperactivity scores. The researchers then performed partial correlations, removing the effects of chronological age, and found that all previously significant correlations between mental age and hyperactivity ratings ceased to be significant. The researchers subsequently concluded that the association between chronological age and hyperactivity scores was stronger than the
association between mental age and hyperactivity scores. They questioned the appropriateness of using norms based on mental age, rather than chronological age. On the other hand, the results of the present study provide support for using norms based on mental age. Future studies should be conducted to resolve this issue. It would be appropriate to directly compare scores of mentally retarded children to normal IQ children matched on mental age.

It should be noted that mean IQ and adaptive behavior ratings of the normal IQ comparison group were significantly higher than subjects of all remaining groups, including the other two groups comprising normal IQ children. This may affect interpretation of the results of this study. Consequently there may be some question as to whether or not the three normal IQ groups were truly equivalent. The comparison subjects received mean IQ scores and adaptive behavior ratings in the “average” range, whereas subjects in the other normal IQ groups received mean IQ scores and adaptive behavior ratings in the “low average” range. Although this discrepancy is not as great the discrepancy between “average” and “mentally retarded,” the reduced functioning level may have resulted in differences in social skills. This may account for significant differences between comparison subjects and subjects in the other two normal IQ groups. Consequently, when selecting comparison subjects, it may be more appropriate to use normal IQ children with mean IQ and adaptive behavior ratings equivalent to those of medicated subjects and subjects with ADHD symptoms. With regard to mentally retarded subjects, mean IQ
and adaptive behavior ratings were comparable across groups. Therefore decreased functioning level did not appear to be a factor contributing to significant differences among the mentally retarded groups.

Many of the children in the normal IQ high-activity-level and medicated groups were receiving special education services in programs designated for children with learning disabilities, whereas none of the the normal IQ comparison subjects were receiving special services. Previous researchers found that classroom-related social skills of children labeled “learning disabled” received scores on the SSRS which were significantly different from those of nonhandicapped peers (Gresham, Elliott & Black, 1987). As a result, activity level may not have been the only variable in which the normal IQ comparison subjects differed from subjects in the other normal IQ groups. Consequently it is possible that differences in social skills may have resulted from the learning problems of the normal IQ high-activity-level and medicated groups, rather than from ADHD symptoms. It is well-documented that children with learning disabilities have more social difficulties than other children (Bryan, 1976; Garrett & Crump, 1980; Scranton & Ryckman, 1979). It may be more appropriate, therefore, to select medicated and high-activity level children who are mainstreamed in the same classrooms as comparison subjects. This did not appear to be an issue with the mentally retarded subjects, as the majority of subjects from comparison, high-activity-level and medicated groups were receiving special education services.
The results of this study are based upon the teachers' perceptions of the children's behavior, and do not consider behavior outside the classroom. To gain a more comprehensive picture of children's social skills, future studies should consider ratings of parents and peers, as well as teachers. The current study also included only males, although ADHD is also diagnosed in females. Social skills difficulties in females with ADHD tend to differ from males with ADHD (Berry, et al., 1985), and evaluation of these differences in normal IQ and mentally retarded children would be a possible area of research. Because of the differences in racial compositions of groups in this study, it would be appropriate for future studies to control for racial differences by using race as a blocking variable. In addition, a clinical diagnosis of ADHD was not necessary for inclusion in this study. Consequently, future studies should employ subjects with diagnoses of ADHD, who have undergone thorough assessment procedures. The effects of medication on social skills in mentally retarded children with ADHD symptoms were modest at best in this study. However, given the implications for improved treatment strategies with this population, it would be appropriate for outcome studies evaluating pharmacological treatments of ADHD to include social skills as an outcome variable.
SUMMARY AND CONCLUSIONS

In summary, differences in MESSY and SSRS factor scores were examined among all mentally retarded and normal IQ groups in the study. One significant finding was that ADHD symptoms affect social skills in both normal IQ and mentally retarded children. Specifically, children with ADHD symptoms experience high frequencies of behavior problems and poor classroom-related social behaviors. However, ADHD symptoms do not appear to negatively affect positive social behaviors, as the frequency of these behaviors appears to be comparable to those of children without ADHD symptoms. The social skills of mentally retarded children without ADHD symptoms were compared to those of normal IQ children without ADHD symptoms. Mentally retarded children were found to have less prosocial skills than normal IQ children and greater amounts of behavior problems. In addition, the mentally retarded children demonstrated higher activity levels. Medicated normal IQ and mentally retarded subjects with ADHD symptoms were then compared to their unmedicated counterparts. It was found that the medicated mentally retarded children displayed more dramatic improvements in social skills than the medicated normal IQ children. Finally, normal IQ children with ADHD symptoms were compared to mentally retarded children with ADHD symptoms. The normal IQ children were rated as being more assertive than their mentally retarded counterparts.

Results of this study do not provide support for the concept of "diagnostic overshadowing," which holds that mentally retarded persons cannot experience
mental illness because of their compromised intellectual abilities. The results suggest that when evaluating mentally retarded children for ADHD, their behavior should be compared to norms corresponding to mental age rather than chronological age. Several variables may influence interpretation of the results of this study, including functioning level, learning and emotional difficulties, teacher report, and demographic variables. Future studies should address these variables, and evaluate how their influence on measures of social skills in mentally retarded children with attention deficit-hyperactivity disorder.
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APPENDIX A
Parent Consent Form
Dear Parents,

I am a Doctoral student at LSU asking for your help in completing my dissertation. I am working on a project to better understand social behavior in children.

As part of the project, your child's teacher would be asked to complete four behavior checklists. In these checklists, your child's teacher will be asked to indicate how often your child performs social behaviors, such as following directions and looking at people when they are speaking.

We also ask for your permission to have your child complete a number of tasks at school. Your child will be asked questions about general information, vocabulary words and similarity of items, draw pictures, do simple arithmetic problems, make designs with blocks and put together puzzles. These tasks will be used to determine your child's ability level, so we can make sure that our different study groups are of comparable levels of ability. This information will be kept confidential. The tasks should take your child about 30 to 40 minutes.

We hope that you will complete and return this consent form and the background information form to your child's teacher promptly. Please understand that your child's name and any potentially identifying information will be kept strictly confidential and that information gained from the project may be potentially helpful to many children and their parents.

If you have any questions, Debra Benavidez may be contacted at 388-8745.

Sincerely,

Debra Benavidez, M.A. Johnny L. Matson, Ph.D.
LSU Doctoral Student LSU Professor of Psychology and
Director of Clinical Training

I agree to my child's participation in this project but understand that I may revoke my permission at any time during the course of the study.

Child's Name

Parent Signature Date
APPENDIX B
Parent Background Information Form
BACKGROUND INFORMATION

Child's Date of Birth ____________________ Age _________

Sex ______ Male ______ Female

Race ______ White ______ Asian-American ______ African-American ______ Other

School ___________________________________________

Teacher's Name____________________________________

1. Has the child ever been diagnosed as having Attention Deficit Hyperactivity Disorder?
   Circle: yes no
   If so, by whom? pediatrician psychologist psychiatrist
   school system other ___________________
   When _____________

2. Has the child ever been diagnosed as mentally retarded?
   Circle: yes no
   If so, by whom? pediatrician psychologist psychiatrist
   school system other ___________________
   When _____________

3. Is the child currently taking any medication? yes no
   Type _______________________________________
   Dosage _____________________________________
   For ________________________________________
   How long? ___________________________________

4. Has the child been on any medications previously? yes no
   Type _______________________________________
   Dosage _____________________________________
   For ________________________________________
   How long? ___________________________________
APPENDIX C
ADHD Rating Scale
BEHAVIOR CHECKLIST

Circle the number in the one column which best describes the child.

<table>
<thead>
<tr>
<th>RATING SCALE</th>
<th>0 = Not at all</th>
<th>1 = Just a little</th>
<th>2 = Pretty Much</th>
<th>3 = Very Much</th>
</tr>
</thead>
</table>

1. Often fidgets or squirms in seat.
2. Has difficulty remaining seated.
3. Is easily distracted.
4. Has difficulty awaiting turn in groups.
5. Often blurts out answers to questions.
6. Has difficulty following instructions.
7. Has difficulty sustaining attention to tasks.
8. Often shifts from one uncompleted activity to another.
9. Has difficulty playing quietly.
10. Often talks excessively.
11. Often interrupts or intrudes on others.
12. Often does not seem to listen.
14. Often engages in physically dangerous activities without considering consequences.
APPENDIX D
Matson Evaluation of Social Skills with Youngsters (MESSY)
MESSY TEACHER RATING SCALE

This survey is a measure of social behavior. Rate how often the child demonstrates each behavior in situations where it might occur. Be sure to rate how often each behavior occurs, not what you think a good answer would be. Please circle your answer.

<table>
<thead>
<tr>
<th>RATING SCALE</th>
<th>1 = Not at all</th>
<th>2 = A little</th>
<th>3 = Some</th>
<th>4 = Much of the time</th>
<th>5 = Very much</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 2 3 4 5</td>
<td>1. Makes other people laugh (tells jokes, funny stories, etc.).</td>
<td></td>
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<tr>
<td>1 2 3 4 5</td>
<td>2. Threatens people or acts like a bully.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>3. Becomes angry easily.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>4. Is bossy (tells people what to do instead of asking).</td>
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<tr>
<td>1 2 3 4 5</td>
<td>5. Gripes or complains often.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>6. Speaks (breaks in) when someone else is speaking.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>7. Takes or uses things that are not his/hers without permission.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>8. Brags about self.</td>
<td></td>
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<tr>
<td>1 2 3 4 5</td>
<td>9. Slaps or hits when angry.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>10. Helps a friend who is hurt.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>11. Gives other children dirty looks.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>12. Feels angry or jealous when someone else does well.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>13. Picks out other children's faults/mistakes.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>14. Always wants to be first.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>15. Breaks promises.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>16. Lies to get what he/she wants.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>17. Picks on people to make them angry.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>18. Walks up to people and starts a conversation.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>19. Says &quot;thank you&quot; and is happy when someone does something for him/her.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>20. Is afraid to speak to people.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>21. Hurts other's feelings on purpose (tries to make people sad).</td>
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<tr>
<td>1 2 3 4 5</td>
<td>22. Is a sore loser.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>23. Makes fun of others.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>24. Blames others for own problems.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>25. Sticks up for friends.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>26. Looks at people when they are speaking.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>27. Thinks he/she knows it all.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>28. Smiles at people he/she knows.</td>
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<tr>
<td>1 2 3 4 5</td>
<td>29. Is stubborn.</td>
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<tr>
<td>Rating Scale</td>
<td>Description</td>
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<td>-----------------------------------------------------------------------------</td>
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</tr>
<tr>
<td>1</td>
<td>Not at all</td>
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<tr>
<td>2</td>
<td>A little</td>
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<tr>
<td>3</td>
<td>Some</td>
<td></td>
<td></td>
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</tr>
<tr>
<td>4</td>
<td>Much of the time</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>5</td>
<td>Very much</td>
<td></td>
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</tbody>
</table>

| 1 2 3 4 5 | 30. Acts as if he/she is better than others.                                |
| 1 2 3 4 5 | 31. Shows feelings.                                                        |
| 1 2 3 4 5 | 32. Thinks people are picking on him/her when they are not.                 |
| 1 2 3 4 5 | 33. Thinks good things are going to happen.                                 |
| 1 2 3 4 5 | 34. Works well on a team.                                                  |
| 1 2 3 4 5 | 35. Makes sounds that bother others (e.g. burping, sniffling).              |
| 1 2 3 4 5 | 36. Brags too much when he/she wins.                                       |
| 1 2 3 4 5 | 37. Takes care of others' property as if it were his/her own.               |
| 1 2 3 4 5 | 38. Speaks too loudly.                                                     |
| 1 2 3 4 5 | 39. Calls people by their names.                                           |
| 1 2 3 4 5 | 40. Asks if he/she can be of help.                                         |
| 1 2 3 4 5 | 41. Feels good if he/she helps others.                                     |
| 1 2 3 4 5 | 42. Defends self.                                                          |
| 1 2 3 4 5 | 43. Always thinks something bad is going to happen.                         |
| 1 2 3 4 5 | 44. Tries to be better than everyone else.                                 |
| 1 2 3 4 5 | 45. Asks questions when talking to others.                                  |
| 1 2 3 4 5 | 46. Feels lonely.                                                           |
| 1 2 3 4 5 | 47. Feels sorry when he/she hurts others.                                  |
| 1 2 3 4 5 | 48. Gets upset when he/she has to wait for things.                          |
| 1 2 3 4 5 | 49. Likes to be the leader.                                                |
| 1 2 3 4 5 | 50. Joins in games with other children.                                    |
| 1 2 3 4 5 | 51. Plays by the rules of a game.                                          |
| 1 2 3 4 5 | 52. Gets into fights a lot.                                                |
| 1 2 3 4 5 | 53. Is jealous of other people.                                            |
| 1 2 3 4 5 | 54. Does nice things for others who are nice to him/her.                   |
| 1 2 3 4 5 | 55. Tries to get others to do what he/she wants.                           |
| 1 2 3 4 5 | 56. Asks others how they are, what they have been doing, etc.              |
| 1 2 3 4 5 | 57. Stays with others too long (wears out welcome).                         |
| 1 2 3 4 5 | 58. Explains things more than necessary.                                   |
| 1 2 3 4 5 | 59. Is friendly to new people he/she meets.                                |
| 1 2 3 4 5 | 60. Hurts others to get what he/she wants.                                 |
| 1 2 3 4 5 | 61. Talks a lot about problems or worries.                                 |
| 1 2 3 4 5 | 62. Thinks that winning is everything.                                     |
| 1 2 3 4 5 | 63. Hurts others' feelings when teasing them.                              |
| 1 2 3 4 5 | 64. Wants to get even with someone who hurts him/her.                      |
APPENDIX E
Point-Biserial Correlations
To determine if there was a statistically significant relationship between race and the dependent variables, Point-Biserial correlation coefficients were obtained for race and MESSY and SSRS total and factor scores, for a total of 10 coefficients. A Bonferroni correction (.05/10 = .005) was used to control for the experiment-wise error rate. Only one factor, the SSRS Externalizing Problems factor, was significant ($r_{pb} = .3408, p < .001$). This indicates that there is a statistically significant relationship between race and scores on this factor. Consequently, significant different scores between groups on this factor should be interpreted with caution.
VITA

Debra Anne Benavidez was born in National City, CA on September 29, 1967. She earned her B.A. at the University of California, San Diego and her M.A. at Louisiana State University. She is currently completing her predoctoral internship at the Child Development and Rehabilitation Center at Oregon Health Sciences University and will be beginning a postdoctoral residency at the University of Texas Medical Center upon graduation. Her research interests include clinical child psychology, neuropsychology, and developmental disabilities.
DOCTORAL EXAMINATION AND DISSERTATION REPORT

Candidate: Debra Anne Benavidez

Major Field: Psychology

Title of Dissertation: Social Skills in Mentally Retarded Children with Symptoms of Attention Deficit-Hyperactivity Disorder

Approved:

[Signatures]

Major Professor and Chairman

Dean of the Graduate School

EXAMINING COMMITTEE:

[Signatures]

Date of Examination: April 5, 1995