A Comparison of Adaptive Behavior Skills and IQ in Three Populations: Children with Learning Disabilities, Mental Retardation, and Autism

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by

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ABSTRACT

A Comparison of Adaptive Behavior Skills and IQ in Three Populations:

Children with Learning Disabilities, Mental Retardation, and Autism

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Adaptive Behavior skills are the conceptual, social, and practical skills that individuals learn to be able to function in their everyday lives (AAIDD, 2008). Measuring adaptive behavior is a way to summarize the effectiveness with which individuals meet the standards of personal independence and social responsibility expected for their age and cultural group. This paper discusses the history and development of adaptive behavior as a construct, its measurement, and its relationship to intelligence. Previous research has examined the relationship between adaptive and intellectual functioning; this study investigates adaptive performance among children with disabilities while controlling for the influence of intellectual level. Children with autism, specific learning disabilities, and mental retardation were studied to determine how they fared in the adaptive subdomains of communication, socialization, and activities of daily living. Data for the study were gathered by reviewing archives from special education records in a large, urban school district. Results indicated a positive and moderate relationship between intelligence and adaptive behavior, but only in the autism group. The groups differed in their performance on the subdomains of adaptive behavior; however, the pattern of adaptive skills for each diagnostic group was unique. Children with autism were found to have deficits in socialization, children with learning

disabilities were found to have deficits in communication, and children with mental retardation showed deficits in all domains. These patterns held up even when IQ was controlled; however, the groups no longer differed on communication skills, suggesting that IQ is most strongly related to communication. Finally, the study revealed that full scale IQ, activities of daily living, and communication skills discriminate mental retardation from the other groups while socialization skills discriminate autism from the other groups. Implications of these findings are discussed relative to assessment practices, differential diagnosis, program development, and progress monitoring.

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CHAPTER 1

INTRODUCTION

The American Association on Intellectual and Developmental Disabilities (AAIDD), formerly the American Association on Mental Retardation (AAMR), defines adaptive behavior (AB) as "the conceptual, social, and practical skills that people have learned to be able to function in their everyday lives." Significant limitations in adaptive behavior impact a person's daily life and affect the ability to respond to a particular situation or to the environment (AAIDD website, 2008). Adaptive behavior can also be considered the effectiveness with which individuals meet the standards of personal independence and social responsibility expected of individuals of their age and cultural group (AAMR, 1992). Compared to the history of understanding and measurement of "intelligence" as a construct, adaptive behavior is a relatively young construct in its recognition and measurement. The introduction of measures of intelligence dates back to the early 1900s, but the concept of social competence was not formally recognized until Edgar Doll proposed measuring an individual's *social maturity* some thirty years later. In 1959, the American Association on Mental Deficiency (AAMD) published its first official manual and formally included deficits in adaptive behavior, in addition to subaverage intelligence, as an integral part of the definition of mental retardation [1]. The passage of PL 94-142 in 1975 advanced the development and awareness of the adaptive

[1] The term mental retardation (MR), in addition to intellectual disability (ID), is used in this paper as it is still recognized as a disability category under the Pennsylvania Department of Education's interpretation of the Individuals with Disabilities Education Improvement Act of 2004.

behavior construct, as it also included adaptive behavior deficits in the definition of mental retardation. PL 94-142 and its reauthorizations under the name "Individuals with Disabilities Education Act " (IDEA), have since mandated adaptive behavior assessment when considering a diagnosis of mental retardation. The definition of mental retardation in IDEA is similar to the current AAIDD definition, and the law requires that deficits in adaptive behavior be substantiated before a child is classified with mental retardation for educational purposes.

The AAIDD has always considered low or deficient intelligence a defining feature of mental retardation. With concerns related to the overrepresentation of racial and ethnic minority students in programs for the intellectually disabled, this secondary criterion was developed. An individual had to show concomitant deficits in adaptive behavior to be considered for a diagnosis of mental retardation. Yet, there were concerns at its outset that the construct of adaptive behavior was too loosely defined. Kamphaus (1987) argued that the AAMD definition has had a significant impact on the structure of adaptive behavior scales and that no similar influence was apparent in the area of intellectual assessment. The concept of adaptive behavior may have been ill-defined at its outset, but probably no more so than that of intelligence when it was first measured. The field of intellectual assessment, for example, does not have the equivalent of a single definition of adaptive behavior. While numerous definitions of the construct of intelligence exist, the AAIDD has clearly and narrowly defined the construct of adaptive behavior. Test developers have followed this guidance in their construction of the measures commonly used by practitioners today. However, proposals to alter the definition and measurement of adaptive behavior have come and gone since its

introduction. For example, some have termed "social competence" as a more encompassing construct. All existing definitions agree, however, that adaptive behavior is: age related, defined by societal standards or expectations, measured in terms of typical behavior, and modifiable.

Terrasi and Airaisian (1989) suggested that adaptive behavior can be seen as a construct comprised of personal independence skills (which can range from basic self-care skills such as washing, dressing, and grooming oneself to more sophisticated behaviors such as managing money and time); social competence (interacting effectively with others); and attitudinal dimensions (such as willingness to cooperate, motivation to succeed, and perseverance). According to Cicchetti et al. (1984), adaptive behavior is defined by the degree to which a person functions and maintains him/herself independently and also satisfies cultural requirements for personal and social responsibility. Both agree that adaptive behavior is developmental and increases in complexity as children grow older. The construct is recognized as being dependent on the expectations of culture groups and demands of particular situations and significant others with whom an individual interacts. Finally, adaptive behavior is viewed as the day-to-day *performance* of activities, rather than *ability* to perform the activities. Such emphasis on typical performance requires a method of assessment other than structured, direct testing.

Assessing adaptive behavior focuses on two major issues: (a) the degree to which individuals are able to function and maintain themselves independently, and (b) the degree to which they meet the culturally imposed demands of personal and social responsibility (Sattler, 2001). Measures of adaptive behavior are useful for diagnosis and

classification as well as intervention planning and progress monitoring. Examples of adaptive skills that are tapped by modern measures include those related to eating, dressing, expressing needs, taking care of personal possessions, making purchases, interacting with peers, controlling one's behavior in a structured setting, following a schedule, communicating with other people, practicing safety, managing money, and holding a job (Harrison & Oakland, 2003).

History

A relevant history of adaptive behavior and its role in assessment and treatment of mental retardation was outlined by Horn and Fuchs (1987), and is summarized here. As early as the middle of the nineteenth century, treatment programs for intellectually disabled individuals emerged. Although not termed adaptive behavior at that time, there was an understanding that successful treatment programs should teach the skills necessary for coping with societal demands. In the early twentieth century, intelligence tests were accepted as the most suitable (and available) way to identify individuals with mental retardation. Such individuals were often restricted from general society; so training programs emphasized skills that probably were not generalizeable to the world outside their institutions. From the 1950s to the 1980s the importance of adaptive behavior grew dramatically. There was increased accountability for training programs, especially for schools with the passage of PL 94-142. For the first time, adaptive measures were employed systematically as an assessment practice, supplementing traditional intelligence tests. Inclusion of adaptive behavior as a necessary criterion for the diagnosis of mental retardation was viewed as broadening the range of behavior addressed by traditional IQ tests and introducing behaviors that were more sensitive to

racial and ethnic differences in children. Currently, there is an understanding that certain behaviors (although they may be related to intelligence) are immeasurable by traditional IQ tests. That low intelligence is a necessary, but insufficient, indicator of mental retardation was seen as the impetus for mandates to consider adaptive functioning, in conjunction with intelligence, when diagnosing intellectual disability.

There were several attempts to develop standardized instruments to measure adaptive behavior; the first in this country was made by Edgar Doll. His instrument, the Vineland Social Maturity Scale (VSMS) was first copyrighted in 1936. Subsequent revisions eventually led to the publishing of the Vineland Adaptive Behavior Scale (VABS; Sparrow, Balla & Cicchetti, 1984). The Vineland is probably the most well-known and widely used measure of adaptive behavior. In recent years, concerns for the Vineland's outdated norms led to the increased popularity of other measures such as the Adaptive Behavior Assessment System (ABAS, ABAS-II—Harrison & Oakland, 2000, 2003). However, when the long-awaited revision of the Vineland was published (Vineland-II—Sparrow, Cicchetti & Balla, 2005), adaptive behavior measures became among the most state-of-the-art tools available to practitioners.

Overrepresentation/Declassification

The assessment of mental retardation has been embroiled in intense debates over the fairness and usefulness of conventional practices with minority and economically disadvantaged children (Reschly, 1982). Allegations suggested that minority students were treated unfairly in the assessment and programming process, leading to an overrepresentation of such students in programs for the intellectually disabled. Conventional assessment practices, particularly the use of intelligence tests, were

regarded as a major cause of overrepresentation. Litigation in the 1970s (including Diana v. State of California, 1970; Guadalupe v. Tempe Elementary District, 1972; and Larry P. v. Riles, 1972*)* eventually led to decrees requiring that intelligence test results should not be the exclusive or primary basis for classifying children as intellectually disabled. The AAMD recommended (and the passage of PL 94-142 *required*) that adaptive behavior should be emphasized in classification decisions. Reschly (1991), reviewed research on the topic and concluded that the overrepresentation of minority individuals in poverty circumstances in the United States is probably the most parsimonious explanation for the overrepresentation of minority students in programs for the intellectually disabled. Yet, as a result of *Larry P. vs. Riles*, the California department of education mandated that intelligence tests should not be used *at all* in the assessment of ethnic minority children.

The implication of using adaptive behavior measures in addition to intellectual measures is that children's adaptive behavior scores, in many cases, will not be equivalent to their intelligence test scores. For example, one child may have below average adaptive behavior scores and average intelligence, while another child might have average adaptive behavior scores and below average intelligence. It is the latter example that results in declassification. Declassification occurs when children who were or would have been eligible for mental retardation classification because of low intelligence scores are no longer eligible because they exhibit adequate adaptive behavior (Harrison, 1987). While preventing these children from receiving the stigmatizing 'label' of mental retardation, declassification also prevented these children from receiving special education services that they may have needed. Although this issue has been raised since the advent of using adaptive behavior measures in the diagnosis of

intellectual disability, no clear solution has been presented nor has one emerged from the literature. Practitioners have often come to their own solution by identifying students with significantly subaverage intelligence but average adaptive behavior skills as "learning disabled" despite not meeting definitional criteria for a specific learning disability as outlined by the Individuals with Disabilities Education Act (IDEA).

Structure

Adaptive behavior can be viewed as one construct—an overarching set of skills similar to general intelligence—but it can also be divided into sub-areas or domains. As with intelligence, increasing emphasis is being placed on the measurement of its sub-domains (as a summary or composite score does not always elucidate strengths and target needs for intervention). In the AAIDD definition, adaptive behavior's sub-domains are considered to be "conceptual, social, and practical" skills but some measures term the domains "communication, socialization, and activities of daily living." It is the latter terminology (drawn from the Vineland Adaptive Behavior Scales) that will be used throughout this paper.

Evolution of the Literature

When the study and scrutiny of adaptive behavior measures became increasingly popular by researchers, many sought to examine the validity of the construct itself. As such, many of the first studies involved establishing whether there was a relationship between adaptive functioning and other criterion such as intellectual ability and academic achievement. The focus of this paper is the relationship between adaptive behavior and intellectual ability. Some researchers questioned whether they were, in fact, two separate entities or whether they were different ways to observe the same underlying construct.

Much of the oldest work to establish validity examined the adaptive functioning of "normals" versus "mentally deficient" patients (most of them attending Doll's training school at Vineland, New Jersey). Around the passage of PL 94-142 in 1975, increased attention was directed toward the adaptive characteristics of children with disabilities. As children began to be included in validity studies, it became apparent that adaptive skills developed differently among children with various exceptionalities. This led to a refinement in the research. Rather than examining the adaptive functioning of disabled versus non-disabled children, the population of disabled children began to break down into sub-groups according to type of disability. The current study is an example of examining adaptive behavior patterns as a function of exceptionality group.

Previous research has established a relationship between adaptive functioning and intellectual functioning. It is also known that adaptive skills differ among disability populations. However it is less clear whether these differences are attributable solely to intellectual level or whether these different patterns exist due to the nature of the disability itself. For example, there is a well-established pattern of nonverbal ability being higher than verbal ability in individuals with learning disabilities. This pattern has appeared consistently over decades of research. IQ scores are generally within the normal range, but may be low average to average. From this pattern of intellectual functioning, one might deduce that individuals with learning disabilities will experience relative deficits in communication scores on adaptive behavior measures. However, is this relative deficit in communication due to intellectual ability or due to some other characteristic of the disability? In other words, would a relative deficit in communication *still exist* if the influence of intelligence on adaptive behavior was controlled?

Purpose of Current Study

The purpose of the current study is to investigate the adaptive and intellectual functioning of children with autism, mental retardation, and specific learning disabilities; to determine how adaptive skills differ among the groups; to determine whether intellectual level influences the pattern of adaptive skills; and to determine whether it is possible to differentiate the diagnostic groups based on their adaptive skill performance. Previous research has examined the relationship between adaptive and intellectual functioning; this study aims to expand this work by investigating adaptive performance among children with disabilities when the influence of intellectual functioning is controlled for.

Research Questions

(1) What is the relationship between intellectual functioning and adaptive behavior among students with autism, mental retardation, and specific learning disabilities?

(2) Do the groups differ in their performance on the sub-areas of adaptive behavior: communication, socialization, and activities of daily living?

(3) With the influence of IQ controlled for, do the groups differ on the adaptive sub-domains of socialization, communication, and daily living skills?

(4) What is the pattern of adaptive behavior functioning among students with autism, mental retardation, and specific learning disabilities?

(5) Are there adaptive behavior characteristics that discriminate among the three diagnostic groups?

Although an abundance of research has examined adaptive behavior, previous studies have generally sought to compare two groups such as individuals with disabilities and their nondisabled peers. As impaired adaptive functioning is a specific criterion in the definition of mental retardation, most research on the concept has involved only individuals with intellectual disabilities. Some studies have sought to compare children with mental retardation of unknown vs. known etiologies (i.e., specific syndromes). More recently, there has been a venture into examining the adaptive characteristics of children with autism spectrum disorders since there has been a dramatic increase in their incidence. However, there have been fewer studies examining the adaptive functioning of children with specific learning disabilities. This study will provide a unique contribution to the body of existing research by comparing the adaptive functioning skills of children with autism, mental retardation, and specific learning disabilities. It is the author's hope that findings from this investigation will have implications for assessment practices, diagnosis, program development, and progress monitoring.

Assessment practices. Administering adaptive behavior measures is not typical practice when conducting learning disability evaluations (however adaptive scales are often used to differentiate mental retardation from specific learning disabilities in students with overall low intellectual ability). It is often assumed that students with mild learning disabilities do not have significant adaptive deficits. If it can be determined that students with learning disabilities do have specific patterns of adaptive functioning (regardless of their level of cognitive functioning), the increased use of adaptive measures with this population might be warranted.

Differential diagnosis. Gaining a greater understanding of adaptive behavior patterns, exclusive of the effects of intellectual level, might aid practitioners in differential diagnosis. For example, there is great controversy among practitioners about how to distinguish between mental retardation and autism in children who score extremely low on measures of cognitive functioning. Knowing that different patterns of adaptive functioning exist in children with mental retardation versus children with autism may help practitioners reach a definitive diagnosis.

Program development. Implications may exist for program development and planning for these three populations if typical adaptive patterns are found to exist regardless of a student's cognitive functioning. For example, a student with a specific learning disability might be found to have low average communication skills but average socialization and daily living skills. In reviewing this pattern, a practitioner might not recommend intervention for the student's communication skills since they appear to be a relative (rather than significant) deficit. However, if it is known that this student has cognitive functioning that is above average (or higher), this "relative" deficit might be clinically significant and debilitating. Increased used of adaptive behavior assessments to plan intervention could uncover weaknesses that might not be apparent in other measures (i.e., IQ tests).

Progress monitoring. Finally, there is a considerable achievement gap between students with disabilities and their nondisabled peers. As more and more students with disabilities are being educated in regular classrooms, and are required to participate in high-stakes testing, districts are interested in closing this gap. A common characteristic of schools that have substantially closed this achievement gap is a system for assessing

the progress of individual students and for planning instructional changes according to data from progress monitoring. The findings of this study will support how current assessment practices can be integrated into a progress monitoring approach to improve instructional planning for students with disabilities.

Relevance to Participating School District

The mission of the participating school district expressly states that achieving students' full intellectual and social potential is a significant priority. Students with disabilities, both mild and severe, represent a unique challenge to the district, as these students must be taught in special ways. Yet, these students are held to the rigorous standards set forth by each school. This study aims to clearly describe the relationship between intellectual abilities and adaptive abilities in students with mild to severe disabilities. Since the fundamental purpose of assessment is to guide instructional planning, it is hoped that results from this study will highlight the importance of certain assessments in differentially programming for students with disabilities.

CHAPTER 2

REVIEW OF LITERATURE

From its origin, adaptive behavior (AB) was intended for use in the assessment of individuals suspected of having mental retardation (MR). Most of the early research on adaptive behavior involved validating measures for use in this population, or comparing individuals with MR to their nondisabled peers. Later, interest grew into expanding the use of AB measures to wider populations, including individuals with Pervasive Developmental Disorders, Mental Retardation caused by particular syndromes (e.g., Fragile X, Down Syndrome), developmental delays in early childhood, and specific learning disabilities. A wide body of research with adaptive behavior measures in various populations now exists. Of particular interest to this author in reviewing the literature was choosing studies that examined the extent to which adaptive behavior relates to cognitive functioning. This led to investigations into the *topography*, or the specific adaptive strengths and deficits that manifest in different disorders. Researchers wanted to know if particular patterns of adaptive behavior might be indicative of (or lead to the early identification of) disorders such as autism or specific learning disabilities.

In general, most findings indicate a moderate correlation between cognitive functioning and adaptive behavior and that a unique pattern of skill strengths and weaknesses exists in children with particular disabilities. Studies of individuals with mental retardation suggest some characteristic patterns in the organization of adaptive development, such as the tendency for social adaptive skills to exceed, and communication skills to fall below expectations based on intellectual ability. Among individuals with mental retardation, sub-categories (previously termed *educable* and

trainable) show decreasing levels of adaptive behavior, respectively. Some specific findings show particular patterns in MR of known etiology (i.e., Down Syndrome). In autism, there are well known characteristic social deficits. Children with autism are particularly deficient in social and communication skills, relative to other domains of adaptive functioning and relative to intelligence. A few investigations into the adaptive functioning of students with specific learning disabilities show relative strengths in socialization and daily living skills (compared to their peers with more severe disabilities). However, students with specific learning disabilities also show weaknesses, particularly in the communication domain.

History and Instrument Development

As early as 1935, Edgar Doll recognized that assessments of individuals with mental retardation are incomplete without estimates of their 'social maturity.' His conceptualization of social maturity included the ability of individuals to exercise personal independence and social responsibility. According to Doll, the primary focus of assessment of individuals with mental retardation should be on their capacity for maintaining themselves and their affairs. Probably the first measure of adaptive behavior, Doll proposed an instrument for measuring social adequacy in terms of social self-sufficiency genetically expressed as progressive social maturation. Subdomains of this scale included: self-help, locomotion, communication, occupation, self-direction, and socialization. For the most part, these domains are what modern tests of adaptive behavior measure as well.

In 1935, Doll conducted preliminary examinations using the proposed "Genetic Scale of Social Maturity," which was a precursor to the Vineland Social Maturity Scale

(VSMS). As with current measures of adaptive behavior, Doll's social maturity scale employed a method of report (from a third party) rather than a method of examination or observation. Fifteen normal subjects from birth to adult were examined, as well as 50 *mentally deficient* patients from his training school at Vineland. Doll found a high correlation between mental age and 'social age' (r=.86) in the mentally deficient group. There was a similarly high correlation (r=.70) between IQ and 'SQ' (social quotient, derived from the social maturity scale). Doll recognized that his concept of social maturity must reflect the relationship between intelligence and social adequacy but must also be relatively independent of intelligence in order to stand as a unique construct.

After the publication of the VSMS, the next major adaptive behavior instrument to be developed was the American Association on Mental Deficiency's (AAMD) Adaptive Behavior Scales (ABS) created by Nihira, Foster, Shellhaas, and Leland (1974). The instrument was composed of 24 domains, divided into two sections. Part 1 addresses 10 adaptive behavior domains; Part 2 addresses 14 domains which focus on maladaptive behaviors. There were some questions about the psychometric properties of the ABS, including much higher reliability estimates for Part 1 than Part 2, limited generalizability of the standardization sample (only institutionalized individuals were used), and discrepancies existing between ratings made on the ABS and those obtained by direct observation. The ABS-School Edition (ABS-SE) was published in 1981. The instrument is composed of essentially the same items found in the AAMD ABS, except its intended use was by teachers rather than parents.

The Adaptive Behavior Inventory for Children (ABIC) was developed in 1977 for the explicit purpose of improving classification/placement decisions with mildly

handicapped children. The ABIC was part of a comprehensive assessment system, the System of Multicultural Pluralistic Assessment (SOMPA), which touted itself one of the first "nonbiased" measures of intelligence. The ABIC emphasizes performance in social roles in a variety of settings. Domains include the social roles or social systems of family, community, peer, nonacademic school, earner/consumer, and self-maintenance. The ABIC is administered as a structured interview with a child's primary caretaker. The standardization sample was limited to a California population, and although racial-ethnic groups were included, adequate representation by disability groups was not clear.

Despite Doll's foresight and the long-standing utility of an instrument that defined adaptive behavior as it remains currently conceptualized, it became increasingly evident in the late 1970s that the VSMS required a revision. The publication of the Vineland Adaptive Behavior Scales (VABS) in 1984 accomplished this task, and included a nationally representative standardization sample, items updated to reflect cultural and societal changes, and it reflected advances in statistical technology. Between the survey and classroom editions, 6,000 subjects were included in the standardization samples, which reflected the 1980 census data. Psychometric properties were widely studied and the Vineland was held as the most thoroughly developed measure of adaptive behavior at the time.

After fifteen years of widespread use of the Vineland, again it became clear that a revision was needed. While the Vineland-II was being conceptualized and standardized, the release of the Adaptive Behavior Assessment System (ABAS) (Harrison & Oakland, 2000) provided a similar, yet new approach to the measurement of adaptive behavior. According to the ABAS manual, the purpose of the measure is "the comprehensive,

diagnostic assessment of individuals having difficulties with the daily adaptive skills necessary to function effectively in their environments, given the typical demands placed on individuals the same age" (p.18). The author contends that adaptive behavior assessment is essential when the goal of the intervention or treatment is to improve the daily adaptive functioning of the individual. Thus, its authors emphasize treatment planning as a purported use of the ABAS, in addition to diagnosis and classification. The specific skill areas measured by the ABAS can be combined into three categorical domains: Conceptual (communication and academic skills), Social (interpersonal and social competence skills) and Practical (independent living and daily living skills). Although relatively new, the ABAS has enjoyed positive reviews and boasts good psychometric properties.

It was not until 2005 that the anticipated Vineland Adaptive Behavior Scales, Second edition (Sparrow, Cicchetti, & Balla, 2005) was released. The Vineland-II maintains the 4-domain, 11-subdomain structure of the original Vineland, but it includes new items to improve measurement for very young children or for adults. The standardization sample is nationally representative and includes 3,695 individuals aged birth through 90 years old. The authors report good psychometric properties of the Vineland-II.

Parent vs. Teacher Ratings

Most adaptive behavior scales are administered to third-party informants, which is seen as the most ecologically valid way of measuring 'real world' skills. However, parents and teachers are not viewed as interchangeable informants. Studies investigating the relationship between parents' and teachers' scores found low to moderate

correlations, and often times significant differences between the informants. Some studies showed significantly higher scores when parents were used as informants than when teachers were used. For example, Mayfield, Forman, and Nagle (1984) compared the AAMD Adaptive Behavior Scale scores of parents and teachers for a sample of educably mentally retarded (EMR) children. Significant differences were found between the two types of informants, with the teachers providing much lower estimates of skills than the ratings of the parents would suggest.

Harrison and Oakland (2000) reported moderate correlations between adaptive behavior ratings by parents and teachers using the ABAS. The consistency between teacher/daycare provider and parent/caregiver ratings was studied in a sample of 130 preschool children. Interrater reliabilities ranged from .56-.70 in the adaptive subdomains, and the interrater reliability for the General Adaptive Composite was .68. The consistency between teacher and parent ratings in older children was also reported in the ABAS manual. Interrater reliabilities ranged from .73 to .85 for the three adaptive subdomains; the reliability for the General Adaptive Composite was .81 (Harrison & Oakland, 2000).

Bensberg and Irons (1986) investigated whether the ratings of parents and teachers on the Vineland correlate with teacher ratings of the same students on the AAMD Adaptive Behavior Scale. Correlations between scores produced by parents and teachers on the separate instruments were “surprisingly high;” in the area of personal self-sufficiency, the rate of agreement between parents and teachers essentially equaled that of teachers on the two scales. Thus, the authors inferred that the two different scales would be able to produce similar ratings of student behaviors, even when different

persons completed the scales. The socialization domain was the one that had the least agreement between teachers and parents. This finding suggests that expected norms of social behavior in the classroom and at home may be different when compared with behavioral expectations in other domains such as communication or daily living skills.

Despite some mixed findings, the research overall has suggested that adaptive skill ratings made by parents may be higher on some skill areas than ratings made by teachers (Harrison, 1987). Adaptive behavior is considered to be situation-specific and influenced by the expectations of significant others. Since parents and teachers observe children in different settings they may have different expectations for behavior. Furthermore, it is likely that children behave differently in home versus school environments. Though differences exist between parent and teacher ratings, it is acceptable to use either (or both) in multidisciplinary evaluations conducted at school.

Relationship of Adaptive Behavior to Intelligence

Most researchers have attempted to demonstrate that there is a positive relationship between intelligence test scores and adaptive behavior scores. Harrison and Boan (2000) suggest that the two should be separate, but related constructs because: (1) intelligence is conceptualized as a thought process whereas adaptive behavior emphasizes everyday behavior; (2) intelligence scales measure maximum performance whereas adaptive behavior scales measure typical performance; and (3) intelligence scales assume a stability in scores whereas adaptive behavior scales assume that performance can be modified.

The majority of findings indicate a moderate degree of overlap ($r = .40 - .60$), which is consistent with the hypothesis of two separate, but related, constructs. For

example, Keith, Fehrmann, Harrison, and Pottenbaum (1987) used confirmatory factor analysis to examine models of construct-relatedness in standardization samples from the Kaufman Assessment Battery for Children (K-ABC) and the Vineland. Results of the study found a moderate correlation between adaptive behavior and ability, indicating that the inclusion of both measures is not redundant, but rather provides for a multifactored assessment.

Platt, Kamphaus, Cole, and Smith (1991) examined correlations between the VABS (interview edition), Stanford-Binet, Fourth Edition (SB4), and the Wechsler Intelligence Scale for Children, Revised (WISC-R) in a referred sample. Results yielded low to moderate correlations (.37 to .39) between the IQ measures and the VABS. However, authors conclude that findings support previous assertions that adaptive behavior and intelligence are separate but related constructs.

Others have found variability in this moderate correlation between adaptive functioning and intellectual functioning. For example, Roszkowski and Bean (1980) found correlations between the AAMD's ABS and intelligence as high as .77. This was found in a population of institutionalized mentally retarded children and adults. As we will see again, the tendency for higher correlations between AB and IQ is evident in more severely disabled individuals.

Hayes and Farnhill (2003) used the Kaufman Brief Intelligence Test (KBIT) and the VABS (self-report) to compare IQ and adaptive in a forensic sample of adolescents and adults. Significant correlations were found between the total scores (.86) and subtests of the two tests. This result was replicated when partial correlation coefficients controlling for age were conducted. ANOVA results concluded that the IQ scores were

better at predicting the adaptive behavior scores than the reverse. The authors hypothesized that this finding may reflect greater variations in adaptive skills than IQ skills. Significant differences between the mean total score on each test and its subtests were found, indicating that each subtest contributes unique information to the overall assessment of the individual. The authors concluded that assessment of both adaptive behavior and cognitive functioning provides important information toward diagnosis, even though scores on the two tests correlated significantly.

Vig and Jedrysek (1995) examined a sample of young urban children with developmental disabilities to determine if there is a relationship between intelligence and adaptive behavior. Also, the authors investigated whether there were differences in patterns of adaptive behavior in children with disabilities that could not be explained by intelligence. The sample included preschool children who were diagnosed with developmental disabilities after an assessment battery (including cognitive/developmental and adaptive behavior) was given. A correlation coefficient of .75, representing the association between the adaptive behavior composite and full scale IQ, indicated a strong, positive relationship between the two areas. Additional correlations were obtained based on IQ and each of the Vineland domains for each disability group. The relationship between all domains of adaptive behavior and intelligence were stronger for children with more severe disabilities (e.g., autism) than those with mild impairments (e.g., mild cognitive deficits, nonspecific developmental delays). In the children with autism, the highest correlations between adaptive functioning and intelligence were in the domains of communication, daily living skills, and motor skills (rather than in communication and socialization as was characteristic of other diagnostic groups). Because the autism group

had the lowest cognitive ability of the disability groups, this finding may represent the phenomenon of less differentiation of adaptive behavior and intelligence at lower levels of cognitive ability (i.e., in more severe disabilities).

In studies that report very high correlations between adaptive behavior and intelligence, some have questioned whether they provide information that is redundant. If adaptive behavior scores are not discriminated sufficiently from intellectual ability scores, they might really be differing aspects of the same general construct (rather than two separate constructs). Reynolds (1987) suggested that if adaptive behavior and intelligence correlate higher than .50-.60, that might call into question the validity of adaptive behavior measures. As previously mentioned, there appears to be a trend toward higher correlations (between AB and IQ) in more severely disabled populations (found in Keith et al., 1987; and Sparrow et al., 1984).

Others have found virtually no overlap between intelligence and adaptive behavior, including Oakland (1983) and Terrasi and Airasian (1989). Terrasi and Airasian conducted factor analysis to study the relationship between adaptive behavior (as measured by the ABIC) and intelligence (as measured by the WISC-R). Two factors emerged from the analysis: one clearly representing an adaptive behavior dimension, and one representing an intelligence dimension. Upon factor rotation, a second, more distinct pattern of loadings emerged. The correlation between these two factors was low, supporting the claim for the distinctness of intelligence and adaptive behavior in the sample. Oakland (1983) refers to *the six-hour retardate:* a term coined for children who might be considered mentally retarded based on IQ scores and academic performance, but would not be considered mentally retarded based on their adaptive behavior and

'normal' functioning outside of school. That such a phenomenon exists suggests that adaptive behavior in children could be largely *unrelated* to intellectual ability and school achievement.

Meyers, Nihira, and Zetlin (1979), described features that distinguish adaptive behavior from intelligence. Adaptive behavior emphasizes everyday behavior, whereas intelligence emphasizes thought processes. Adaptive behavior focuses on common or typical behavior, whereas intelligence focuses on maximum performance. Adaptive behavior stresses nonabstract, nonacademic aspects of life, whereas intelligence stresses those aspects that are abstract and academic.

Adaptive behavior scales that emphasize underlying cognitive or school-related functions (typically those that are high in communication or language-based items) yield higher correlations with IQ scores than do scales that focus exclusively on out-of-school adaptive skills. Concomitantly, various domains within adaptive behavior are differentially related to IQ scores. Specifically, the communication/cognitive skills domain tends to be related most strongly, while social adjustment is associated to a lesser degree (found in Bruininks & McGrew, 1988; Harrison, 1985, and Lambert, 1976).

Adaptive Behavior, Intellectual Ability, and Academic Achievement

In reviewing the literature that showed a relationship between adaptive behavior and intelligence, Kamphaus (1987) was not able to find any evidence that adaptive behavior predicted academic achievement beyond that predicted by IQ. Oakland (1983) examined relationships of reading and math achievement with intelligence and adaptive behavior. The influence of IQ, adaptive behavior, SES, and race on reading and math achievement was determined through multiple linear regression analyses (using the

WISC-R and ABIC) and the California Achievement Test (CAT). The first analysis found that SES and race did not significantly predict achievement beyond the contributions made by IQ and adaptive behavior. Second, Oakland found that the contribution of adaptive behavior in predicting achievement was nonsignificant beyond that predicted by IQ. He concluded that joint use of IQ and AB measures would provide redundant information with respect to predicting achievement.

Popoff-Walker (1982), studied the effects of IQ, SES, and adaptive behavior on performance on a learning potential assessment task, which followed a test-train-test paradigm. The author's stated hypothesis is, "If both adaptive behavior and one's ability to benefit from training on a problem-solving task are indicators of adequate intellectual functioning and evidence to rule out mental retardation, one would expect there to be a relationship between learning potential and adaptive behavior" (p.225). The study sought to determine whether performance on a measure of learning potential could be enhanced by a training procedure. If so, the author speculated, perhaps such a systematic learning experience could minimize SES differences in measured abilities. Using ANCOVA, results indicated that the training procedure had a significant effect on the post-test scores (when pre-test scores were entered as covariate). In multiple regression analysis, IQ was the best predictor of pre-test and post-test scores, with adaptive behavior scores and SES contributing negligibly to the prediction of pre-test or post-test scores.

DiSibio (1993) studied the conjoint effects of intelligence and adaptive behavior on achievement in a sample of nondisabled students. Students were assessed with the Wechsler Preschool and Primary Scales of Intelligence, Revised (WPPSI-R) and the VABS, Classroom Edition. Two years later, data were collected on student achievement.

Results showed an overall moderate relationship between adaptive behavior scores and IQ scores. Achievement scores were related strongly to both IQ and adaptive behavior. However, multiple regression analyses revealed that little variance in achievement was accounted for by adaptive behavior once intelligence had been taken into account.

From these findings, it seems that the educational relevance of adaptive behavior measures lies not in their predictive ability (for academic achievement) but in their *diagnostic* (or confirmatory diagnostic) ability.

Adaptive Behavior and Autism

Adaptive behavior problems are found in individuals diagnosed with developmental disorders including autism. One consistent finding is that children with autism show deficits in the social domain relative to comparison groups. Another finding is that children with autism show greater variability in adaptive behavior than children with other developmental disabilities. Research has often addressed the question of how autistic children (with IQs in the MR range) differ from nonautistic children with mental retardation in cognitive development and adaptive functioning. Patterns of adaptive behavior in autistic children have been found to differ from those seen in individuals with mental retardation in several ways: adaptive functioning is lower in children with autism relative to IQ-matched comparison groups; children with autism typically show a more uneven pattern of skill development across different adaptive behavior domains; children with autism demonstrate a specific deficit in the area of socialization relative to other areas of adaptive behavior and relative to comparison groups matched on IQ or mental age. A relative weakness in the communication domain has also been reported for autistic samples; adaptive behavior in autistic populations tends to be impaired relative to

cognitive abilities; and discrepancies between intelligence and adaptive behavior found in children with autism are greater than those demonstrated by children with mental retardation, particularly in the areas of socialization and communication.

To elucidate these patterns, Volkmar and colleagues (1987; 1993), using the standardization sample from the VABS, found that children with autism had selective deficits in socialization and communication but not in daily living skills, relative to children with other disabilities (such as mental retardation, developmental language disorder, and PDD-NOS). When multiple regression analysis was completed, children diagnosed with autism had obtained socialization scores that were greater than two standard deviations below predicted levels for their chronological ages. Volkmar's studies demonstrate the apparent specificity of the socialization skill deficit in relation to other areas of adaptive functioning in children with autism.

Loveland and Kelley (1988), examined relationships among adaptive skills and measures of development (or ability) in adolescents and young adults with autism and Down Syndrome. The two groups were matched closely on ability level and chronological age. The authors compared performance of the groups on the three major domains of adaptive behavior: communication, daily living, and socialization. Results indicate that that autistic and Down Syndrome groups matched on ability did not differ in their overall adaptive functioning. Different patterns of adaptive behavior were displayed between the groups, though. For individuals with Down Syndrome, adaptive skills were comparable to their ability levels, whereas those with autism were delayed in communication and socialization relative to their ability levels. Later, Loveland and Kelley (1991) compared adaptive behavior in preschool children with autism and Down

Syndrome. The authors found that socialization scores were significantly lower for the children with autism than those with Down Syndrome. When Vineland scores were recalculated according to mental age rather than chronological age, this difference was still present. The authors conclude that social adaptive functioning of children with autism is more discrepant from overall developmental level than that of children with Down Syndrome.

Jacobson and Ackerman (1990), compared adaptive functioning among individuals classified as having autism and mental retardation by analyzing cross-sectional data. In the youngest age group, daily living skills were found to be superior in those individuals diagnosed with autism compared with their MR peers. In the adolescent group, daily living skills were again higher in children with autism; language, quantitative skills, and social skills were higher in the MR group. When age was controlled, these differences in skills were still identified (indicating differences between diagnostic groups, regardless of age). Differences diminished when older groups were compared, suggesting that there may be a plateau effect associated with adaptive functioning in individuals with autism as they grow older.

Rodrigue, Morgan, and Geffken (1991), studied low-functioning children with autism who were matched to children with Down Syndrome and a group of nondisabled children on demographics and overall adaptive behavior levels. They found a significant difference between the autistic group and the other two groups in the socialization domain. There was no difference in socialization between the nondisabled group and the MR group. The authors conclude that the socialization deficit found in autistic children

is not just a function of low developmental level, but is a specific deficit, not found in young normal children or in those with MR but not autism.

Using a cross-sectional analysis, Schatz and Hamdan-Allen (1995) examined the impact of age and intelligence (as measured by Performance IQ) on the pattern of adaptive skills (as measured by VABS domain scores) in children with autism versus mental retardation. Two sets of multiple regression analyses were conducted. The first set of analyses tested for age-related changes between the two groups for adaptive behavior scores. The second set of analyses tested for IQ-related changes between the groups. Findings suggest that the relationship between adaptive abilities in children with autism and MR varies according to IQ but not age. Children with autism showed impairments in the social domain as opposed to children with mental retardation, who did not. The unique finding of this study is that differences in socialization scores between autistic and non-autistic children seem to depend upon IQ level. A similar finding to other studies is that the profile of adaptive abilities across Vineland domains appears to depend upon IQ level in children with autism. For lower-functioning children, social deficits do not easily distinguish autistic children from children with other disabilities. However, with higher functioning children, the discrepancy in social skills is large on the Vineland. In conclusion, IQ level appears to affect the pattern of adaptive skills differently for children with autism versus those with MR.

To explore differences in adaptive behavior that cannot be accounted for by IQ, Vig and Jedrysek (1995), conducted a MANCOVA using IQ as covariate. In a population of preschool children diagnosed with developmental disabilities, when intelligence was controlled, the most significant differences occurred in Communication

and Socialization domains. Namely, children with autism and PDD-NOS differed from the other diagnostic groups (developmental delay, mild cognitive deficits) in both of these domains. This finding points to the uniqueness of developmental patterns (specific deficits in communication and social skills) for autistic spectrum disorders.

Carpentieri and Morgan (1996), studied the relationship between adaptive functioning and intellectual functioning in a sample of autistic and nonautistic intellectually disabled children. The groups were comparable in age and IQ. The findings showed that the autistic group had a substantially lower adaptive composite score than the MR group. These differences between the groups were due primarily to the much lower scores of the autistic group in the domains of socialization and communication. In the autistic group, a specific weakness in the socialization domain was the most striking contrast. The authors also investigated the ability of the Vineland to distinguish children with autism from nonautistic mentally retarded children. The profile of domain scores on the Vineland proved effective in distinguishing the two groups, especially due to the domains of socialization and communication. These differential profiles, the authors contend, confirm the clinical picture often found with autistic children and support the usefulness of the Vineland in the differential diagnosis of autism versus mental retardation.

Freeman, Del'Homme, Guthrie, and Zhang (1999), examined how Vineland scores in individuals with autism change as a function of age utilizing human growth modeling statistical techniques. The mixed linear model (MLM) was used to determine an individual's 'growth rate.' The major goal of the data analysis was to examine the change of VABS scores as a function of age, and to assess the effect of initial IQ on the

change in VABS scores. Subjects were divided into three groups based on their initial IQ scores (high, average, low). The authors found that the Communication domain showed a significant increase as a function of age in all three groups. Daily Living Skills also showed a significant increase as a function of age, but the high and average IQ groups had a significantly faster growth rate than the low IQ group. Social skills showed a significant increase as a function of age; but these changes were not related to IQ. Results indicate that the natural course of autism is one of improvement in adaptive skills with increasing age. Whereas individual growth in communication and daily living skills was dependent on IQ, improvement in social skills is was independent of IQ.

Stone, Ousley, Hepburn, Hogan, and Brown (1999), studied adaptive behavior in children less then three years of age in order to determine whether patterns could emerge for early identification of autism. A secondary purpose was to examine the degree to which cognitive and language skills are associated with adaptive behavior functioning. Subjects included children who had just received a diagnosis of autism or a (non-autistic) developmental delay. Findings revealed that the two groups did exhibit different patterns of adaptive behavior, and that these differences were accounted for primarily by low socialization and communication scores in the autistic group compared with the delayed (non-autistic) group. When language was used as a covariate, the same results were obtained (indicating that weak language skills did not account for this pattern). Since the groups were matched on both chronological age and mental age, the pattern could not be attributed to differences in cognitive level. This pattern (weaker socialization and communication scores in autistic children) was found in children as young as two years of age. These findings replicated those of previous studies using older populations;

namely, that there is a pattern of lower adaptive behavior skills compared to cognitive skills in children with autism. The greatest discrepancies between mental age and adaptive skills occurred in the communication and socialization domains for the autistic group. The fact that this pattern was found in children with autism as early as two years of age suggests it may be useful as an early marker in the identification of autism.

Kraijer (2000), reviewed studies which assessed the organization of adaptive skills in individuals with the dual disability of mental retardation and a Pervasive Developmental Disorder (PDD) in order to determine whether a general tendency is observable in the test results, independent of the measure being used. The author concluded that individuals with autism obtained significantly lower results on communication and socialization domains; daily living skills did not appear to be affected by the disability. These results were also obtained using a Dutch scale of adaptive behavior, with similar subdomains as the Vineland.

Bolte and Poustka (2002), investigated whether the association between adaptive and intellectual abilities in autism varies depending on the presence or absence of comorbid mental retardation. Data collected with the screening form of the VABS were compared to performance on Wechsler IQ measures (WISC-R, WAIS-R) in a sample of individuals with autism or PDD-NOS, with or without comorbid mental retardation. On average, the sample with autism or PDD showed higher intellectual functioning than adaptive behavior skills; they typically scored highest on daily living, lowest on socialization, with communication falling in between. The magnitude of adaptive behavior level and cognitive functioning differs primarily in higher-functioning individuals, and much less in lower-functioning individuals. So, concluding that IQ

typically exceeds adaptive behavior scores in individuals with autism may be limited to those with higher IQs. Regression analysis demonstrated that the relationship between adaptive behavior and IQ is stronger in the group with comorbid MR. In the cognitively normal group, the relationship between adaptive behavior and IQ is weaker. These findings indicate that intelligence and adaptive behavior are similar in low-functioning individuals, but are divergent in higher-functioning individuals.

Fisch, Simensen, and Schroer (2002), evaluated the development of adaptive behavior and cognitive abilities in children and adolescents diagnosed with autism compared with those with Fragile X Syndrome. The study consisted of 18 children diagnosed with autism who were matched with 18 children with Fragile X. A battery of the SB4 and the VABS was used as the basis for analysis. Findings revealed that young children with autism initially exhibited lower IQ scores than did same-aged children with Fragile X. Both diagnostic groups showed declines in IQ scores, however children with autism eventually showed a plateau in the decline of IQ score (whereas children with Fragile X continued to decline). Both diagnostic groups showed declines in adaptive behavior scores (composites and domains) as well. At first glance, this might seem like a regression in skills; however the authors caution that the declines in scores actually reflect the fact that these children acquire adaptive skills at slower rates. Consequently they fall further and further behind their non-disabled peers as they grow older. Children with autism exhibited significantly lower levels of adaptive behavior in general, as well as communication and socialization (specifically) compared with children with Fragile X syndrome.

Paul et al. (2004), examined specific aspects of adaptive behavior in two subject groups (those diagnosed with autism, and those diagnosed with PDD-NOS) to find out whether any of the behaviors help to differentiate the diagnoses. The authors believed that autism could be differentiated from both PDD-NOS and non-autistic developmental disorders by scores on the socialization and daily living scales of the Vineland. Individuals were selected and matched based on age and IQ ranges. Results indicated significant differences in scores between the autistic group and the PDD-NOS group on the Vineland domains of communication and socialization. No significant differences were found in the daily living skills domain. Using IQ as covariate, scores for the PDD-NOS group were still higher than scores for the autistic group. Significant differences between the autistic and PDD-NOS groups were seen on the following specific item sets: Communication-Expressive, socialization-interpersonal, socialization-coping, and daily living-community.

Adaptive Behavior and Mental Retardation

Lambert and Nicoll (1976), used the AAMD Adaptive Behavior Scale to compare dimensions of adaptive behavior in children diagnosed with mental retardation to their nondisabled peers. The authors proposed that, if a unique factor structure emerged in children with MR, this might have utility in differential diagnosis. The sample included students in regular classrooms and those assigned to (then called) EMR and TMR classrooms. Teacher ratings on the ABS were used. Two dimensions were revealed via factor analysis. The first was termed “functional autonomy” because it reflected qualities of adaptive behavior characterized by independent functioning supported by cognitive and physical development. The second dimension was termed “social responsibility”

because it reflected self-reflection, responsibility, and socialization. The results of the factor analysis yielded evidence that the dimensions of adaptive behavior are identical for children with and without mental retardation.

Bensberg and Irons (1986), compared the AAMD Adaptive Behavior Scale with the Vineland Survey form and Classroom edition in a population of mentally retarded individuals. Objectives of the study included assessing the relationships among the scales using raw and age equivalent scores, comparing parent and teacher ratings on the Vineland, and comparing age equivalent scores (from adaptive behavior measures) to mental age scores (from an intelligence test). Problems in the analysis arose when an inability to convert raw scores to standard scores and percentiles (due to inadequate norms for certain age groups) forced the authors to compare raw scores from the Vineland and ABS domains. However, a comparison of age equivalent scores on the Vineland with each student's mental age score (derived from the Stanford-Binet) revealed a moderately high relationship between adaptive and cognitive functioning.

Bruininks, McGrew, and Maruyama (1988), investigated the structure of adaptive behavior as a function of age and severity of handicap in various samples of individuals with or without mental retardation. Exploratory factor analysis was used, and the Scales of Independent Behavior (SIB) was the measure subjected to analysis. Results yielded a three-factor solution for preschool students without mental retardation (General development, practical academics, and personal responsibility). For school-age children without MR, the factor solutions consistently indicated that adaptive behavior is unidimensional (general development or personal independence) in this population. In the samples of individuals diagnosed with mental retardation, a two-factor solution

emerged with a large (70.5% variance) general factor and a small (7.9% variance) second factor. The second factor appeared to represent an academic/conceptual factor because the subscales with salient loadings were those emphasizing cognitive skills. When all samples were combined, a General Adaptive Behavior factor accounted for approximately 64% of the total variance, and the second and third factors (when present) accounted for approximately 10%. The occurrence of single-factor solutions during the years of formal education suggests possible differential environmental influences or expectations as a result of schooling. Another finding was a lack of any noticeable difference in the structure of adaptive behavior in samples with and without mental retardation.

Loveland and Tunali-Kotoski (1998), described that what is of interest about adaptive behavior in persons with mental retardation is not merely that it is delayed, but that its pattern of organization and trajectory of development varies with diagnostic classification, intellectual ability, and maturation. It also varies with the etiology of MR as well as the individual's environmental context. The authors found that the organization of adaptive behavior and its relationship to intellectual development varies with the etiology of MR as well as the age and IQ of the individual.

Balboni, Pedrabissi, Molteni, and Villa (2001), examined the discriminant validity of the Vineland Scales (i.e., the differentiation among the domains of adaptive behavior). The study compared Vineland scores of mentally retarded individuals with scores of individuals with MR *and* other specific disorders in communication, social behavior, or motor areas. The authors hypothesized that, if every scale measures with precision and accuracy the area it is intended to measure, then individuals with a communication

disorder should obtain lower scores than control participants on the communication scale, and so on. To confirm the discriminant validity of the VABS, the authors believed that: (1) individuals with a double disorder should obtain significantly lower scores on only those scales related to the domains affected by the specific disorder (as compared to controls), and (2) no significant differences should be observed between the scores obtained by the two groups in the other domains. Their results met both conditions; all the individuals with a specific disorder revealed a pattern of adaptive behavior significantly different from that of the controls, and the scores they obtained were lower only in the areas corresponding to their specific disorder. The findings suggest adequate discriminative ability of the Vineland.

DeBildt, Kraijer, Systema, and Minderaa (2005), examined the psychometric properties of the Vineland in children and adolescents with mental retardation in a Dutch sample. The study authors contend that the Vineland is well developed and well studied for measuring adaptive functioning in children and adolescents with mental retardation. The authors believed that increased insight into the psychometric properties would contribute to more evidence-based use of the Vineland in this population. First, the authors examined the *structure* of the VABS, via factor analysis. Findings indicate one central, underlying construct, with three recognizable subdomains in individuals with mild to moderate levels of functioning. This is identical to the structure delineated by the authors of the Vineland. However, in the severe/profound levels of functioning, the structure of the sub-domains did not hold up as well. When adaptive scores were compared to intelligence scores, low correlations were found in individuals with mild to moderate mental retardation. However, relatively high correlations between adaptive

scores and intelligence scores were found in individuals with severe/profound mental retardation. These findings provide support for the authors' contention that IQ and adaptive behavior are most related in more severely disabled populations.

Adaptive Behavior and Learning Disabilities

The concept of adaptive behavior is not included in the definition of learning disabilities, and adaptive behavior measures are not commonly used in the identification of learning disabilities. However, it would be false to conclude that children with learning disabilities do not have deficits within certain areas of adaptive functioning. They may, and such deficits are emerging as children with learning disabilities are being included in the research on adaptive behavior. Although fewer studies of adaptive behavior in learning disabled students exist (as compared to more severely disabled children), research in this population is becoming more prevalent. There is some evidence that assessment of adaptive behavior may help identify learning disabilities, their subtypes, or may assist practitioners in differential diagnosis. Some researchers have suggested that adaptive behavior measures be used to identify appropriate placement options for learning disabled students. For example, Bender and Golden (1988) assert that the effectiveness and degree to which a child's behavior meets the standards of a particular educational setting should be assessed prior to (instead of after) determining the appropriate placement for the child.

Strawser and Weller (1985), investigated whether subtypes and severity of learning disabilities could be established when scores from intelligence, achievement and language measures were used in conjunction with adaptive behavior measures. One hundred twelve school-age students who were diagnosed with learning disabilities using

a discrepancy model composed the sample. The authors examined (a) the *number* of discrepancies displayed by each subject (the number of instances found in which the achievement scores were significantly lower than the ability scores); and (b) the *degree* of discrepancy displayed by each subject (the degree of discrepancy found across ability/achievement comparisons). Based on these criteria, the sample was divided into three groups representing three levels of disability severity. The groups were then compared on the basis of their adaptive behavior scores to see if this criterion would further differentiate the sub-types of learning disabilities. The results of the study reinforce that the learning disabled population is a heterogeneous one. The findings were reported in terms of the characteristics of the three groups. The first group was described as possessing average intellectual ability, mild to moderate levels of adaptive behavior, and discrepancy only in academic skills. This subgroup was found to be consistent with the description of mild learning disabilities. Performance deficits did not interfere with their adaptive capabilities, no vast processing disorders were observed, and there was a low correlation between academic performance and adaptive behavior skills. The second group was described as possessing average intellectual ability, moderate to severe adaptive behavior deficits, and a significantly greater number and degree of discrepancy in both academic and processing skills. This subgroup was found to be consistent with the description of severely disabled students. A moderate correlation was observed between academic skills and adaptive behavior skills in this group. The third group was described as possessing borderline to low average intellectual ability and few to no discrepancies between ability and performance in either academic or processing areas. This subgroup might be considered a slow-learner (and possibly not learning disabled)

group. Low correlations were found between adaptive behavior scores and the number and degree of academic and processing discrepancies. The authors conclude that identifying subgroups of learning disabilities can be appropriately determined by adaptive behavior assessments rather than relying on discrepancies in academic or processing skills alone.

Leigh (1987), compared the adaptive behavior of school-age children diagnosed with learning disabilities and mental retardation using children with normal intelligence as controls. In addition, the authors investigated how summary adaptive behavior scores, as well as specific domain scores, differ between elementary level and secondary level LD students. The scores used as the basis for comparison were derived from the Adaptive Behavior Inventory (ABI). The ABI contains four sub-scales: self-care, communication, social skills, academic skills, and occupational skills. Mean ABI scores for the LD group were found to be significantly less than the mean for the normal intelligence group, but were significantly higher than the mean for the MR group. When the LD group was divided into subgroups by age, the elementary level subjects scored significantly lower on the academic skills sub-scale compared to all other sub-scales. The highest mean scores for the elementary age subjects were on the self-care and social skills sub-scales. At the secondary level, the lowest mean score was obtained on the communication skills scale. The highest mean scores were obtained on the self-care skills and social skills sub-scales. The overall performance in adaptive behavior skills declined from the elementary to the secondary level. The most sizable decrease in performance between the two age levels occurred in the communication skills scale.

These findings imply a gradually increasing deficit in communication skills as children with learning disabilities grow older.

Bender and Golden (1988), defined adaptive behavior as the ability to use language in classroom social situations, produce information in the classroom, and socially cope with the demands of the environment. This definition deviates somewhat from the AAMR definition, yet still emphasizes communication and social skills as important aspects of adaptive behavior. The authors compared the adaptive behavior of learning disabled and non-learning disabled students. Subjects were 54 learning disabled students in grades 3 through 6 who were matched with non-LD students of comparable demographics. The results indicated that teachers rated the adaptive behavior characteristics of learning disabled students much lower than their non-disabled peers. When given self-reports, the learning disabled children did not accurately perceive their own adaptive behavior in areas which involved social relationships. The authors state, "this is consistent with previous research which has demonstrated that LD children are less able to identify social cues and interact in social situations than non-LD children" (p.58). Given these findings, the authors suggest that measuring adaptive behavior as part of an assessment may prove useful in identifying learning disabled students.

In summary, most research findings have established a relationship between intellectual functioning and adaptive behavior in children with disabilities. However, some mixed results exist, which suggest that the two are not as closely related as popularly believed. This study aims to examine this relationship in children with autism, mental retardation, and specific learning disabilities. Most of the research examining the structure and organization of adaptive behavior domains has established a distinction

between communication, socialization, and daily living. This study will review strengths and weaknesses in these domains among the three exceptionality groups. Only a few studies have attempted to view adaptive functioning as it exists independently of intellectual functioning, and the findings were mixed. This study aims to explore whether adaptive behavior can explain differences between groups beyond what would be explained by intelligence. Finally, studies have generally shown adaptive characteristics to differentiate between disabled and non-disabled groups. It is believed that there is some differential ability of adaptive scales to separate diagnostic groups as well. This study aims to identify which adaptive characteristics are able to discriminate between autism, mental retardation, and learning disabilities.

CHAPTER 3

METHOD

Subjects. Participants were chosen by reviewing special education rolls from selected schools in a large urban school district. Students who met specific diagnostic criteria were selected and then the author reviewed archive records for each student. Subjects who also met specific assessment criteria (i.e., their files contained test scores from chosen instruments) were ultimately included in the study.

The participating school district enrolls 188,547 students, from the following ethnic backgrounds: 0.2% American Indian; 5.5% Asian; 64.9% Black; 15.5% Hispanic; 14.0% White. Twelve and six tenths percent of the district population are identified as students with disabilities and enrolled in special education programs. A total of 23,761 students receive special education services in the district. Of this total, 3.2% are diagnosed with autism, 13.9% are diagnosed with mental retardation, and 58.0% are diagnosed with specific learning disabilities. The demographic makeup of the special education population can be found in table 3-1.

Table 3-1

Ethnic Background for Special Education Students and District as a Whole

	Spec. Ed.	District
American Indian	0.3%	0.2%
Asian	1.7%	5.5%
Black	65.7%	64.9%
Hispanic	15.7%	15.5%
White	16.6%	14.0%

Subjects selected for this study were in grades K-12 and had been identified as having autism, mental retardation, or a specific learning disability based on the following criteria outlined in the Individuals with Disabilities Education Act:

- "*Autism* means a developmental disability significantly affecting verbal and nonverbal communication and social interaction, generally evident before age 3, that adversely affects a child's educational performance. Other characteristics often associated with autism are engagement in repetitive activities and stereotyped movement, resistance to environmental change or change in daily routines, and unusual responses to sensory experiences…"
- "*Mental Retardation* means significantly subaverage general intellectual functioning, existing concurrently with deficits in adaptive behavior and manifested during the developmental period, that adversely affects a child's educational performance."
- "*Specific Learning Dis□ability* means a disorder in one or more of the basic psycho□logical processes involved in understanding or in using language, spoken or written, which disorder may manifest itself in the imperfect ability to listen, think, speak, read, write, spell, or do mathematical calculations. The term includes such conditions as perceptual disabilities, brain injury, minimal brain dysfunction, dyslexia, and developmental aphasia."

Subjects identified as having comorbid autism and mental retardation were not selected for inclusion in the study. Therefore, the autistic group consisted of students with autism and *not* mental retardation; similarly the mental retardation group consisted of students with mental retardation and *not* autism. A review of records determined which students were selected based on the types of assessments given as part of a multi-disciplinary evaluation. Subjects were selected if their records include:

- A full scale IQ score from a Wechsler scale (WISC-III, WISC-IV, WPPSI-III, or WAIS-III); Stanford-Binet, Fifth edition (SB5); Stanford-Binet, Fourth edition (SB4) or Reynolds Intellectual Assessment Scales (RIAS)
- A Vineland Adaptive Behavior Scale—Classroom edition (VABS, VABS-II); or Adaptive Behavior Assessment System—Teacher form (ABAS, ABAS-II)

For the adaptive measures, teacher or classroom ratings were selected for inclusion. This decision was based on: (1) the desirability of involving teachers in the assessment process since they ultimately will be relied upon to deliver programs for exceptional children, and (2) the convenience of obtaining teacher ratings as part of a school's multidisciplinary evaluation.

The complete sample consisted of 76 students. Descriptive characteristics of the disability groups and of the sample as a whole are presented in table 3-2.

Table 3-2

Descriptive Characteristics of the Sample by Disability and as a Whole

	AUT	MR	SLD	Full Sample
N	22	33	21	76
% of Sample	29%	33%	21%	100%
Age				
Mean	7.95	10.39	8.71	9.30
SD	3.69	2.78	1.93	3.02
Range	5-17	5-14	5-14	5-17
Gender				
% Female	32%	27%	43%	33%
% Male	68%	73%	57%	67%
Ethnicity				
% African-American	91%	100%	90%	95%
% Caucasian	9%	0%	10%	5%

Note. AUT= Autism; MR= Mental Retardation; SLD= Learning Disabled

Instrumentation

Intellectual ability. The full-scale score was used in the analysis because it represents the most reliable indication of the student's overall cognitive functioning and it is most readily available in student data records. Full scale scores from the Wechsler, Stanford-Binet, and Reynolds Intellectual Assessment Scales (RIAS) were included because they are comprised of both verbal and nonverbal (or performance) cognitive skills. Tests that

are administered nonverbally, or tests that primarily tap nonverbal intelligence skills, were not used because they do not always correlate highly with other traditional, verbally-administered measures of intelligence.

Statistical Properties of the Intellectual Measures

According to the *Standards,* reliability estimates above .80 are necessary and those above .90 are highly desirable for tests used to make decisions about individuals (AERA, APA, & NCME, 1999). For each measure selected, the authors purport to have established satisfactory levels of the statistical properties of reliability (consistency, stability, interscorer agreement) and validity (content, structure, relations to external variables, and outcomes of testing). For each measure selected, the full-scale or composite score is converted to a normalized scale with a mean of 100 and a standard deviation of 15 (with the exception of the Stanford-Binet, Fourth Edition which is normalized with a mean of 100 and a standard deviation of 16).

The Wechsler scales (WISC-III, WISC-IV, WAIS-III, WPPSI-R, WPPSI-III) are individually administered instruments for assessing the cognitive abilities of children, adolescents, and adults. The Wechsler scales provide composite scores that represent intellectual functioning in specified cognitive areas, as well as providing a composite score that represents an individual's general intellectual ability. The Wechsler assessments have a substantial history of acceptable standards for reliability and validity.

The Stanford-Binet, Fourth Edition and Fifth Edition are individually administered instruments for assessing the cognitive abilities of children and adults. The Fifth Edition was published in 2003 and provides a Full Scale IQ that is considered by the authors to be the standard measure of global intellectual ability (Roid, 2003). The authors

report that reliability coefficients for the Full Scale IQ scores were extremely high and consistent across age groups. The authors also report that acceptable standards for content, criterion, and construct validity were established through various analyses.

The Reynolds Intellectual Assessment Scales (RIAS) is an individually administered test of intelligence with a supplemental measure of memory. The RIAS provides a Composite Intelligence Index (CIX) that is a summary estimate of global intelligence. According to the authors, reliability estimates of RIAS indexes are of sufficient magnitude to allow confidence in the consistency and stability of test scores over time (Reynolds & Kamphaus, 2003). The authors purport the RIAS to have satisfactory estimates of validity based on a number of analyses, most establishing the strongest interpretive support for the CIX (Reynolds & Kamphaus, 2003).

Table 3-3 provides intercorrelations among the composite scores of the cognitive measures used in this study.

Table 3-3

Intercorrelations for Full-Scale Scores on the Cognitive Assessment Measures

	WISC-III	WISC-IV	WPPSI-R	WPPSI-III	WAIS-III	SB4	SB5	RIAS
WISC-III	__							
WISC-IV	.89	__						
WPPSI-R	.85	*	__					
WPPSI-III	*	.89	.85	__				
WAIS-III	*	.89	*	*	__			
SB4	*	*	*	*	*	__		
SB5	.84	*	.83	*	.82	.90	__	
RIAS	.76	*	*	*	.75	*	*	__

* *Data not available*

Adaptive behavior. Adaptive behavior was measured using the Vineland Adaptive Behavior Scales—Classroom edition (VABS, VABS-2) and the Adaptive Behavior Assessment System—Teacher form (ABAS, ABAS-2).

The VABS (and VABS-2) assesses adaptive behavior through the administration of the scales to an informant (typically a parent or teacher) who is asked to describe the child's everyday behavior in four domains: Communication, Daily Living, Socialization, and Motor skills. Standard scores are calculated for each domain; these domain scores can be combined to yield an adaptive behavior composite score. The VABS was standardized with national samples of handicapped and nonhandicapped individuals representative of the population. The authors purport that both the Vineland and the Vineland-2 meet satisfactory standards of reliability and validity.

The ABAS (and ABAS-2) provides a comprehensive, norm-referenced assessment of adaptive skills, with opportunities for multiple respondents (parent, teacher and self) in order to evaluate functioning across multiple settings. This approach contributes to a complete assessment of the daily, functional skills of an individual. Specific skill areas measured by the ABAS can be combined into three categorical domains: Conceptual (communication and academic skills), Social (interpersonal and social competence skills) and Practical (independent living and daily living skills). The ABAS (and ABAS-2) was standardized with national samples, including individuals with typically developing skills and those identified as having disabilities. The samples were representative of the US population. The authors contend that the measures have good psychometric properties and meet satisfactory standards for reliability and validity. Table 3-4 shows the intercorrelations between composite scores on the Vineland and ABAS.

Although the overall adaptive composite score was collected as data in order to establish its relationship with general cognitive functioning, of particular interest in this study is the examination of the subdomains corresponding to communication skills, daily living skills, and socialization skills.

Table 3-4

Intercorrelations for AB Composite Scores Among the Assessment Measures

	VABS	VABS-2	ABAS	ABAS-2
VABS	__			
VABS-2	.86-.87*	__		
ABAS	**	**	__	
ABAS-2	.82	.52-.70*	**	__

* depending on age group

** *Data not available*

Procedure. Data were collected through a review of records according to Temple University's policy on archival research. As mentioned, subjects were selected based on their diagnostic classification as well as archived test scores that included one of the cognitive measures cited *and* one of the adaptive behavior measures cited. The author and several volunteer colleagues reviewed student confidential files to determine which records met criteria for inclusion in the study. From each student file, the following data were gathered: exceptionality (Autism, Mental Retardation, or Specific Learning Disability); age; gender; ethnicity; full scale IQ, Adaptive Behavior Composite; Socialization score; Communication score; Daily Living score. At no point was the student's name recorded as part of the data collection. This was to ensure that the student data remained anonymous and so individuals could not be identified by reviewing the data set. The database was created and maintained through Excel.

One of the difficulties the examiner encountered during subject selection was that there were few students classified as learning disabled who had adaptive behavior assessments administered during their multidisciplinary evaluations. This is because administering adaptive behavior assessments is not common practice for learning disability evaluations, unless an individual's IQ is low enough that adaptive measures were needed to rule out mental retardation. Although it is more common to administer adaptive behavior assessments to students with autism, again these were mostly students with low IQs. This resulted in a sample where the students with mental retardation (N=33) outnumbered the students with both learning disabilities (N=21) and autistic spectrum disorders (N= 22).

CHAPTER 4

RESULTS

Data analysis consisted of four procedures: basic correlations, multivariate analysis of variance (MANOVA), multivariate analysis of covariance (MANCOVA), and discriminant function analysis (DISCRIM).

A Pearson correlation analysis was used to determine the relationship between intellectual functioning and adaptive behavior in the three diagnostic groups of autism (AUT), mental retardation (MR) and specific learning disability (SLD), as well as in the sample as a whole. The full-scale IQ score (FSIQ) was compared to the adaptive behavior composite score (AB Comp) to generate the correlations found in Table 4-1.

Table 4-1

Pearson Correlations Between FSIQ and AB Comp by Exceptionality Group

	FSIQ			
	AUT	MR	SLD	Full Sample
AB Comp	.51*	.23	.28	.62**

Note. FSIQ= Full Scale IQ; AB Comp= Adaptive Behavior Composite; AUT= Autism group; MR= Mental Retardation group; SLD=Learning Disabled group.
* $p<.05$. ** $p<.01$.

In the full sample, the relationship between FSIQ and AB Comp was found to be significant, with a moderate correlation. However, the main focus of this study was to examine the relationship between cognitive and adaptive functioning among the distinct diagnostic groups. In the autism group, the correlation between FSIQ and AB Comp was also significant and moderate, as expected.

Contrary to expectations, the correlation between FSIQ and AB Comp in the mental retardation group was not significant and in fact was quite low. Similarly, the correlation between FSIQ and AB Comp in the learning disabled group was low.

To determine if the diagnostic groups differed in their performance on the sub-areas of adaptive behavior, multiple analysis of variance (MANOVA) was performed. The adaptive behavior domains of socialization (SOC), communication (COM) and daily living skills (ADL) were the dependent variables placed into a MANOVA by exceptionality group (the independent variable). Means for full-scale IQ and adaptive behavior subdomains by exceptionality group are presented in Table 4-2.

Results of the analysis are presented in Table 4-3.

Table 4-2

Means for Full-Scale IQ and Adaptive Behavior Subdomains by Exceptionality

	Autism		Mental Retardation		Learning Disabled	
	M	*SD*	*M*	*SD*	*M*	*SD*
FSIQ	70.61	14.49	51.94	9.62	76.76	8.17
SOC	68.41	10.53	64.52	10.14	83.95	11.64
COM	70.59	13.01	58.33	7.69	74.48	12.29
ADL	74.82	14.46	61.33	9.11	83.71	12.41

Note. FSIQ=Full-Scale IQ; SOC= Socialization; COM= Communication; ADL= Activities of Daily Living

Table 4-3

MANOVA Results of Adaptive Behavior Sub-Areas by Exceptionality

Effect	Value	F	Sig	Partial Eta Squared
Exceptionality				
Wilks' Lambda	.455	11.424	.000*	.326

* $p<.05$.

The overall effect in the MANOVA was statistically significant $F(6, 142)= 11.424$; Wilks' Lambda= .455; partial eta squared= .326. This finding indicates the three exceptionality groups did, in fact, differ on their adaptive behavior domain performance. Approximately 33% of the variance between groups is explained by their performance on adaptive behavior sub-areas. When the results for the dependent variables were considered separately in Post-Hoc analysis (Tukey HSD), the results are presented in Table 4-4.

Table 4-4

Results of MANOVA and Post-Hoc Test

AB Sub-Area	F	Sig.	Partial Eta Squared	Post-Hoc
SOC	22.169	.000*	.378	MR=AUT < SLD
COM	16.828	.000*	.316	MR < AUT=SLD
ADL	24.452	.000*	.401	MR < AUT < SLD

Note. SOC= Socialization; COM= Communication; ADL= Activities of Daily Living
MR= Mental Retardation; AUT= Autistic; SLD= Specific Learning Disability
* $p<.05$.

All three groups significantly differed from each other in the following ways:

- In the socialization (SOC) domain, children with Mental Retardation (*M*=64.52*, SD*=10.14) did not differ from children with Autism (*M*=68.40*, SD*=10.53), but both performed significantly lower than children with Learning Disabilities (*M*=83.95*, SD*=11.64).
- In the communication (COM) domain, children with Mental Retardation (*M*=58.33, *SD*=7.69) performed significantly lower than children with Autism (*M*=70.59*, SD*=13.01) and children with Learning Disabilities (*M*=74.48*, SD*=12.29), who did not differ from each other.
- In the daily living skills (ADL) domain, all three groups differed. Children with Mental Retardation (*M*=61.33, *SD*=9.11) performed significantly lower than children with Autism (*M*=74.82*, SD*=14.46) who performed significantly lower than children with Learning Disabilities (*M*=83.71*, SD*=12.41).

One of the main questions in this study involved examining the adaptive behavior domains of socialization, communication, and activities of daily living exclusive of their relationship to general intellectual functioning. Using IQ as covariate, multiple analysis of covariance (MANCOVA) was used to determine how the diagnostic groups fared in the sub-areas of adaptive functioning when IQ was controlled. The dependent variables were the adaptive behavior domains of socialization (SOC), communication (COM) and daily living skills (ADL) and exceptionality group was the independent variable, with IQ as covariate. Unadjusted and adjusted means for the adaptive behavior sub-areas by exceptionality group are presented in Table 4-5.

Table 4-5

Unadjusted and Adjusted Means for Exceptionality by Adaptive Sub-Area

		Communication	
	N	Unadjusted Means	Adjusted Means
Autism	22	70.59	67.44
Mental Retardation	33	58.33	63.48
Learning Disabled	21	74.48	69.69
		Activities of Daily Living	
	N	Unadjusted Means	Adjusted Means
Autism	22	74.82	71.39
Mental Retardation	33	61.33	66.94
Learning Disabled	21	83.71	78.50
		Socialization	
	N	Unadjusted Means	Adjusted Means
Autism	22	68.41	66.63
Mental Retardation	33	64.51	67.42
Learning Disabled	21	83.95	81.25

In examining the means for the communication domain, each group saw a change in performance once general intelligence was controlled. The autism and learning disabled groups had a decrease in scores, while the mental retardation group had an increase. In the daily living skills domain, the autism and learning disabled groups also had a decrease in scores while the mental retardation group had an increase. Finally, in the socialization domain, again the autism and learning disabled groups had a decrease in

scores while the mental retardation group had an increase. Table 4-6 shows the MANCOVA results.

Table 4-6

MANCOVA Results with Adaptive Behavior Sub-Areas by Exceptionality

Effect	Value	F	Sig	Partial Eta Squared
Exceptionality				
Wilkes' Lambda	.690	4.749	.000*	.169

* $p<.05$.

As expected, there were still significant differences between the exceptionality groups after covariance. However, only 17% of the variance between groups is explained by adaptive behavior performance now that IQ has been controlled for. Table 4-7 shows the levels of significance when the dependent variables were considered separately, as well as the pattern of adaptive behavior domains in the disability groups without the effects of IQ.

Table 4-7

Differences between Disability Groups and Pattern of AB domains Exclusive of IQ

AB Sub-Area	F	Sig.	Partial Eta Squared	Pattern
SOC	11.160	.000*	.237	MR=AUT < SLD
COM	1.312	.276	.035	MR=AUT=SLD
ADL	4.166	.019*	.104	MR < AUT < SLD

Note. SOC= Socialization; COM= Communication; ADL= Activities of Daily Living
MR= Mental Retardation; AUT= Autistic; SLD= Specific Learning Disability
* $p<.05$.

After adjusting for IQ, there were still significant differences between the three groups in the adaptive domains of socialization [$F(2,72)=11.16$, $p=.000$, partial eta squared= .237] and daily living skills [$F(2,72)=4.17$, $p=.019$, partial eta squared= .104], but *not* communication [$F(2,72)=1.31$, $p=.276$, partial eta squared= .035]. In other words, after extracting IQ, no more variance between the groups is explained by communication skills.

In order to examine the pattern of adaptive skills in the three populations, findings from the MANOVA and MANCOVA are presented differently in Table 4-8.

Table 4-8

Pattern of Adaptive Domains by Exceptionality, Before and After IQ Covariance

	Autism		Mental Retardation		Learning Disabled	
	Before	*After*	*Before*	*After*	*Before*	*After*
Strongest	ADL	ADL	SOC	SOC	SOC	SOC
Middle	COM	COM	ADL	ADL	ADL	ADL
Weakest	SOC	SOC	COM	COM	COM	COM

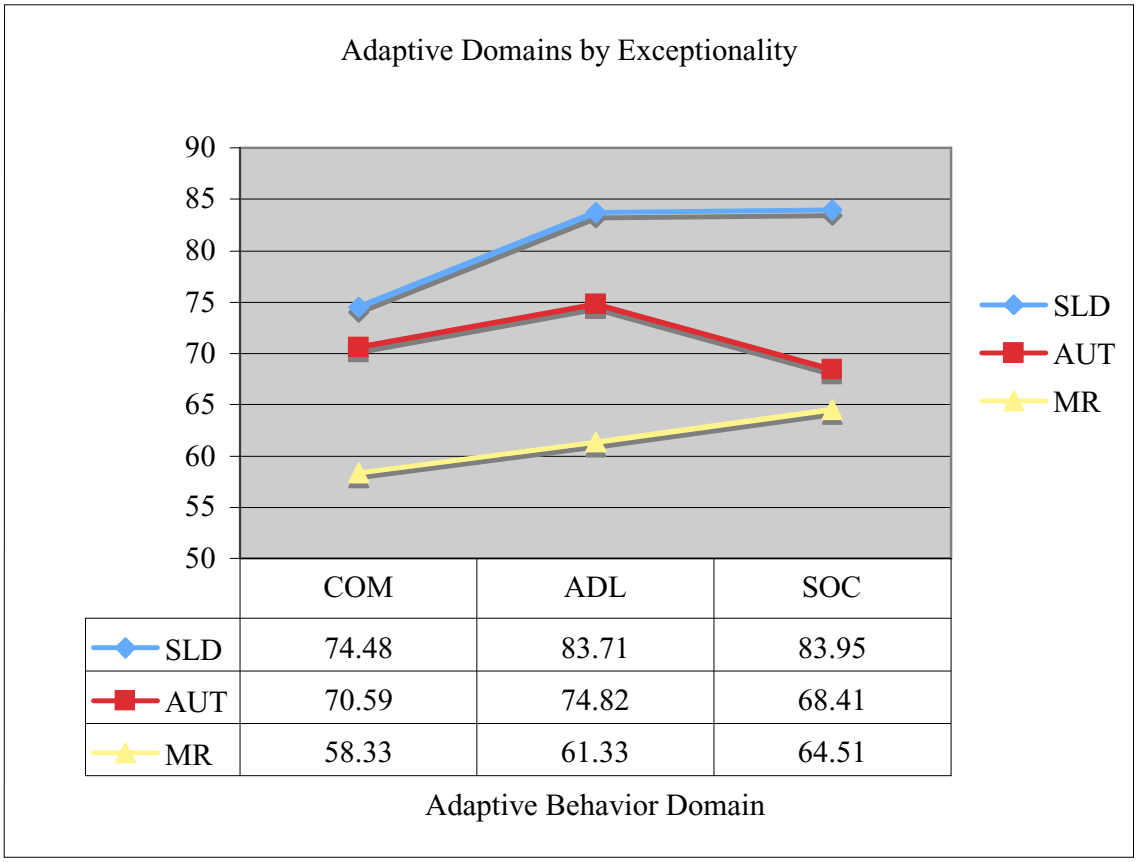
Note. SOC= Socialization; COM= Communication; ADL= Activities of Daily Living; Before= Before Covariance; After=After Covariance

The results show that the patterns of adaptive domains remained the same for each population, both before and after the analysis of covariance. The following patterns emerged:

- In the autistic group, the strongest skills were found to be in activities of daily living. Communication skills fell in the middle, and the weakest skills were in the socialization domain.

- In the mentally retarded group, the strongest skills were found to be in socialization. Daily living skills fell in the middle, and communication skills were the weakest.
- In the learning disabled group, the pattern matched that of the mentally retarded group, with stronger skills in socialization, daily living skills in the middle, and weaker communication skills.

A visual representation of the adaptive domain pattern in each group is presented in Figure 4-1.



	COM	ADL	SOC
SLD	74.48	83.71	83.95
AUT	70.59	74.82	68.41
MR	58.33	61.33	64.51

Figure 4-1

Adaptive Domain Performance for the Exceptionality Groups

Finally, a discriminant function analysis was conducted to determine if performance on the adaptive domains could differentiate between the diagnostic groups. Descriptive characteristics including age, ethnicity, and gender, were also included in the analysis to determine if these variables could differentiate between the groups. Table 4-9 shows the number of factors that emerged from the analysis and Table 4-10 shows the significance of these functions.

Table 4-9

Summary of Canonical Discriminant Functions

Function	Eigenvalue	% of Variance	Cumulative %	Canonical Correlation
1	1.560	79.3	79.3	.781
2	.407	20.7	100.0	.538

These results indicate that two functions emerged, explaining 79.3% and 20.7% of the variance, respectively.

Table 4-10

Test of the Significance of the Functions

Test of Function(s)	Wilkes' Lambda	Chi-Square	df	Sig.
1 through 2	.278	89.711	14	.000
2	.711	23.918	6	.001

* $p<.05$.

These results indicate that both of the functions are significant. Table 4-11 illustrates the variables that compose the functions and Table 4-12 shows the distribution of the groups according to functions 1 and 2.

Table 4-11

Assessment Variables that Define Function 1 and Function 2

	Function 1	Function 2
FSIQ	.853*	-.153
ADL	.649*	.173
COM	.544*	-.023
Age	-.252*	.218
Ethnicity	.166*	-.063
SOC	.525	.661*
Gender	.099	.099*

Note. FSIQ= Full Scale IQ; SOC= Socialization; COM= Communication; ADL= Activities of Daily Living

These results indicate that the variables composing Function 1 are: full scale IQ (FSIQ), activities of daily living (ADL), communication (COM), Age, and Ethnicity. Function 2 is made up of the remaining variables, socialization (SOC) and Gender.

Table 4-12

Distribution of Exceptionality Groups According to Functions

Excep	Function 1	Function 2
AUT	.687	-.915
MR	-1.361	.160
SLD	1.419	.706

Note. AUT= autism group; MR= mental retardation group; SLD= learning disabled group

These results show that Function 1 is discriminating the MR group from the autistic group and the learning disabled group. In other words, their performance on measures of IQ, daily living, and communication discriminates the MR group from the other two. Although age and ethnicity contributed to function 1, their effects were very little. Function 2 is discriminating the autism group from the MR group and the learning disabled group. In other words, their performance on measures of socialization discriminates the autism group from the other two. Gender also contributed to function 2, but its effect was very little.

CHAPTER 5

DISCUSSION

Summary of Results

The findings of this study support previous findings that there is a moderate and positive relationship between IQ and adaptive behavior among students with disabilities. However, contrary to expectations, this finding was not universal across the three disability groups. In the autism group, the relationship between IQ and adaptive behavior was positive and moderate, but the relationship between IQ and adaptive behavior in the mental retardation group and the learning disabled group was quite low. Possible reasons for this finding will be discussed in the *limitations* section.

Next, the study findings suggest that the groups did, in fact, differ in their performance on the subdomains of adaptive behavior. One-third of the variance between the diagnostic groups can be explained by their performance on the socialization, communication, and daily living domains. However, the pattern of adaptive skills for each diagnostic group is unique.

For children with autism, activities of daily living (ADL) could be considered a relative strength, although this sample's mean ADL score was still below average. Communication and socialization skills are weaknesses, with social skills being the most notable deficit. A problem of sampling could explain why the subdomain means in the sample were so low. Certainly, there are children with autistic spectrum disorders who have average skills in daily living and communication, but were not included in the study since they had either not been referred, or a multi-disciplinary evaluation did not

complete adaptive behavior assessments as they were judged to be "higher functioning." Since archival data were used, results were limited by what was available.

Children with mental retardation were found to have the lowest levels of adaptive functioning overall. However, socialization (SOC) skills could be considered a relative strength, even though this sample's mean SOC score was still significantly below average. Among children with cognitive skills that are extremely low, a practitioner who finds an adaptive subdomain to be somewhat higher (usually described as "evidence of higher functioning" in multidisciplinary evaluation reports), might not conclude with a diagnosis of mental retardation at all. This phenomenon of declassification (or misclassification) based on a single score could disguise relative strengths in socialization among the MR population, simply because children with relatively higher social skills might not ever be classified as having mental retardation. Practitioners may be hesitant to conclude with a diagnosis of mental retardation, when any one piece of data (i.e., a single subtest score or an adaptive behavior subdomain) that is *slightly* higher, despite all other evidence suggesting the presence of intellectual disability. In general, children with mental retardation probably have somewhat higher socialization skills than this study suggests.

The learning disabled population was found to have the highest overall adaptive functioning, but showed significantly more deficits in their communication skills. This finding supports that of previous research in both cognitive and adaptive behavior assessment. It is well-established in the research on learning disabled individuals that there is a discrepancy between their nonverbal and verbal cognitive skills. This phenomenon may actually define the disorder and may be the cause of the deficit in

communication skills found on adaptive assessments. The children with learning disabilities in this study's sample did have social and daily living skills that were in the normal range, however they were at the lower end of this range. This suggests that the learning disabled sample in this study was relatively homogenous; they could be considered lower-functioning than the majority of children with learning disabilities who have IQs in the average range.

In addition to investigating the pattern of adaptive skills in the three populations, the groups were also compared on the subdomains. In the socialization domain, the autism and mental retardation groups did not differ in their performance, but they did perform significantly lower than the learning disabled group. This means that children with autism and mental retardation are comparable in this domain. Even though children with mental retardation do not have the characteristic social "oddness" that is seen in children with autism, their deficits are still remarkable when compared to non-disabled peers. It is likely that these groups did not differ in this domain because adaptive behavior assessments do not include questions specifically addressing the social peculiarities inherent in autism. The children with learning disabilities scored highest in socialization, in the normal range (although at the lower end). This finding suggests that children with both mental retardation and autism will need explicit instruction and practice to build socialization skills that most other children learn incidentally.

In the communication domain, the mental retardation group performed significantly lower than the autism and learning disabled groups, who did not differ from each other. Although initially unexpected, given that autistic children are known to experience deficits in both socialization and communication, this finding suggests that the

learning disabled group has a unique deficit in communication, and not that they were the only group with concerns in this area. That the sample of learning disabled and autistic children in this study had comparable communication skills suggests that the learning disabled group could be characterized as lower-functioning (with lower IQs). As the sample size for the LD students was small (N=21), it is probably not representative of all learning disabled children (as they typically do not have the severe communication deficits more commonly seen in autism). Findings from the communication domain suggest that all three groups will need some specialized instruction or accommodations to build communication skills to some degree. Even though the learning disabled group outperformed the other groups, communication was still found to be a relative deficit.

Finally, in the daily living skills domain, children with mental retardation had the lowest skills (as expected). Children with learning disabilities had the highest skills, falling in the normal range (although at the lower end). Children with autism fell in the middle. This finding was commensurate with initial expectations based on experience as a practitioner. Most students with learning disabilities do not need special instruction in daily living skills, while most children with mental retardation and lower-functioning autism need a substantial amount of specialized instruction in activities of daily living (including feeding, toileting, dressing, and functioning in the community).

The findings supported that IQ is related to adaptive behavior patterns. When intellectual level was factored out, the pattern of adaptive functioning remained the same within each exceptionality group (e.g., COM remained a deficit for the SLD group and SOC remained a deficit for the AUT group). This means that the pattern of adaptive functioning in the disability groups is probably not explained solely by intellectual ability

since the pattern was not altered when IQ was controlled for. However, the level of difference between groups was altered. Specifically, the groups no longer differed on communication skills once IQ was controlled. This is likely due to the fact that one's verbal ability (as measured by traditional IQ tests) correlates highly to one's full scale IQ. Communication ability does not explain any more variance between the groups once intellectual ability has been considered.

Finally, the analyses confirmed that there are indeed intellectual and adaptive characteristics that differentiate the three diagnostic groups. The variables of full-scale IQ, activities of daily living, and communication discriminate between the groups such that the children with mental retardation are most different from the children with autism and learning disabilities on these characteristics. A pattern of extremely low IQ, daily living skills, and communication skills can help practitioners conclusively diagnose mental retardation. As mentioned before, socialization seems to be a relative strength in the MR group, even though the socialization scores were still lower than normative samples. Findings from the discriminant analysis suggest that social skills alone do not differentiate mental retardation from the other groups.

The variable of socialization differentiates the autism group from the MR and SLD groups. This finding supports the diagnostic criteria and identified socialization deficits of children with autism. This finding can be of use to practitioners because simply knowing that an individual has weak socialization skills would not be enough to provide support for suspected autism, but weak socialization skills—relative to the other areas of adaptive behavior—might.

Another application of the findings from the discriminant analysis might be in the area of early intervention. If the adaptive domains of communication and activities of daily living are known to differentiate MR from the other disabilities, early intervention programs for children with mental retardation might focus specifically on these two domains. Similarly, early intervention programs for children with autism could focus primarily on improving socialization skills. If practitioners can identify differences between the diagnostic groups early, they can intervene on those specific skills and possibly delay the onset of symptom presentation. At the very least, there will be variables identified that can direct further research about these disabilities.

Limitations of the Study

One of the major factors impacting the results of this study was a problem of restricted range. Restricted range means that the sample selected likely did not adequately represent the entire spectrum of presentation among the disability groups. Even though "the autism spectrum" is a commonly-used term to describe the disorder's heterogeneity, it is important to recognize that learning disabilities represent an entire spectrum of disorders as well. For example, both children with autism and learning disabilities can have average IQs (or above), and both children with autism and learning disabilities can have low IQs. Mental retardation itself is a disorder of restricted range, being that it is defined by significantly subaverage intelligence and adaptive functioning. In reviewing the sample collected for this study, most of the children with learning disabilities and autism tended to have low IQs; those considered "higher-functioning" were not well represented. That the study sample had restricted range impacted the

comparisons made between IQ and adaptive behavior, resulting in low correlations for the MR group and the learning disabled group.

The restricted range problem was not necessarily a function of poor sampling procedures or of small sample size. Rather, the sample's restricted range was the result of the information that was available in student records. Since archival data were used, the author was limited to the information available and could not obtain more representative samples simply by reviewing more records. In order to meet selection criteria for inclusion in this study, student records had to include both IQ and adaptive behavior scores. Administering adaptive behavior assessments is common practice in order to determine a diagnosis of mental retardation. Therefore, the majority of the sample consisted of students whose cognitive functioning was quite low—low enough where a diagnosis of mental retardation was considered, even if it was ultimately ruled out. It was rare to find students with autism and learning disabilities (who had IQs in the normal range) to have adaptive assessments included in their records.

Another limitation of this study is the problem of comorbidity between autism and mental retardation. Historically, estimates of the prevalence of mental retardation in the population of individuals with autism have been in the range of 70% to 80% (National Research Council, 2001). However, because the broad autism spectrum includes higher functioning individuals (with IQs in the average range), these estimates may now considered to be too high. The author excluded children with autism and comorbid mental retardation from the sample; however, many of the children with autism who were selected had IQs in the mental retardation range, though an official diagnosis was not made. The comorbidity problem may have impacted this study because there was

probably some degree of overlap between the autism and mental retardation groups, even though sampling criteria attempted to prevent this from occurring. The differences between the mental retardation group and the autism group may have been more pronounced had a more heterogeneous sample of children with autism been gathered.

A third limitation of the study was that adaptive behavior ratings from teachers were sought, while parent ratings (even when available) were not included. The rationale behind this decision involved the availability of teacher ratings as part of student records, and the unrestricted access to teachers enjoyed by school-based practitioners. However, as discussed in the literature review, teacher and parent ratings are not interchangeable. While it is desirable to obtain adaptive ratings from both parents and teachers, it is not necessary (and in some cases not possible) to obtain parent ratings to reach diagnostic conclusions. During the process of reviewing student records, the author found few adaptive behavior scales completed by parents, while rating scales completed by teachers were more plentiful. Had parent as well as teacher ratings been used in the study, a more complete view of students' adaptive behavior characteristics in both home and school would have been possible.

Implications for Current Practice

Assessment practices. As mentioned, adaptive behavior assessment is usually conducted for the purpose of ruling out or establishing a diagnosis of mental retardation. Given that individuals with mental retardation represent a very small percentage of the cases seen by school-based practitioners, administering adaptive behavior measures tends to be an infrequent practice. Adaptive behavior assessments can provide a rich contribution to a comprehensive assessment by detailing specific sets of skills within a

developmental context. The findings of this study support the use of adaptive measures more broadly because many assessment referrals include questions about a student's communication, socialization, or daily living skills. Certainly, these are important to parents and are not addressed by traditional measures of cognitive ability and academic achievement. That students with learning disabilities and autism were found to have adaptive weaknesses relative to their IQs supports the increased use of adaptive behavior measures within these populations.

Differential diagnosis. Legislation (e.g., the Individuals with Disabilities Education Improvement Act [IDEA, 2004]) states that deficits in adaptive behavior must be substantiated before a student is given a diagnosis or classification of mental retardation. Although this is well-known to practitioners, the findings from this study suggest adaptive measures can help differentiate other disabilities as well. The patterns of adaptive strengths and weaknesses found among the diagnostic groups may assist practitioners in differential diagnosis when data from other assessments are inconclusive. Previous research using younger students suggests that these patterns may be found in children as early as two years of age. Therefore, relative weaknesses in socialization may be useful as an early marker in the identification of autism. Similarly, relative weaknesses in communication may identify students who are at risk of developing learning disabilities. This study found that examining full scale IQ, activities of daily living, and communication skills could help practitioners distinguish mental retardation from other diagnostic groups. In addition, examining socialization skills can help differentiate autism from other disabilities.

Program development. Legislation governing special education emphasizes the development and implementation of individual educational and treatment programs. Since adaptive behavior measures can be used from preschool to adulthood, assessment results can be used to inform early intervention programming as well as vocational and transitional planning for older students. The development of a program requires a clear description of a student's strengths and weaknesses as they relate to important quality of life activities. Teachers can increasingly rely on adaptive behavior assessments to drive intervention goals and provide a developmental approach to building skills. For example, teachers can identify which skills a student has already mastered, and which skills she or he needs to work on next, by periodically completing adaptive questionnaires. For children with autism, teachers can specifically develop goals for socialization and communication based on needs identified on adaptive assessments. Among higher-functioning individuals, such as those with mild learning disabilities, teachers can identify program modifications, accommodations, and specially designed instructions needed to access the core curriculum.

Progress monitoring. With the passage of the federal No Child Left Behind Act of 2001 (2002), schools must demonstrate progress for all students. For students with disabilities, determining what constitutes "adequate" progress and how to measure it can be challenging. Adaptive behavior measures, utilized in school settings, were designed specifically to measure how a student functions in important school situations. These measures can identify strengths and weaknesses in social and emotional skills and basic academic functioning as well as communication skills and school behaviors. The results of an adaptive assessment can be useful in monitoring progress on individualized

education plans (IEPs) and alternative curriculum goals. That adaptive behavior is viewed as a highly malleable construct suggests a child's scores should improve as a result of intervention. With an increased emphasis on accountability, schools and practitioners would benefit from a standardized method of measuring and documenting progress. Adaptive behavior measures can be used for this purpose. It can be especially beneficial to examine specific weaknesses in certain populations—for example socialization in students with autism spectrum disorders and communication in students with learning disabilities—target these areas for intervention, and monitor progress by administering those subdomains at periodic re-evaluation schedules.

Implications for Future Research

Autism is widely recognized as a spectrum of disorders, with presentations that can drastically vary. Future research in the area of cognitive and adaptive functioning might separate autism into its various spectrum disorders (Autistic disorder, Asperger Syndrome, and PDD/NOS) and study adaptive behavior patterns in those populations. The same is suggested for future research into specific learning disabilities. That learning disabilities can impact academic performance in different areas of the curriculum suggests that they, too, are a heterogeneous group of disabilities. As more attention is focused on understanding Nonverbal Learning Disabilities (NLD), researchers could examine the relationship between intellectual and adaptive abilities in this population. If patterns of adaptive behavior among students with NLD are similar to that of students with autism, this may support including NLD under the autism spectrum in future editions of the DSM.

Adaptive behavior is seen as malleable and highly susceptible to intervention, but intelligence is viewed as static, innate, and fixed. However they are related, as evidenced by moderate correlations between the two. It would be interesting to examine whether certain cognitive and achievement factors improve as a result of direct intervention on adaptive behavior skills. It seems logical that, as one's communication, socialization, and daily living skills improve, their overall "quality of life" will improve and this may result in higher estimates of cognitive functioning than previously assessed. This phenomenon has not yet been studied.

In contrast, it is suspected that some students with disabilities may reach a plateau in certain areas of adaptive functioning. It would be beneficial for teachers and parents to know the point at which intensive intervention results in diminished gains, signaling the need to move on to other areas for intervention. For example, in a child with autism, some teachers wonder at what point social skills training becomes an exercise in futility. While social skills training might expand a child's repertoire to include more appropriate behaviors, social skills training probably will not inspire a child to become a social butterfly. It may be that the child's time is better spent working on developing a unique skill or talent that the child can work on individually. An understanding of the plateaus inherent in adaptive behavior can help teachers communicate with parents about realistic expectations for their children. Future research should examine the course of adaptive behavior development in different disabilities, especially as it relates to intellectual ability. Students with lower cognitive abilities should not be expected to acquire new skills at the same rate as more capable individuals.

Finally, this study discussed children's adaptive behavior in school. Although there is a large body of behavioral research on the factors that promote or inhibit generalization, less attention has been paid to IQ as one of these factors. Most of the behavioral literature downplays cognition entirely, but one's intellectual ability must certainly affect the ability to generalize behavior. It would be interesting to study the degree to which children are able to generalize skills learned in school to other environments (such as home, post-secondary activities, vocational situations, etc.) as a function of their IQ. It is suspected that those with higher IQs will be able to generalize more effectively and with less support than students with lower cognitive ability.

In conclusion, it is the author's hope that this study will contribute to practitioners' understanding and use of adaptive behavior measures in populations other than those with intellectual disabilities. The findings have shown how measures of adaptive functioning can help identify relative strengths and weaknesses in children with learning disabilities and autism as well. Even in higher-functioning children, an understanding of adaptive characteristics can be an asset to practitioners in diagnosis and treatment planning. Along with a comprehensive assessment of cognitive skills should be a thorough description of those skills important to getting along in the world in a personally and socially sufficient manner: adaptive behavior.

Reflection: Summary of Purpose

The construct of adaptive behavior became of interest to the author during the early years of graduate school, when training focused on taking a critical eye to test development and construction. The author took interest in reading test reviews and the construction and validation chapters of assessment tool manuals. This process came to be

viewed as enjoyable rather than one of the fundamentals to be suffered through on the way to learning more interesting things such as test administration and interpretation. During the author's first few years of training, updated and revised editions of IQ tests were being published (such as the WISC-IV and Stanford-Binet, Fifth Edition), but most practitioners were still relying on a 15-year-old Vineland to assess adaptive behavior. It was then that the author first considered investigating adaptive behavior measures as one area of the field that was in desperate need of updating. Although newer measures such as Harrison and Oakland's ABAS were soon published, the author's interest in the measurement of adaptive behavior (including test construction and development) remained.

A few years later as a practicing school psychologist, the author began to gain more experience working with students with both high- and low-incidence disabilities. Reviewing students' multi-disciplinary evaluations became a common practice. In addition to reviewing the work of others, the evaluator had opportunities to discuss common assessment practices with fellow practitioners. It became obvious that practitioners largely viewed adaptive behavior assessment as a formality—something that is *required*—in order to conclude with (or rule out) a diagnosis of mental retardation. Few gave the impression that they believed adaptive behavior measures were valuable assessment tools in their own right. In reviewing evaluations that did utilize adaptive behavior measures, often the reports provided a composite score only, but no domain scores were reported. Few evaluation reports discussed the results of adaptive assessments in detail, whereas a cognitive assessment interpretation section might be several pages long. How could practitioners overlook the importance of adaptive skills

and not directly link adaptive behavior assessment results to interventions? Especially in a population such as MR where explicit instruction is needed for so may skills, many recommendations for adaptive behavior interventions were very general—for example, "work on social skills"—if they were mentioned at all. This led to the realization that adaptive behavior is an undervalued concept among practitioners, and that these measures are drastically underused.

In the author's own practice, administering adaptive behavior measures became more commonplace, even when mental retardation was not being considered as a diagnosis. Admittedly, this was done in part to gather subjects for this study, but much information was gleaned for students who might not ordinarily have adaptive measures as part of a comprehensive test battery. In fact, the author noticed how directly individual items from the adaptive measures could link to intervention. For example, if a teacher reports that a child "never" uses utensils properly for eating, then a goal for intervention very simply could be written to address this. Moreover, if a parent reports that a child "never" looks both ways before crossing the street, again this could be targeted for intervention. Teachers reported that multi-disciplinary evaluations where adaptive behavior results were discussed in detail gave them richer, more usable information for writing goals and objectives. Teachers and parents described skill weaknesses in some areas that might not have been revealed on an IQ test, a classroom observation, or an achievement test. An adaptive behavior assessment could elucidate these skill weaknesses that are important to parents and teachers in programming for better outcomes.

This author found, in periodic re-evaluations of students with moderate to severe disabilities (such as autism and mental retardation), practitioners *almost never* re-administered adaptive behavior measures. It seemed as though once a diagnosis of mental retardation was established, practitioners did not find it useful to look at a child's adaptive functioning ever again. In contrast to IQ, which is considered relatively stable (though practitioners *do* re-test IQ every few years), adaptive behavior is much more malleable and can document progress (hence showing program effectiveness) better than an IQ test can. Yet practitioners, in eliminating adaptive measures from re-evaluations, were missing many opportunities to examine growth, monitor progress, or recommend different interventions and programs.

In addition to becoming inspired by what other practitioners were *not* doing, some students became inspirations for this project as well. One case in particular contributed to the author's idea to study adaptive behavior as it relates to IQ in children with disabilities. The student was a 17-year-old young man with high-functioning autism. He was performing very well in school but his parents were frustrated because he was experiencing little success at home and in the community. It is the responsibility of the school district to help prepare individuals with disabilities for post-secondary life, so if this young man was unable to function independently in the community despite soaring academically, the district had certainly failed him and his family. Evaluating his IQ (well above average) and his academic skills (well above average) provided very little basis for intervention, but evaluating his adaptive skills (well below average in socialization and daily living skills) provided the IEP team with a clear delineation of his life skills needs, none of which were being addressed in 10 years of previous IEPs. This case highlighted

the importance of considering one's adaptive functioning exclusive of their intellectual ability. Thus, the idea for this dissertation was conceived.

Specific research questions were developed in the process of reviewing the literature. There was some comparison work on adaptive behavior in children with mental retardation and other developmental disabilities. But there was very little information on children with specific learning disabilities. For practitioners in schools, this is the population most often seen, diagnosed, and for whom programs need to be developed. Moreover, there has been a drastic increase in the number of autistic spectrum disorders school practitioners are expected to assess. These individuals present with such unique strengths and weaknesses that they can be remarkably talented in some areas yet experience debilitating deficits in others. Finally, individuals with mental retardation were included because this is the population with which adaptive skills have been studied the most.

The purpose of this study was to investigate the adaptive and intellectual functioning of children with autism, mental retardation, and specific learning disabilities. The groups were studied to determine if there were differences in their level and pattern of adaptive functioning, both with and without the influence of IQ. Finally, the groups were studied to determine if they could be differentiated based on their adaptive characteristics. Previous research has established the relationship between adaptive and intellectual functioning, but this study examined the adaptive performance of children with disabilities when the effects of intellectual ability are controlled.

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APPENDIX

DATA COLLECTION FORM

Subjects should be selected if they are LD, MR, or AUT. Must have a FSIQ (from any Wechsler scale, Stanford-Binet 4 or 5, or RIAS) and an adaptive measure (VABS, VABS-II classroom ed. Or ABAS, ABAS-II teacher rating form). Students who have comorbid AUT and MR should not be included.

Eth= Ethnicity (code B=Black, W=White, L=Latino, A=Asian, O=Other)

Subject Number	Exceptionality	Age	Gender	Eth	FSIQ (test)	AB composite (test)	SOC	COM	ADL
Example	MR	12	F	B	68 (WISC-III)	58 (Vineland)	64	52	60
1									
2									
3									
4									
5									
6									
7									
8									
9									
10									