COMPARISON OF PERFORMANCE BETWEEN AT-RISK AND NORMAL PRESCHOOLERS ON THE DIFFERENTIAL ABILITY SCALES

By

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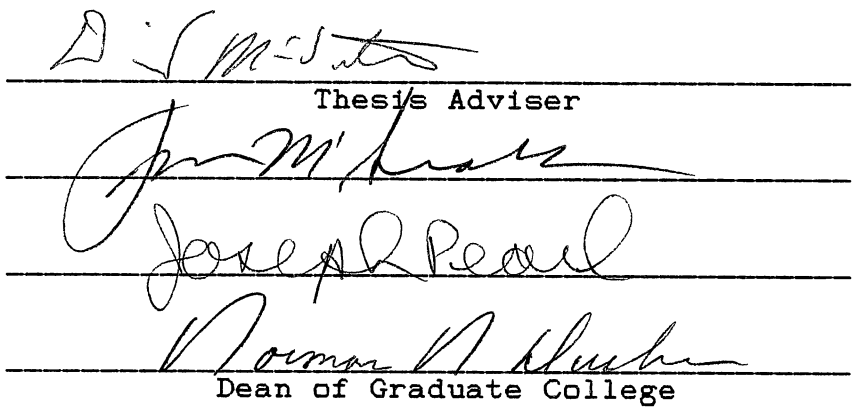

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TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

CHAPTER I

INTRODUCTION

The early identification of preschoolers who may be handicapped or at-risk for developmental delays has become an educational priority at the national and local levels with the recent passage of Public Law 99-457 (1987). Advances in psychometrics and the recognition of research in the area of early childhood assessment has spurred such legislation (Bailey & Wolery, 1989). The realization that some children are at-risk for later educational difficulties due to early neurological and developmental impairment (e.g., cognitive, perceptual-motor, speech-language delays), maternal perinatal difficulties (Dean, 1978) neonatal complications requiring intensive medical care (Hunt, Tooley, & Harvin, 1982; Prasse, Siewert, & Ellison, 1983) and cultural deprivation (Ryan, 1975; Steadman, 1982) has increased the need for early intervention services. However, the implementation and development of a brief, low-cost comprehensive assessment program aimed at identifying children in need of early services is difficult. Traditionally, two approaches in identifying at-risk children has been: (a) selective screening or the screening of only those preschool children with known risk factors in their histories such as low birth

weight, premature birth, prenatal hypoxia, maternal drug addiction, etc., and (b) large scale screening where all preschool children of a given age and sex are screened (Barnes, 1982). The large scale screening is the most common approach implemented. Usually incorporated into these large scale screenings are instruments that allow time and cost efficient approaches to assessment. However, these screening measures have been criticized for their lack of validity and reliability.

In general, there appears to be a consensus among professionals that the majority of preschool instruments lack appropriate validity (Goodman, 1989; Mowder, Widerstrom, & Sandall 1989; Zeidner & Feitelson, 1989). The limited number of subtests designed for administration with preschoolers (Allard & Pfohl, 1988); the poor longitudinal predicative power (Adelman, 1982; Vacc, Vacc, & Fogleman, 1987; Wilson & Reichmuth, 1985; Zeidner & Feitelson, 1989); lack of special populations in the standardization samples (Henderson & Rankin, 1973; Krohn & Lamp, 1989); inability to differentiate among at-risk and normal children (Allard & Pfohl, 1988; Miller & Sprong, 1986); and too narrow an assessment for adequate screening of children's functioning (Gracey, Azzara, & Reinherz, 1984) has contributed to the poor validity in preschool screening instruments. In addition, Wolery (1989) noted that the unreliability of many preschool screening instruments is due to a lack of procedural and scoring reliability. Procedural reliability refers to the extent to

which the examiner follows the precise administrative procedures required by a particular test. Scoring reliability refers to the examiner giving proper credit for the child's response and for the examiner correctly calculating the child's total score. Meisels (1987) and Harrington (1984) further indicated that one of the many misuses of screening measures is the use of instruments that have poor reliability.

Despite the lack of validity and reliability associated with many screening measures, Bailey and Wolery (1989) have identified five benefits in screening preschoolers for suspected difficulties. They indicated that early assessment was beneficial in differentiating between at-risk and normal children, in making diagnostic placement, program planning, and evaluation decisions. Incorporated within the preschool screening process itself is the application of a series of observation and measurement procedures, which are used to identify children in the general population who may be at-risk for a specific disability or who may otherwise need special services or programs in order to develop to their maximum potential (Bailey & Wolery, 1989; Barnes, 1982; Lichtenstein & Ireton, 1984; Southworth, Burr, & Cox, 1980). The primary force behind preschool screening is to identify problems that without subsequent intervention will emerge as significant learning difficulties (Bailey & Wolery, 1989; Fewell, 1984; Meisels, 1987).

Screening instruments are usually brief, cost efficient

measures aimed at identifying children in need of more comprehensive evaluations. They tend to be less reliable and valid compared to the more traditional measures of intelligence (e.g., Stanford-Binet Intelligence Scale: Fourth Edition). While it is expected that screening instruments should demonstrate moderately high relationships with intellectual measures, these relationships should not be so high as to warrant substituting one for the other (Carvajal, McVey, Sellers, Wey, & McKnab, 1987). In addition, the diagnostic utility of screening instruments is limited compared to intelligence tests. Therefore, there is a need to compare at-risk and normal preschoolers on more traditional measures of intelligence (e.g., Standford-Binet Intelligence Scale: Fourth Edition). Several studies have been conducted that suggest that the relationship among intelligence measures is higher with at-risk children compared to normal children (Kitano & DeLeon, 1988; Kustic, Vance, Schwarting, & West, 1988; Smith, St.Martin, & Lyon, 1989; Zucker & Copeland, 1988). At-risk children consistently obtained lower scores compared to normal children on intelligence measures (Allard & Pfohl, 1988; Zucker & Copeland, 1988). When a new instrument appears, a logical question becomes, "How will different groups of children perform on this test?"

The Differential Ability Scales (DAS) (Elliott, 1990a) is a recently developed measure of cognitive ability (intelligence). It assesses children 2 1/2 through 17 years

of age (see Appendix). The DAS is unique in comparison to other cognitive measures in that: (a) the General Conceptual Ability (GCA) score (composite) incorporates only subtests that are salient measures of "g" having been found to have substantial loadings on that factor (Elliott, 1990b), (b) subtests measuring specific processing skills (diagnostic subtests) are not included in determining the total composite score, and (c) achievement measures are included which were normed on the same standardization sample as the cognitive measures. Also, the standardization sample included children representative of the general population and some special populations such as learning disabled, reading-disabled, speech and language impaired, educable mentally retarded, severely emotionally disturbed, gifted and talented, and those with mild hearing, visual, or motor impairments (Elliott, 1990c). With the DAS being such a new measure there is a need to determine how at-risk children will perform as compared to normal children. While it is expected that the at-risk group will score lower in overall ability compared to the normal group, this study is interested in examining the pattern of performance among the DAS subtests for the two groups.

Problem to be Studied

This study determined whether at-risk and normal preschoolers performed differently from one another on the

Differential Ability Scales (DAS). The following null hypotheses were studied:

1. There will not be a significant difference between the mean General Conceptual Ability score of at-risk children and the mean General Conceptual Ability score of normal children on the DAS at the .05 level of significance.
2. There will not be a significant difference between the mean Verbal Ability Cluster score of at-risk children on the mean Verbal Ability Cluster score of normal children on the DAS at the .05 level of significance.
3. There will not be a significant difference between the mean Nonverbal Ability Cluster score of at-risk children and the mean Nonverbal Ability Cluster score of normal children on the DAS at the .05 level of significance.
4. There will not be a significant difference between the mean core subtest scores of at-risk children and the mean core subtest scores of normal children on the DAS at the .05 level of significance.
5. There will not be a significant difference between the mean diagnostic subtest scores of at-risk children and the mean diagnostic subtest scores of normal school on the DAS at the .05 level of significance.

Significance of the Study

This study contributed significantly by investigating whether at-risk preschool children performed differently on the DAS compared to normal preschool children. To date, no study has been conducted to determine whether at-risk and normal preschool children will perform differently on the DAS. Therefore, clinicians have little information as to which DAS subtests would be of benefit in identifying at-risk preschoolers. Since the General Conceptual Ability (GCA) score on the DAS includes only those subtests that are strong and valid measures of general reasoning and conceptual abilities, it is important to determine whether the performance of at-risk students on these specific subtests are significantly different from normal preschoolers. Elliott (1990c) has described the GCA score as a "focused index that does not incorporate measures of relatively independent dimensions such as memory and perception" (p.60). Therefore, the GCA score of the DAS is purportedly less likely to be influenced by specific processing deficits compared to other intelligence scales available. The pattern of performance on the subtests, then, should be similar for the at-risk and normal group with the only difference being level of performance.

This study also investigated whether at-risk and normal preschool children performed differently on the

DAS diagnostic subtests. By studying these differences, it was determined whether or not administering the diagnostic subtests provided additional diagnostic information beyond the core subtests in the identification of at-risk preschoolers (McIntosh & Gridley, 1990). This was an important issue since the administration of the diagnostic subtests is optional.

Basic Limitations

The study was limited to children between the ages of 3 years, 6 months through 5 years, 11 months. Therefore, the findings will not generalize to children who were not within this age range.

CHAPTER II

LITERATURE REVIEW

Early Intervention

The assessment of intelligence in preschool-age children requires special attention to issues and challenges unique to this age group. Assessment is a process of ongoing insight into how children think, interact, and behave developmentally (Almy & Genishi, 1979). The term "assessment" is used synonymously with "early intervention" to reflect the ongoing, interdependent, and varying nature of the process. A frequent conclusion drawn from reviews of early intervention research is that the earlier an intervention begins, the more effective it will be (Bronfenbrenner, 1974; Comptroller General, 1979; Garland, Swanson, Stone, & Woodruff, 1981; Mastropieri, 1987; McDaniels, 1977; O'Connor, 1975). A population that benefits greatly from early intervention are preschoolers considered to be at-risk for later educational difficulties.

At-Risk Children

Children are considered at-risk when they have been subjected to certain genetic, prenatal, perinatal, postnatal, or environmental conditions that are known to cause defects

or are highly related with later learning difficulties (Peterson, 1987). In addition, these children may be at an increased risk for developmental delays, cognitive impairments, and school failure. Current research has also demonstrated that preschool children with poor attention or memory (Attwell, Orpet, & Meyers, 1967; Stevenson, Parker, Wilkinson, Hegion, and Fish 1976), poor verbal fluency (Feshback, Adelman, & Williamson, 1974), low interest in school-related activities (Feshback, Adelman, & Williamson, 1974), and difficulties in identifying letters and numbers (deHirsch, Jansky, & Langford, 1966; Jansky and deHirsch, 1972) are more likely to be considered at-risk for later learning problems. The assessment of preschoolers for the purpose of early identification has been referred to as early detection, early warning, and screening in the literature (Adelman, 1982).

Preschool Screening

Screening is a low-cost, time efficient procedure in which to assess large numbers of preschoolers who may be at-risk. Hamilton and Swan (1981) indicated that norm-referenced screening measures were the most common instruments used in the identification of at-risk children. The essential task of these instruments is to determine whether a given child's performance is significantly different from the performance of other children in order to justify special intervention or further testing. Hamilton

and Swan further indicated that the utility of a norm-referenced screening measure depends largely on how well they predict later learning problems. However, few norm-referenced preschool screening instruments incorporate adequate standardization samples, validity, and reliability. For example, Miller and Sprong (1986) compared the psychometric qualities of the Comprehensive Identification Process (CIP), the Developmental Indicators for the Assessment of Learning - Revised (DIAL-R), the Denver Developmental Screening Test (DDST), and the Miller Assessment for Preschoolers (MAP). They evaluated these instruments based upon their description of the normative sample, sample size, item analysis, reporting of measures of central tendency and variability, concurrent validity, predictive validity, test-retest reliability, and interexaminer reliability. They found that none of these instruments met all of the criteria but did indicate that the DIAL-R and the MAP were the most psychometrically sound. Presently, little evidence supports the use of screening measures for prediction especially with the instruments currently being used for massive screening of preschoolers and kindergarteners (Adelman, 1982). In fact, few instruments meet even the minimal psychometric criteria established by the American Psychological Association and the American Educational Research Association. Despite the numerous limitations associated with screening measures, they tend to be used extensively in the identification of at-risk

preschoolers. The most frequent misuse of screening instruments by clinicians is from using measures that have little or no established reliability and validity. As a result, many children in need of special services are being overlooked while other children are being misidentified as at-risk (Meisels, 1987). However, Gallagher and Bradley (1972) were able to present a rationale for using screening measures in the identification of at-risk children. Consistent with other researchers (e.g., Lerner , Mardell-Czudonwski, & Goldenberg, 1981), they found that most screening instruments will accurately identify approximately 85% of the children screened. In addition, Gallagher and Bradley indicated that the benefits of preschool screening is primarily in its ability to identify children at the time of testing and not so much to make future long-term predictions. Screening instruments are primarily used to make gross decisions and are not expected to be precise as more comprehensive diagnostic evaluations (Harrington, 1984).

Basic Concepts

Basic concepts are widely recognized as an essential component of thinking. Concepts are used across cultures to describe or explain objects and events, to communicate with others, and to organize experiences (Boehm, 1990). Concepts are also an important part of a child's preschool and primary school experience. Children with learning problems, such as delays in language development or in understanding basic

concepts, have been found to be at-risk for experiencing school problems (Lichtenstein & Ireton, 1984; Wiig & Semel, 1976). Basic concepts are necessary for children's early reading, understanding orally presented material, school achievement, and development of thinking skills (Boehm, 1984). Not surprisingly, with such an importance attributed to early concept formation and its relation to later learning, many clinicians have begun to assess basic concepts in the early preschool years. They have found that assessment of basic concepts has been beneficial in: (a) gaining an understanding of a child's overall repertoire of basic concepts; (b) pinpointing concepts that are understood, that are partially understood, or that need to be developed; (c) identifying strategies a child uses to approach a problem and the kind of errors made; (d) predicting a child's readiness for instruction; and (e) obtaining results that can be translated into instruction.

Prediction of Intelligence From Screening Instruments

Clinicians have also found that screening instruments can provide reliable and valid estimates of children's intelligence. Although it is recognized that screening instruments do not provide the same quality or quantity of information as intellectual measures, they can serve as a brief, low-cost means of screening children's intelligence (Carvajal, McVey, Sellers, Wey, & McKnab, 1987). The Peabody

Picture Vocabulary Test-Revised (PPVT-R) is a measure of receptive vocabulary and has been found to moderately correlate with measures of intelligence. The PPVT-R has also been used extensively in the screening of preschoolers and has been found to measure basic concepts related to school achievement. Kustick, Vance, Schwarting, and West (1988) studied the relationship between the Wechsler Preschool and Primary Scale of Intelligence (WPPSI) and the Peabody Picture Vocabulary Tests-Revised (PPVT-R), using "at-risk" preschool children and found that the PPVT-R correlated significantly with the Verbal (r=.83), Performance (r=.60), and Full Scale IQ (r=.85) scores of the WPPSI. A moderate relationship (r=.60) was demonstrated between the PPVT-R and the Stanford-Binet Intelligence Scale: Fourth Edition (SB:FE) further supporting the PPVT-R as a viable measure for screening intelligence. The relationship of the PPVT-R Form M and Form L with the General Cognitive Index of the McCarthy Scales of Children's Abilities was .69 and .63, respectively, with a sample of at-risk preschoolers (Bracken & Prasse, 1983). One measure of basic concepts, the Bracken Basic Concept Scale (BBCS) (Bracken, 1984), has become increasingly popular among clinicians in the screening of preschoolers. The BBCS is an individually administered scale testing 258 concepts among children 2 to 7 years of age. The BBCS is a measure of receptive language, basic concepts, and school readiness. Therefore, one would expect moderate to high correlations between it and other similar screening measures

used with preschoolers. The relationship of the BBCS with the Peabody Picture Vocabulary Test-Revised was .88, the Boehm Test of Basic Concepts was .78, the Token Test for Children was .78 and the Metropolitan Readiness Test was .65. Although the validity of the BBCS has been substantiated, few studies have been conducted on the utility of the BBCS as a screening instrument and its relationship with measures of intelligence. Furthermore, it has yet to be determined whether children identified as at-risk on the BBCS will perform differently on measures of intelligence compared to their normal counterparts. Differences in performance among at-risk and normal children on intellectual measures has been reported in prior research (Wade, Kutsick, & Vance, 1988; Zucker & Copeland, 1988).

At-Risk Children and Intelligence

A review of the literature indicated that the use of intellectual measures has practical significance in the assessment of gifted, learning disabled, at-risk, and mentally retarded children (Kitano & DeLeon, 1988; Kustic, Vance, Schwarting, & West, 1988; Smith, St. Martin, & Lyon, 1989; Zucker & Copeland, 1988). Smith, St. Martin, and Lyon (1989) compared the performance of students with learning disabilities on the Stanford-Binet Intelligence Scale: Fourth Edition (SB:FE) and the Kaufman Assessment Battery for Children (K-ABC). A moderately high relationship between the SB:FE Composite and K-ABC Mental Processing (r=.74) and

Achievement Composite (r=.85) scores was noted. Zucker and Copeland (1988) found the K-ABC Mental Processing Composite and the McCarthy Scales of Children's Abilities (MSCA) General Cognitive Index was significantly related for both at-risk (r=.84) and normal preschoolers (r=.54), however, it was significantly greater for the at-risk group. Kustick, Vance, Schwarting, & West (1988) compared the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), Peabody Picture Vocabulary Test-Revised (PPVT-R) with at-risk preschool children and noted that the PPVT-R was significantly related with the Verbal (r=.83), Performance (r=.60), and Full Scale IQ (r=.85) scores of the WPPSI. The results of these studies suggest that the relationship among intelligence measures is higher with at-risk children compared to normal children.

In other studies, the level of performance of at-risk and normal children on intelligence measures has been compared. These studies have found that at-risk children consistently obtain lower scores compared to normal children (Allard & Pfohl, 1988; Zucker & Copeland, 1988). For example, Allard and Pfohl (1988) studied the performance of 60 at-risk children between the ages of 3 years, 0 months to 5 years, 11 months on the Kaufman Assessment Battery for Children (K-ABC). The at-risk children, as a group, scored lower on the Sequential Processing (M=88.93, SD=3.60), Simultaneous Processing (M=85.96, SD=13.97), Mental Processing (M=85.15, SD=12.82), and Achievement (M=85.06,

SD=12.73) scales of the K-ABC compared to the standardization sample (M=100, SD=15). Zucker and Copeland (1988) found similar results with a group of at-risk preschoolers on the K-ABC and the McCarthy Scales of Children's Abilities. They reported a mean K-ABC Mental Processing Composite score of 90.02 (SD=14.22) and a mean McCarthy General Cognitive Index score of 83.28 (SD=20.00) for the at-risk group.

The Differential Ability Scales (DAS) (Elliott, 1990a) is a recently developed measure of cognitive ability designed to assess children 2 1/2 years through 17 years of age (see Appendix). The DAS differs from other cognitive measures in that: (a) the General Conceptual Ability (GCA) score (composite score) incorporates only subtests that are salient measures of "g" having been found to have substantial loadings on that factor (Elliott, 1990b), (b) subtests measuring specific processing skills (diagnostic subtests) are not included in determining the total composite score, and (c) achievement measures are included which were normed on the same standardization sample as the cognitive measures. In addition, the standardization sample included children representative of the general population and also those children with a variety of classifications, such as learning disabled, speech and language impaired, educable mentally retarded, severely emotionally disturbed, gifted and talented, as well as those with mild hearing, visual, or motor impairments (Elliott, 1990c). The relationship of the DAS with the Peabody Picture Vocabulary Test-Revised (PPVT-R)

and the Woodcock-Johnson Psycho-Educational Battery Preschool Skills Cluster (WJ-PSSC) is reported in the DAS Technical Manual (Elliott, 1990c). The PPVT-R was administered to 32 first-grade children and 32 third-grade children. The first-grade sample had a mean age of 7:4 (SD=7 months), and the third-grade sample had a mean age of 9:4 (SD=5 months). Each child was administered all of the DAS subtests that had been normed for their age range; consequently, almost all of the first-graders were administered Naming Vocabulary, Early Number Concepts, and Picture Similarities, plus the School-Age Level subtests, but only a few of the third-graders were administered the Preschool Level subtests. The DAS Verbal Ability Cluster score correlated moderately with the PPVT-R (r=.84). The PPVT-R correlated significantly higher with the DAS Naming Vocabulary subtest (r=.76) than with any of the other DAS subtest scores. The WJ-PSSC was administered to 23 Louisiana preschool children aged 3:6-5:11, with a mean age of 4:6 (SD=9 months) prior to the administration of the DAS. The Preschool Skills Cluster of the Woodcock-Johnson Psycho-Educational Battery measures the child's abilities to recognize and write simple letters and words, to count, and to perform simple arithmetic. The DAS composites correlated moderately with the WJ-PSSC (Verbal Ability Cluster r=.56, Nonverbal Ability Cluster r=.67, and GCA r=.67).

As with any new measure of ability, clinicians are interested in how special populations will perform on the

DAS. The DAS Technical Manual (Elliott, 1990c) reports the mean GCA for normal preschool children (M=.94) and for special populations such as gifted (M=116.9, SD=11.4), educable mentally retarded (M=59.4, SD=9.0), learning-disabled children (M=89.6, SD=12.0), and reading-disabled (M=97.2, SD=7.9). However, it does not indicate how at-risk preschoolers will perform on the DAS. This study will determine if at-risk preschoolers perform differently on the DAS compared to normal preschoolers.

CHAPTER III

METHODS

Subjects

The subjects consisted of 36 white preschool children (18 at-risk and 18 normal) between the ages of 3 years, 6 months and 5 years, 11 months. Of the 36 preschool subjects, 27 were males and 9 were females. The subjects were matched by age (*M*=5 years, 2 months; *SD*=5 months) to control for any differences that may be due to chronological age. Twelve preschoolers came from a preschool in a rural, midwestern, college town in Oklahoma. The remaining 24 preschoolers were from a small rural town in Indiana. Subjects' economic background ranged from low socioeconomic status to lower-middle socioeconomic level. The 18 at-risk subjects were identified as at-risk based upon a *Bracken Basic Concept Scale* (BBCS) Total Test score of 85 or below. The normal group were selected based on a BBCS Total Test score of 86 or above. The BBCS and the *Differential Ability Scales* (DAS) were administered in counterbalanced order to control for response effect due to treatment order. Subjects for this study were obtained from an existing database and were considered archival data.

Instruments

Bracken Basic Concept Scale

The Bracken Basic Concept Scale (BBCS) was designed to measure receptive language, basic concepts, and school readiness of children ages 2 1/2 years to 7 years, 11 months. The mean for the Total Test score is 100 and the standard deviation is 15. The mean for the subtests is 10 and the standard deviation is 3. The administration time is approximately 15-20 minutes. The BBCS consists of the following subtests: Color, Letter Identification, Numbers/Counting, Comparisons, Shapes, Directional/Positional, Social/Emotional, Size, Texture/Material, Quantity, and Time/Sequence. A description of the BBCS subtests are as follows:

School Readiness Composite: The School Readiness Composite is comprised of Color, Letter Identification, Numbers/Counting, Comparisons, and Shapes subtests.

Color-- This subtest measures knowledge of primary colors and basic color terms for all languages. The child points to the color specified. For example, the child is asked to choose the color "purple" from a page with primary and secondary colors shown.

Letter Identification-- This subtest measures knowledge of upper and lower case letters. For example, the child points to the letter specified such as the letter "A" from a page with various capital letters

shown.

Numbers/Counting-- This subtest measures understanding of discrete values assigned to and indicated by numeral ranging from 0 to 9. For example, the child is asked to point to the number "6" from a page with various numbers shown.

Comparisons-- This subtest requires a child to match and/or differentiate objects based on one or more of their salient characteristics. The continuum of comparability ranges from exactly identical to totally dissimilar. For example, the child is shown a page with four different pictures of fruit and they are asked to point to the fruit that are different.

Shapes-- This subtest measures basic one-, two-, and three-dimensional shapes. Included in the one-dimensional category are linear shapes such as line, curve, and diagonal. Two dimensional shapes are represented by concepts such as circle, square, triangle, and three-dimensional shapes include concepts such as cube and pyramid.

Directional/Positional--This subtest includes relational terms which describe where one object is relative to one or more objects (e.g., the child behind the chair), describes a position of an object relative to an unspoken second object or relative to itself (e.g., open, closed,
upside-down), or describes a direction of placement

(e.g., right, left, corner, center).

Social/Emotional-- This subtest represents a domain of concepts that is measured infrequently by traditional preschool and primary grade cognitive and language scales. Included in the social aspect of the subtest are terms describing kinship, gender, relative ages, and social appropriateness (e.g., right and wrong).

Size-- This category includes concepts which describe the one dimensional aspects of an object (e.g., tall being a descriptor of vertical length or long being a descriptor of horizontal length), two dimensional aspects (e.g., short may be a descriptor of either vertical or horizontal dimensions), or three dimensions of an object (concepts such as big, small, and thick where more than one salient dimension must be considered).

Texture/Material-- This subtest includes those terms which describe the salient characteristics of an object, especially external characteristics. Also included in this scale are the basic materials wood, glass, and metal.

Quantity-- This subtest measures a child's understanding of terms that describe a relative degree of existence (e.g., concepts such as full or all). All objects exist in some quantity, and while those objects may be fluid, solid, concrete, or abstract, quantity

terms are those which describe the degree to which the objects exist and the space which these objects occupy.

Time/Sequence--This subtest measures the child's understanding of occurrences along a temporal or sequential continuum and the degree of speed and/or order with which those events occur on the continuum. For example, the child is asked to point to the picture that shows new shoes or a person who has quit working.

The internal reliabilities for the Total Test ranged from .97 to .98 for 3-5 year olds (Bracken, 1984). The BBCS subtest test-retest reliabilities ranged from .67 (Size) to .98 (School Readiness Composite), with a median reliability coefficient of .91 (Bracken, 1984). Test-retest reliability for the Total Test was .97. Split half reliability estimates reported for the BBCS ranged from .47 to .96 for the subtest scores and .94 to .98 for the total test score. Intercorrelations among the subtests ranged from .29 to .78. Subtest-total test correlations over five age groups ranged from .56 to .91 (Bracken, 1984).

The relationship of the BBCS, Peabody Picture Vocabulary Test-Revised (PPVT-R) Form M and Token Test for Children was .68 and .88, respectively (Bracken, 1984).

Differential Ability Scales

The Differential Ability Scales (DAS) (Elliott, 1990a) is an individually administered, standardized test of intelligence, achievement, and information processing

(Elliott, 1990c). The DAS differs from other cognitive measures in that: (a) the General Conceptual Ability (GCA) score (composite score) incorporates only subtests that are salient measures of "g" having been found to have substantial loadings on that factor (Elliott, 1990), (b) subtests measuring specific processing skills (diagnostic subtests) are not included in determining the total composite score, and (c) achievement measures are included which were normed on the same standardization sample as the cognitive measures.

The structure of the upper preschool level of the cognitive battery of the DAS (see Appendix) for children 3 years, 6 months to 5 years, 11 months is comprised of the General Conceptual Ability (GCA) score (composite) at the highest level. The GCA is composed of two second level clusters--Verbal Ability Cluster and Nonverbal Ability Cluster. The GCA score and cluster scores yield standard scores with a mean of 100 and a standard deviation of 15. Subtest scores are based on a mean of 50 and standard deviation of 10. The administration time is about 25-65 minutes. The descriptions of the GCA, Verbal and Nonverbal Ability Clusters and core subtests that comprise each cluster are as follows:

Verbal Ability Cluster: The Verbal Ability Cluster is comprised of the Verbal Comprehension and Naming Vocabulary subtests.

Verbal Comprehension--This subtest measures receptive language, understanding of oral directions,

the use of basic language concepts, and memory. The child points to pictures and manipulates objects after the examiner gives oral instructions.

Naming Vocabulary--This subtest measures expressive language, knowledge of picture names, language development, and memory. The child is required to name objects and pictures.

Nonverbal Ability Cluster: The Nonverbal Ability Cluster is comprised of the Picture Similarities, Pattern Construction, and Copying subtests.

Picture Similarities--This subtest measures nonverbal abstract reasoning and visual attention to detail. A row of four pictures are shown to the child and the child places a card under the picture with which the card shares an element or concept.

Pattern Construction-- This subtest measures nonverbal reasoning, spatial visualization/reasoning and part-whole relationships.

Copying--This subtest measures ability to copy simple shapes using paper-and-pencil responses, fine motor coordination, perception of spatial orientation, and pencil control. For each item, the child is presented with a line drawing printed in a booklet. The drawing remains in view while the child attempts to reproduce it.

Early Number Concepts--This subtest measures knowledge of numerical and prenumerical concepts,

nonverbal and verbal knowledge, and quantitative concepts. The child uses colored chips or pictures to answer questions about numbers, size, or other numerical concepts.

The DAS was also developed with several additional subtests that were not included in the above clusters. These additional subtests were included for diagnostic purposes and were not found to be as pure measures of general intelligence as the core subtests (Elliott, 1990c). Furthermore, the diagnostic subtests are considered optional for administration while the core subtests are required.

Diagnostic subtests administered to the upper preschool level are:

Matching Letter-Like Forms: This test measures visual discrimination, the ability to follow verbal instructions and verbal cues, and visual-perceptual matching. For example, the child is shown a page with a letter-like form on it and is asked to point to the one of the six choices that is analogous to the one above.

Recall of Digits: This test measures short-term auditory memory, attention, concentration, and oral recall of sequences of numbers. The child repeats a sequence of numbers presented orally at the rate of two digits per seconds.

Recall of Objects: This subtest measures short and intermediate auditory recall, concentration, attention, and verbal mediation strategies. This subtest consists

of immediate and delayed verbal recall of the names of 20 common objects pictured on a card.

Recognition of Pictures: This subtest measures short-term visual memory, and verbal reasoning/mediation. After viewing a picture of one or more objects for 5 or 10 seconds the child points to the same objects on a second picture.

The internal reliabilities for the subtests and composites of the upper preschool level of the DAS are given in Table I. The core subtest reliabilities ranged from .66 (Recall of Objects) to .90 (Pattern Construction). The internal reliabilities of the GCA ranged from .94 (3:6-4:11) to .95 (5:0-5:11). Test-Retest reliabilities for the subtests ranged from .38 (Recall of Objects-Delayed) to .81 (Verbal Comprehension and Recall of Digits). The test-retest reliabilities of the composites were .79 (Nonverbal Ability Cluster), .84 (Verbal Ability Cluster), and .90 (GCA).

The concurrent validity of the DAS was established using the Wechsler Preschool and Primary Scale of Intelligence - Revised (WPPSI-R) and Stanford-Binet Intelligence Scale, Fourth Edition (SB:FE). The correlation between the DAS General Conceptual Ability (GCA) score and the WPPSI-R Full Scale IQ score was .89. Correlations between the DAS Verbal Ability Cluster score and the WPPSI-Verbal IQ was .74 to .75 between the DAS Nonverbal Ability Cluster score and the WPPSI-R Performance IQ score. The relationship between the DAS GCA and the SB:FE composite was .77.

TABLE I

INTERNAL RELIABILITIES OF THE DAS CORE SUBTESTS, DIAGNOSTIC SUBTESTS, AND COMPOSITES BY AGE*

	Age			
Subtests	3:6-3:11	4:0-4:5	4:6-4:11	5:0-5:11
Verbal Comprehension	.85	.85	.82	.83
Naming Vocabulary	.73	.79	.76	.84
Picture Similarities	.76	.70	.73	.72
Pattern Construction	.84	.89	.82	.90
Copying	.82	.86	.88	.88
Early Number Concepts	.88	.87	.85	.87
Matching Letter Like Forms	/	(.78)	.84	.87
Recall of Digits	.87	.89	.85	.88
Recall of Objects Immediate	/	.76	.66	.67
Recognition of Pictures	.78	.80	.74	.74
Composites				
Verbal Ability Cluster	.88	.89	.86	.90
Nonverbal Ability Cluster	.88	.90	.88	.90
GCA	.94	.94	.94	.95

Note. N = 175 for each age ranging from 3:6-4:11; N = 200 for each age range from 5:0-5:11. Values in parentheses are for ages at which the subtest is out of level. Slashes (/) indicate internal reliabilities were not available. *Internal reliabilities were reprinted with permission from The Psychological Corporation.

Research Design and Data Analysis Procedures

This study used an ex post facto design. Although lack of randomization, manipulation, and control are all limitations in a casual-comparative study, this type of investigation does permit queries into areas where true experimental designs are impractical or impossible (Gay, 1987). The two groups of preschool children, at-risk and normal, were the independent variables. The scores on the Differential Ability Scales were the dependent variables. In addition, the at-risk and normal groups were matched on chronological age in an attempt to remove individual differences due to age.

The *t*-test for correlated samples was used to determine whether significant differences existed among the two groups on the core and diagnostic subtests of the DAS. The differences between the GCA, Verbal Ability Cluster and Nonverbal Ability Clusters were also examined. Due to the multiple comparisons and to control for alpha slippage, the Modified Bonferroni test was used. The patterns of performance of the at-risk and normal preschoolers on the DAS subtests were also studied. In addition, the means, standard deviations, and ranges for the BBCS and DAS subtests and composites were computed for each group.

CHAPTER IV

RESULTS

Introduction

This study determined whether at-risk and normal preschoolers performed differently on the DAS. The following null hypotheses were studied:

1. There will not be a significant difference between the mean General Conceptual Ability score of at-risk children and the mean General Conceptual Ability score of normal children on the DAS at the .05 level of significance.
2. There will not be a significant difference between the mean Verbal Ability Cluster score of at-risk children and the mean Verbal Ability Cluster score of normal children on the DAS at the .05 level of significance.
3. There will not be a significant difference between the mean Nonverbal Ability Cluster score of at-risk children and the mean Nonverbal Ability Cluster score of normal children on the DAS at the .05 level of significance.
4. There will not be a significant difference between the mean core subtests scores of at-risk children and the mean core subtest scores of normal children on the DAS at

the .05 level of significance.

5. There will not be a significant difference between the mean diagnostic subtest scores of at-risk children and the mean diagnostic subtest scores of normal children on the DAS at the .05 level of significance.

The data were processed using Oklahoma Sate University's CMS computer system. The correlated t-test program used is part of the Statistical Package for the Social Sciences (SPSS-User's Manual, 1988). The conventional .05 level was used to evaluate statistical significance. In order to control for alpha slippage, due to multiple comparisons, the Modified Bonferroni technique was used to calculate the level of significance needed to ensure the .05 level for each comparison. Based upon this technique, .004 was needed for statistical significance.

Descriptive Statistics

Means, standard deviations, and ranges for the Bracken Basic Concept Scale (BBCS) subtests for the normal and at-risk preschoolers are shown in Table II and Table III, respectively. All of the BBCS subtests for the normal preschoolers approximated the standardization sample mean (M=10), with the exception of the Direction/Position (M=11.22) subtest. The mean BBCS subtest scores for the at-risk group ranged from 4.44 (School Readiness Composite) to 6.67 (Quantity) which were considerably lower compared to the standardization sample. The subtest standard deviations for

TABLE II

BBCS SCHOOL READINESS COMPOSITE, SUBTEST, AND TOTAL TEST RANGES, MEANS, AND STANDARD DEVIATIONS FOR THE NORMAL PRESCHOOLERS

Subtest	Range	Mean	SD
School Readiness Composite	5-14	9.28	2.42
Direction/Position	9-15	11.22	1.59
Social/Emotional	7-14	10.22	1.99
Size	5-15	10.00	2.95
Texture/Material	8-15	10.33	1.85
Quantity	6-15	10.56	2.75
Time/Sequence	7-16	10.72	2.27
Total Test Score	87-125	102.55	10.63

Note. N=18.

TABLE III

BBCS SCHOOL READINESS COMPOSITE, SUBTEST, AND TOTAL TEST RANGES, MEANS, AND STANDARD DEVIATIONS FOR THE AT-RISK PRESCHOOLERS

Subtest	Range	Mean	SD
School Readiness Composite	2-7	4.44	1.34
Direction/Position	1-9	6.39	1.79
Social/Emotional	3-13	6.17	2.28
Size	1-11	6.39	2.62
Texture/Material	2-9	6.39	1.88
Quantity	3-9	6.67	1.68
Time/Sequence	4-8	6.33	1.08
Total Test Score	59-85	76.22	6.33

Note. N=18.

the normal preschoolers were somewhat lower than that of the standardization sample (SD=3), ranging from 1.59 (Direction/Position) to 2.95 (Size). The subtest standard deviations for the at-risk group were also somewhat lower than the standardization sample, ranging from 1.08 (Time/Sequence) to 2.62 (Size). The mean BBCS Total Test score for the normal preschoolers was 102.55 with a standard deviation of 10.63. The mean BBCS Total Test score for the at-risk preschoolers was 76.22 with standard deviation of 6.33.

Means, standard deviations, and ranges for the Differential Ability Scales (DAS) core subtests, diagnostic subtests, and Clusters for the normal and at-risk preschoolers are shown in Tables IV and V. The means for the core subtests for the normal preschoolers ranged from 47.44 (Copying) to 57.11 (Recall of Objects-Delayed) and from 36.72 (Copying) to 44.83 (Naming Vocabulary) for the at-risk preschoolers. The standard deviations for the core and diagnostic subtests for the normal preschoolers ranged from 7.00 (Verbal Comprehension) to 12.93 (Picture Similarities) and from 6.61 (Verbal Comprehension) to 10.81 (Recall of Digits) for the at-risk preschoolers. Of the core subtests, the normal preschoolers as well as the at-risk preschoolers, achieved their lowest average core subtest score on the Copying subtest which measures the ability to copy simple shapes using paper-and-pencil responses, fine motor coordination, perception of spatial orientation, and pencil

TABLE IV

DAS CORE SUBTESTS, DIAGNOSTIC SUBTESTS, AND CLUSTER ABILITY SCORE RANGES, MEANS, AND STANDARD DEVIATIONS FOR THE NORMAL PRESCHOOLERS

Subtests	Range	Mean	SD
Core:			
Verbal Comprehension	34-60	49.33	7.00
Picture Similarities	20-71	57.00	12.93
Naming Vocabulary	40-74	54.89	8.41
Pattern Construction	40-66	53.39	8.12
Early Number Concepts	33-67	50.56	8.68
Copying	28-61	47.44	8.42
Diagnostic:			
Matching Letter-Like Forms	42-80	54.83	9.15
Recall of Digits	33-69	55.83	9.29
Recall of Objects-Immediate	35-63	51.00	9.32
Recall of Objects-Delayed	37-70	57.11	8.40
Recognition of Pictures	30-65	51.83	9.47
Clusters:			
Verbal Ability	79-126	103.28	11.91
Nonverbal Ability	62-126	105.22	16.83
GCA	71-126	104.50	14.50

Note. N=18.

TABLE V

DAS CORE SUBTESTS, DIAGNOSTIC SUBTESTS, AND CLUSTER ABILITY SCORE RANGES, MEANS, AND STANDARD DEVIATIONS FOR THE AT-RISK PRESCHOOLERS

Subtests	Range	Mean	SD
Core:			
Verbal Comprehension	30-54	41.94	6.61
Picture Similarities	23-60	43.67	10.22
Naming Vocabulary	33-56	44.83	6.84
Pattern Construction	20-53	37.39	10.46
Early Number Concepts	22-58	38.00	10.30
Copying	22-51	36.72	8.07
Diagnostic:			
Matching Letter-Like Forms	30-55	42.17	7.79
Recall of Digits	20-61	41.78	10.81
Recall of Objects-Immediate	24-54	38.78	8.48
Recall of Objects-Delayed	32-54	44.17	7.19
Recognition of Pictures	29-66	44.61	10.33
Clusters:			
Verbal Ability	77-108	88.94	8.59
Nonverbal Ability	47-97	79.83	14.48
GCA	57-97	81.61	12.14

Note. N=18.

control. This lower score could simply be due to several factors often associated with this age group such as poor attention span or fatigue.

Of the diagnostic subtests, the normal preschoolers, achieved their lowest average subtest score on the Recall of

Objects-Immediate (M=51.00, SD=9.32) subtest which measures short and intermediate term auditory recall, concentration and attention, and verbal mediations strategies. The at-risk group achieved their lowest average score on the diagnostic subtest, Recall of Digits (M=41.78, SD=10.81) which measures short-term auditory memory, attention, concentration, and oral recall of sequences of numbers. Both groups appeared to have had difficulty with tasks that required short-term auditory memory and recall. Young children often have limited attention spans which could make these subtests more difficult for them than some of the other diagnostic subtests. As a result, these lower mean scores could be due to distractability more than poor verbal mediation strategies.

The means of the DAS Cluster scores closely approximated that of the standardization sample (M=100, SD=15), for the normal group. The mean (M=104.5, SD=14.50) General Conceptual Ability (GCA) score for the normal group was within the average range and the mean GCA score (M=81.61, SD=12.14) for the at-risk group was within the below average range based on the DAS classification system (Elliott, 1990b, p.54). The mean Verbal Ability Cluster score (M=103.28, SD=11.91) and the mean Nonverbal Ability Cluster score (M=105.22, SD=16.83) for the normal group were within the average range. The mean Verbal Ability Cluster score (M=88.94, SD=8.59) for the at-risk group was within the below average range and the mean Nonverbal Ability Cluster score

(*M*=79.83, *SD*=14.48) for the at-risk group was within the low range. Comparisons to determine whether the mean Cluster scores were significantly different from the mean GCA were done using the values for statistical significance as presented on page 56 of the DAS Administration and Scoring Manual (Elliott, 1990b). When comparing the Verbal Ability Cluster score with the GCA a 9 point difference was required for significance at the .05 level of significance and when comparing the Nonverbal Ability Cluster with the GCA an 8 point difference was required for significance at the .05 level of significance. Both the Verbal and Nonverbal Ability Clusters were not significantly different from the GCA score for both the normal and at-risk groups. A difference of 14 points was essential for significance at the .05 level when comparing cluster scores with one another. Therefore, there was not a significant difference between the Verbal and Nonverbal Ability Cluster scores for each group.

Tests of the Null Hypotheses

The results of the *t*-tests computed for the core, diagnostic, Clusters and GCA are presented in Table VI and will be discussed in the analysis of the null hypotheses.

Null Hypothesis 1: There will not be a significant difference between the mean General Conceptual Ability (GCA) score of at-risk children and the mean General Conceptual Ability score of normal children on the DAS at the .05 level of significance.

TABLE VI

T-VALUES BETWEEN NORMAL AND AT-RISK PRESCHOOLERS ON THE DAS CORE SUBTESTS, DIAGNOSTIC SUBTESTS, AND ABILITY CLUSTER SCORES

Subtests	Normal Mean	At-Risk Mean	t-value
Core:			
Verbal Comprehension	49.33	41.94	-2.98*
Picture Similarities	57.00	43.67	-3.22*
Naming Vocabulary	54.84	44.83	-5.66***
Pattern Construction	53.39	37.39	-5.29***
Early Number Concepts	50.56	38.00	-4.02**
Copying	47.44	36.72	-3.77**
Diagnostic:			
Matching Letter-Like Forms	54.83	42.17	-6.03***
Recall of Digits	55.83	41.78	-6.62***
Recall of Objects-Immediate	51.00	38.78	-4.35**
Recall of Objects-Delayed	57.11	44.17	-4.53**
Recognition of Pictures	51.83	44.61	-2.47
Cluster:			
Verbal Ability	103.28	88.94	-4.55**
Nonverbal Ability	105.22	79.83	-4.95***
GCA	104.50	81.61	-5.30***

Note. N=36.

*p<.01. **p<.001. ***p<.0001.

There was a significant difference (t=-5.30, df=17, p<.0001) between the mean GCA score of at-risk children and the mean GCA score of normal children on the DAS. Thus, it is possible to reject null hypothesis 1.

At-risk preschoolers were found to perform significantly lower in cognitive ability (intelligence) than normal preschoolers.

Null Hypothesis 2: There will not be a significant difference between the mean Verbal Ability Cluster score of at-risk children and the mean Verbal Ability Cluster score of normal children on the DAS at the .05 level of significance.

A significant difference (t=-4.55, df=17, p<.0003) was found between the mean Verbal Ability Cluster score of at-risk preschoolers and the mean Verbal Ability Cluster score of normal preschoolers on the DAS. Null hypothesis 2 was rejected on the basis of this finding. At-risk preschoolers were found to perform significantly lower than normal children in Verbal ability.

Null Hypothesis 3: There will not be a significant difference between the mean Nonverbal Ability Cluster score of at-risk children and the mean Nonverbal Ability Cluster score of normal children on the DAS at the .05 level of significance.

A significant difference (t=-4.59, df=17, p<.001) was found between the mean Nonverbal Ability Cluster score of the at-risk preschoolers and the mean Nonverbal Ability Cluster score of normal children on the DAS. Null hypothesis 3 was rejected due to this finding. At-risk children were found to perform significantly lower than normal children in Nonverbal ability.

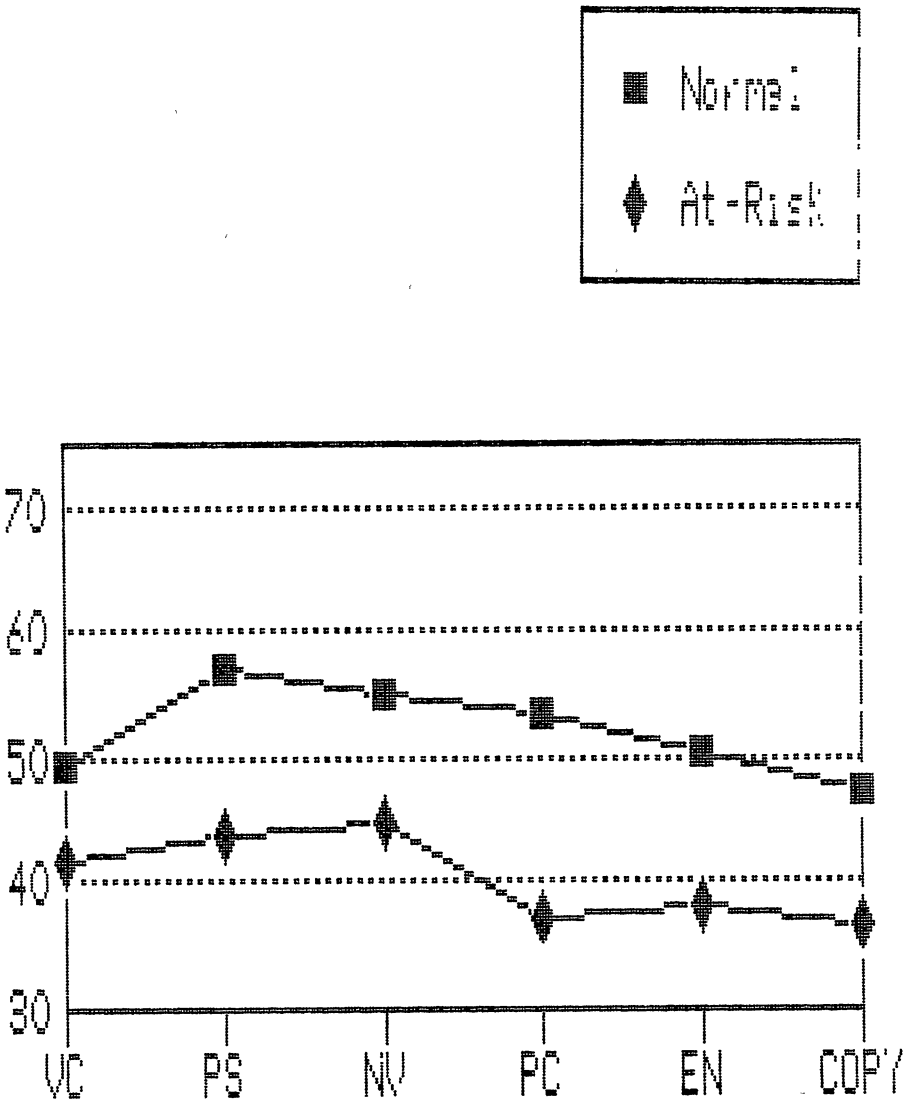
Null Hypothesis 4: There will not be a significant

difference between the mean core subtests scores of at-risk children and the mean core subtest scores of normal children on the DAS at the .05 level of significance.

There was a significant difference between the mean core subtest scores of at-risk and normal preschoolers on the DAS. Therefore, rejection of null hypothesis 4 was warranted. Table VI presents the specific t-values and significance levels for each comparison. A qualitative analysis of the subtest patterns of the at-risk and normal preschoolers indicated little differences between the two groups (see Figure 1). The only differences among the patterns of the core subtests was level of performance. This was anticipated given that Elliott (1990a) indicated that these subtests were salient measures of cognitive ability (intelligence).

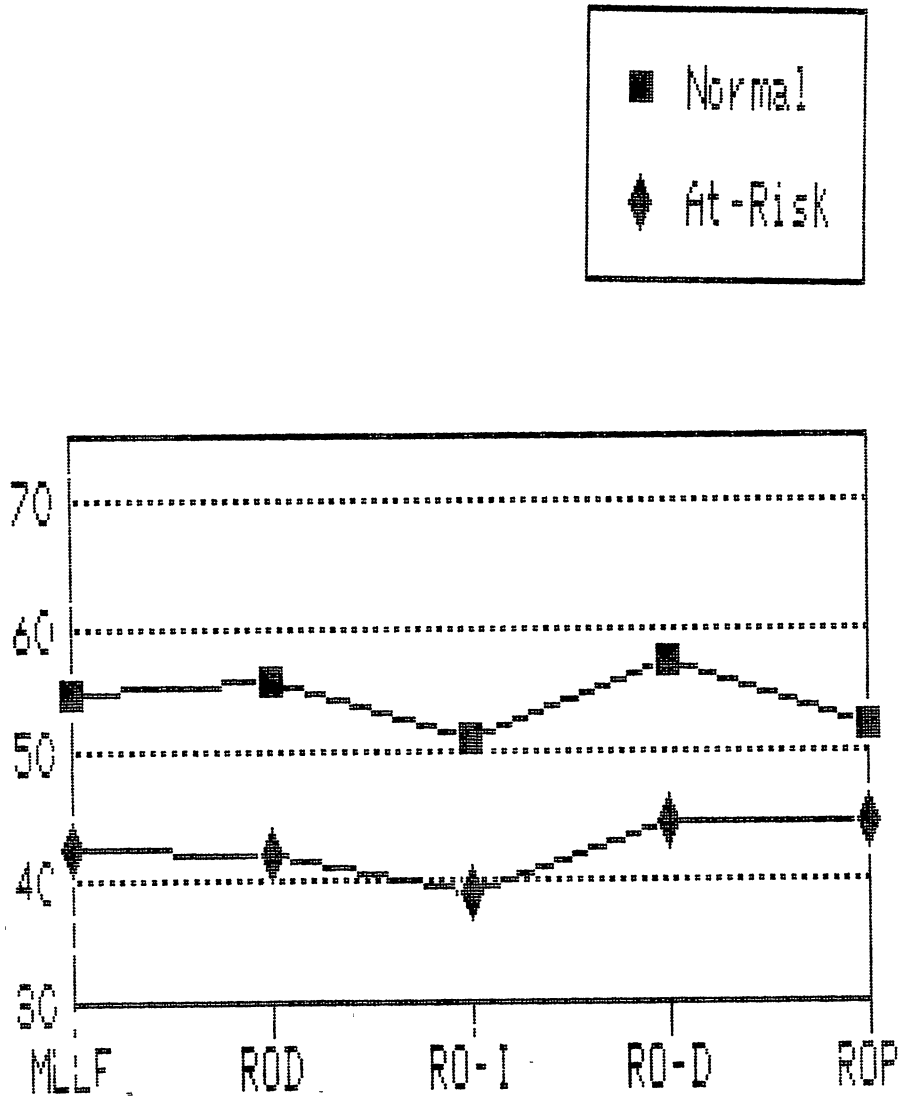
Null Hypothesis 5: There will not be a significant difference between the mean diagnostic subtest scores of at-risk children and the mean diagnostic subtest scores of normal children on the DAS at the .05 level of significance.

There was a significant difference between the mean diagnostic subtest scores of at-risk and normal preschoolers on the DAS except for the Recognition of Pictures subtest (see Figure 2) The mean Recognition of Pictures subtest score of the at-risk children was not significantly different from the mean Recognition of Pictures subtest score of the normal children based upon the .004 level for statistical significance. When analyzing the subtest patterns between



VC=Verbal Comprehension; PS=Picture Similarities; NV=Naming Vocabulary; PC=Picture Completion; EN=Early Number Concepts; COPY=Copying.

Figure 1. DAS core subtests standard score profiles for at-risk and normal preschoolers.



MLLF=Matching Letter-Like Forms; ROD=Recall of Digits; RO-I=Recall of Objects-Immediate; RO-D=Recall of Objects-Delayed; ROP=Recognition of Pictures.

Figure 2. DAS diagnostic subtests standard score profiles for at-risk and normal preschoolers.

the normal and at-risk groups, small differences were found between the two groups. The only difference was level of performance. The diagnostic subtests are not salient measures of "g" (Elliott, 1990a). Therefore, differences were expected in subtest patterns between at-risk and normal preschoolers. Since the diagnostic subtests, according to Elliott (1990a), are more sensitive to processing deficits it was expected that the at-risk group would have demonstrated a specific pattern on these subtests.

CHAPTER V

DISCUSSION AND RECOMMENDATIONS

Discussion

This study found that at-risk preschoolers obtained significantly lower General Conceptual Ability (GCA) scores than normal preschoolers on the Differential Ability Scales (DAS). In addition, the Verbal and Nonverbal Ability Cluster scores for the at-risk group were found to be significantly lower than the Verbal and Nonverbal Ability Cluster scores of the normal group. These findings were consistent with prior research comparing the performance of normal and at-risk preschoolers on measures of intelligence (Allard & Pfohl, 1988; Kutsick, Vance, Schwarting, & West, 1988; Zucker & Copeland, 1988).

This study also found that the core subtest scores of at-risk preschoolers are significantly lower than those of normal preschoolers. Analysis comparing the core subtest patterns of the at-risk and normal preschoolers indicated little differences between the two groups. The only difference between the two groups was in level of performance. This was not surprising since the GCA score, which is comprised of the core subtests, on the DAS includes only subtests that are strong and valid measures of general

reasoning and conceptual abilities (Elliott, 1990a). Therefore, little difference in core subtest patterns were expected.

The at-risk preschoolers performed significantly lower on the diagnostic subtests, except for the Recognition of Pictures subtest, than the normal preschoolers. Comparison of the pattern of performance among the diagnostic subtests between the at-risk and normal preschoolers indicated that the two groups primarily differed in level of performance only. Since the diagnostic subtests are not as strong and valid measures of general reasoning (Elliott, 1990a), as the core subtests, it was expected that the pattern of the diagnostic subtests would have been different between the groups. Instead, the pattern of diagnostic subtests were similar to the patterns obtained for the core subtests for the two groups in that the two groups differed in level of performance only. This suggests that the diagnostic subtests provide little information beyond the core and Cluster scores in helping to differentiate at-risk and normal preschoolers. It is suggested that in addition to the DAS other diagnostic measures be used to differentiate at-risk and normal preschoolers.

The present study indicated that the DAS is a relatively good measure of ability (intelligence) with at-risk and normal preschoolers. Results did not support the use of pattern analysis in the identification of at-risk preschoolers. The primary distinction between the at-risk

and normal preschoolers on the DAS was their GCA score.

The use of a small sample size in this study has limited the generalizability of the results. Therefore, future studies should use a larger sample size. The present study was significant since it was the first one to compare at-risk with normal preschoolers using the DAS. Although, the DAS incorporated handicapped children within the standardization sample, it did not include at-risk preschoolers. In addition, this study was the first to implement the combination of the BBCS, used as a screening instrument, with the DAS.

Recommendations and Suggestions for Future Research

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

1. Future studies should use large sample sizes to increase the generalizability of the results.
2. Future research studying the difference between at-risk and normal preschoolers should attempt to define at-risk based upon multiple criteria.
3. Additional studies should use children with specifically defined handicaps (e.g., language delayed children, emotionally mentally handicapped children, etc.) and compare their performances on the Differential Ability Scales with normal

preschoolers.

REFERENCES

Adelman, H.S. (1982). Identifying learning problems at an early age: A critical appraisal. Journal of Clinical Child Psychology, 11, 255-261.

Allard, A.F., & Pfohl, W. (1988). The Kaufman Assessment Battery For Children: A validity study with at-risk preschoolers. Journal of Psychoeducational Assessment, 6, 215-224.

Almy, M., & Genishi, C. (1979). Ways of studying children (rev. ed.). New York: Teachers College Press.

Attwell, A.A., Orpet, R.E., Meyers, C.E. (1967). Kindergarten behavior ratings as a predictor of academic achievement. Journal of School Psychology, 6, 43-46.

Bailey, D.B., & Wolery, M. (1989). Assessing infants and preschoolers with handicaps. Columbus, OH: Merrill.

Barnes, K.E. (1982). Preschool screening: The measurement and prediction of children at-risk. Springfield, IL: Charles C. Thomas.

Boehm, A.E. (1990). Assessment of children's knowledge of basic concepts. In C.R. Reynolds & R.W. Kamphaus (Eds.), Handbook of psychoeducational assessment of children: Intelligence and achievement (pp. 654-670). New York: Guilford Press.

Boehm, A.E. (1984). Assessing and teaching basic concepts and thinking skills. Paper presented at the Conference on Early Childhood Education, New York.

Bracken, B.A. (1984). Bracken Basic Concept Scale. San Antonio, TX: Psychological Corporation.

Bracken, B.A., & Prasse, D.P. (1983). Concurrent validity of the PPVT-R for "at-risk" preschool children. Psychology in the Schools, 20, 13-15.

Broffenbrenner, U. (1974). Is early intervention effective? (DHEW Publication No. OHD 76-30025). Washington, D.C.: Department of Health, Education, and Welfare, Office of Child Development.

Carvajal, H., McVey, S., Sellers, T., Wey, K., & McKnab, P. (1987). Relationships between scores on the general purpose abbreviated battery of Stanford-Binet IV, Peabody Picture Vocabulary Test-Revised, Columbia Mental Maturity Scale, and Goodenough-Harris Drawing Test. The Psychological Record, 37, 127-130.

Comproller General. (1979). Early childhood and family development programs improve the quality of life for low income families. Report to Congress.

Dean, R.S. (1978). Distinguishing learning-disabled and emotionally disturbed children on the WISC-R. Journal of Consulting and Clinical Psychology, 46(2), 381-382.

deHirsch, K., Jansky, J.J., & Langford, W.S. (1966). Predicting reading failure. New York: Harper & Row.

Elliott, C.D. (1990a). Differential Ability Scales. San Antonio, TX: Psychological Corporation.

Elliott, C.D. (1990b). Differential Ability Scales: Administration and scoring manual. San Antonio, TX: Psychological Corporation.

Elliott, C.D. (1990c). Differential Ability Scales: Technical manual. San Antonio, TX: Psychological Corporation.

Feshback, S., Adelman, H., & Williamson, W.F. (1974). Early identification of children with high risk of reading failure. Journal of Learning Disabilities, 10, 639-644.

Fewell, R.R. (1984). Assessment of preschool handicapped children. Educational Psychologists, 19, 172-179.

Gallagher, J.J., & Bradley, R.H. (1972). Early identification of developmental difficulties. In I.J. Gordon (Ed.), Early childhood education. Chicago: University of Chicago Press.

Garland, C., Swanson, J., Stone, N.W., & Woodruff, G. (Eds.). (1981). Early intervention for children with special needs and their families: Findings and recommendations. Seattle, WA: Washington University.

Gay, L.R. (1987). Educational research: Competencies for analysis and application (3rd ed.). Columbus, Ohio: Merrill.

Goodman, J.F. (1990). Infant intelligence: Do we, can we, should we assess it? In C.R. Reynolds & R.W. Kamphaus (Eds.), Handbook of psychoeducational assessment of children: Intelligence and achievement (pp. 166-182). New York: Guilford Press.

Gracey, C.A., Azzara, C.V., & Reinherz, H. (1984). Screening revisited: A survey of U.S. requirements. The Journal of Special Education, 18(2), 101-107.

Hamilton, J.L., & Swan, W.W. (1981). Measurement reference in the assessment of preschool handicapped children. Topics In Early Childhood Special Education, July, 41-48.

Harrington, R.G. (1984). Preschool screening: The school psychologists perspective. School Psychology Review, 13(3), 363-374.

Henderson, R.W., & Rankin, R.J. (1973). WPPSI reliability and predictive validity with disadvantage Mexican-American children. Journal of School Psychology, 11(1), 16-20.

Hunt, J.V., Tooley, W.H., & Harvin, D. (1982). Learning disabilities in children with birthweights $\leq$ 1500 grams. Seminars in Perinatology, 6, 280-287.

Jansky, J., & deHirsch, K. (1972). Preventing reading failure. New York: Harper & Row.

Kitano, M.K., & DeLeon, J. (1988). Use of the Stanford-Binet Fourth Edition in identifying young gifted children. Roper Review, 10(3), 156-159.

Krohn, E.J., & Lamp, R.E. (1989). Concurrent validity of the Stanford-Binet Fourth Edition and K-ABC for head start children. Journal of School Psychology, 27, 59-67.

Kutsick, K., Vance B., Schwarting, F.G., & West, R. (1988). A comparison of three different measures of intelligence with preschool children identified at-risk. Psychology in the Schools, 25, 270-275.

Learner, J., Mardell-Czudonwski, C., & Goldenberg, D. (1981). Special education for the early childhood years. Englewood Cliffs, N.J.: Prentice-Hall.

Lichtenstein, R., & Ireton, H. (1984). Preschool screening identifying young children with developmental and educational problems. Orlando, FL.

Mastropieri, M.A., (1987). Age at start as a correlate of intervention effectiveness. Psychology in the Schools, 24, 59-62.

McDaniels, G. (1977). Successful programs for young handicapped children. Educational Horizons, 56, 26-33.

McGowen, S.J., (1991). Relationship among scores on the Bracken Basic Concept Scale and the Differential Ability Scales with a preschool sample. Unpublished master's thesis, Oklahoma State University, Stillwater, OK.

McIntosh, D., & Gridley, B.E. (1990). The Differential Ability Scales: Profiles for learning disabled students. Manuscript submitted for publication.

Meisels, S.J. (1987, January). Uses and abuses of developmental screening and school readiness testing. Young children, 4-9.

Miller, L.J., & Sprong, T.A. (1986). Psychometric and qualitative comparison for four preschool screening instruments. Journal of Learning Disabilities, 19(8), 480-484.

Mowder, B.A., Widerstrom, A.H., & Sandall, S. (1989). School Psychologists serving at-risk and handicapped infants, toddlers, and their families. Professional School Psychology, 4(3), 159-171.

O'Connor, P.D. (1975). Efficacy of educational and medical intervention for prevention of metal retardation based on psychological and physiological research. Australian Journal of Mental Retardation, 3, 179-190.

Peterson, (1987). Young children at-risk for developmental disabilities. Early Intervention for Handicapped and At-Risk Children: An Introduction to Early Childhood-Special Education (pp.137-184). Denver, CO: Dove.

Public Law 99-457. (1986). Education of the Handicapped Act Amendments of 1986. Washington, DC: Department of Health, Education, and Welfare.

Ryan, T.J. (1975). Poverty and early education in Canada. In B.Z. Friedlander, G.M. Steritt, & G.E. Kirk (Eds.), Exceptional infant: Vol. 3. Assessment & intervention, pp.304-322. New York: Brunner/Mazel.

Smith, D.K., St.Martin, M.E., & Lyon, M.A. (1989). A validity study of the Stanford-Binet: Fourth Edition with students with learning disabilities. Journal of Learning Disabilities, 22(4), 260-261.

SPSS-X User's Guide. (1988). McGraw-Hill Book Company.

Steadman, D.J. (1982). Effects of educational intervention programs on the cognitive development of young children. In M. Lewis & L.T. Taft (Eds.), Developmental disabilities: Theory, assessment and intervention (pp.257-276). New York: Spectrum Publication.

Stevenson, H.W., Parker, T., Wilkinson, A., Hegion, A., & Fish, E. (1976). Longitudinal study of individual differences in cognitive development and scholastic achievement. Journal of Education Psychology, 68, 377-400.

Southworth, L.E., Burr, R.L., & Cox, A.E. (1980). Screening and evaluating the young child: A handbook of instruments to use from infancy to six years. Springfield, IL: Charles C. Thomas.

Vacc, N.A., Vacc N.N., & Fogleman, M.S. (1987). Preschool screening: Using the DIAL as a predictor of first-grade performance. Journal of School Psychology, 25, 45-51.

Wade, H.L., Kutsick, K., & Vance, B. (1988). A comparison of preschool children's performance on the Kaufman-Assessment Battery for Children Nonverbal Scale and the Wechsler Preschool and Primary Scale of Intelligence Performance Scale. Diagnostique, 13, 98-104.

Wiig, E., & Semel E. (1980). Language assessment and intervention for the learning disabled. Columbus, OH.: Merrill.

Wilson, B.J., & Reichmuth, S.M. (1985). Early-Screening programs: When is predictive accuracy sufficient? Learning Disability Quarterly, 8, 182-188.

Wolery, M. (1989). Child find and screening issues. Assessing Infants and Preschoolers with Handicaps (pp.119-143). Columbus, OH: Merrill.

Zeidner, M., & Feitelson, D. (1989). Probing the validity of intelligence tests for preschool children: A small space analysis. Journal of Psycoeducational Assessment, 7, 175-193.

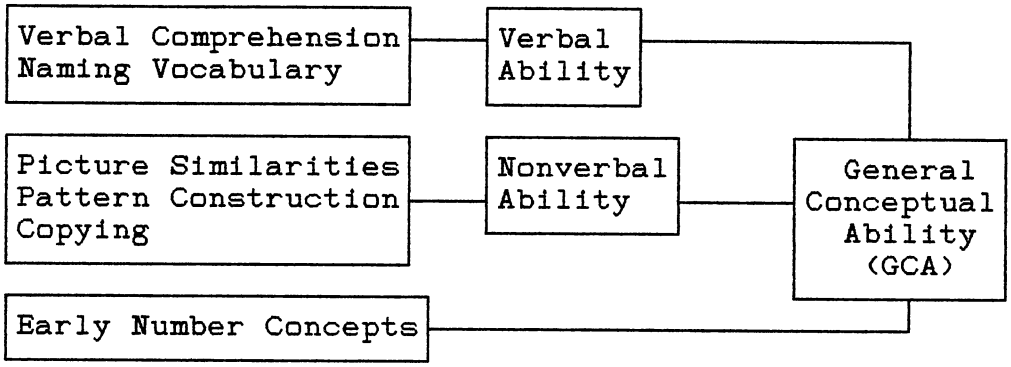
Zucker, S., & Copeland, E.P. (1988). K-ABC and McCarthy Scale Performance among "at-risk" and normal preschoolers. Psychology in the Schools, 25, 5-10.

APPENDIX A

UPPER PRESCHOOL STRUCTURE OF THE

DIFFERENTIAL ABILITY SCALES

Core Subtests



Diagnostic Subtests

Matching Letter-Like Forms
Recall of Digits
Recall of Objects-Immediate
Recall of Objects-Delayed
Recognition of Pictures

VITA

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Master of Science

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