# RELATIONSHIP AMONG SCORES ON THE BRACKEN BASIC CONCEPT SCALE AND THE DIFFERENTIAL ABILITY SCALES WITH A PRESCHOOL SAMPLE

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# CHAPTER I

## INTRODUCTION

Assessment of preschoolers is a necessary and fundamental activity of early childhood professionals (Bailey & Wolery, 1989). The realization that there is a need for identification and intervention in the early stages of a handicap have the potential for being more effective and economical than later remediation has led to an increased emphasis in assessment and diagnostic procedures (Adelman, 1982; Reynolds, Egan & Lerner, 1983; Satz & Fletcher, 1988; Ulman & Kausch, 1979; Ysseldyke, Thurlow, O'Sullivan & Bursaw, 1986). The growing importance in early childhood assessment has also been reflected in state and federal legislation with the passage of P. L. 99-457 (1986). Recognition in the advances of research methodology, instrumentation and theory have spurred such legislation.

A significant contribution stemming from this legislation has been in its recognition of the importance of screening as a primary method in identifying children in need of a more comprehensive evaluation. Screening, in the context of early

intervention, has become essential in identifying handicapped infants and preschoolers who are not typically enrolled in comprehensive service delivery systems (Bailey & Wolery, 1989). The need for brief, low-cost forms of assessment that enables screening of large numbers of children is needed due to the lack of such delivery systems. However, there are several limitations associated with this type of screening process (Bailey & Wolery, 1989; Gracey, Azzara & Rheinhertz, 1984; Harrington, 1984; Paget & Nagle, 1986; Thomas & Grimes, 1990). The potential for premature labeling (Paget & Nagle, 1986; Reynolds & Kamphaus, 1990), the rapid developmental change within children (Dunst & Rheingrover, 1981; Litchenstein, 1982; Thomas & Grimes, 1990), the need to assess within a context of situational specificity (Paget & Nagle, 1986; Thomas & Grimes, 1990), and the limited generalizability of test results (Lichenstein, 1981; Miller & Sprong, 1986) are common limitations cited in the literature. In addition, several studies have reported that the hit rate or predictive utility of preschool screening tests are less than adequate (Adelman, 1982; Satz & Fletcher, 1988; Ullman & Kausch, 1979) in that no currently available procedures intended for large scale use can claim to identify a large number of problems without making many false positive errors. Often, in order to reduce the number of false positives errors,

the cut-off score is lowered, but by doing this, the number of correct identifications also is reduced (Adelman, 1982). Harrington (1984) indicated that the precision of a screening instrument is not so crucial as that of diagnostic instruments, since only gross decisions are made with them and errors tend to be in a conservative direction, with most errors being false positives. Reynolds and Kamphaus (1990) also indicated that if the screening instruments successfully identify handicaps that are not otherwise obvious in early life, they are worthwhile, regardless of their inability to describe the development of normal children. Still, much controversy surrounds the use of preschool screening measures, especially concerning the technical adequacy of these instruments.

Aspects of technical adequacy concerning screening instruments involve their reliability and validity. Bracken (1987) indicated that the adequacy of subtest item gradients contribute directly to the stability or instability of preschool instruments. According to Bracken (1987), preschool screening instruments typically demonstrate large standard score differences in relation to changes in single raw scores. As a result, these instruments are less sensitive to the small incremental differences in children's abilities; hence the less effective the instrument is in assessing children. The poor reliability of preschool screening

instruments also has contributed to their inability to accurately measure a wide range of abilities. For example, the higher a child performs on screening measures, from bottom to top, typically the poorer the test-retest reliability. A partial explanation for less stability in higher scores is that items in the upper end of the scale are worth more than corresponding items at the bottom of the scale and/or have larger item measurement error (Reynolds & Kamphaus, 1990). While reliability is an important characteristic of preschool assessment instruments, their validity is also of considerable importance, particularly their predictive validity.

Dunst and Rheingrover (1981) indicated that tests administered to children under 2 years of age do not predict preschool, school age, or adult intelligence; however, toward the late preschool years, the predictive value of these instruments began to emerge. In contrast, Bailey and Wolery (1989) advocate serial screening beginning in infancy so that delays beginning later in the preschool period (e.g. ages 3-4) may be identified. Sattler (1988) reported that the predictive power of infant assessment instruments that fall in the mentally retarded levels is much greater than for those which fall in the average to superior range. Sattler also suggested that, "infants who scored within the mentally retarded range on developmental scales during

their first year of life have a high probability of obtaining scores in the mentally retarded range during their school years" (p. 71). These results indicate that clinicians should be conservative when making predictions about future performance based on screening results, especially with children scoring within the average or above average range.

The Bracken Basic Concept Scale (BBCS) (Bracken, 1984) is a recently developed screening instrument designed to measure the current understanding of basic conceptual terms of children aged 2 1/2 years to 7 years, 11 months. Bracken (1987) and Sterner and McCallum (1988) reported adequate reliability and validity for the BBCS. A significant positive correlation (.59) was found between the BBCS and the Gesell Developmental Exam (GDE), indicating a moderately strong relationship between basic concept knowledge and developmental age (Sterner & McCallum, 1988). Total test internal consistency coefficients for ages 3-0 through 6-0 ranged from .94 to .98 on the BBCS, while test-retest reliability for mixed ages on the BBCS was reported to be .97 (Bracken, 1987). In consideration of the importance of understanding basic concepts in classroom settings, the major benefit of the BBCS is its ability to identify concepts and conceptual categories that are problematic for individual children (Bracken, 1984). Concepts occurring frequently in directions and

other portions of preschool curriculum materials are often not understood by children (Kaufman, 1978). Therefore, lessons "taught" utilizing these concepts would have been misunderstood because of a problem in communication.

The BBCS has been demonstrated to give reliable and valid information. As a result, it has become popular among clinicians and is beginning to be used extensively in the screening of preschoolers. However, few studies have been conducted on the utility of the BBCS as a screening instrument and its relationship with measures of intelligence.

The Differential Ability Scales (DAS) (Elliott, 1990a) is a recently developed measure of cognitive ability designed to assess children 2 1/2 through 17 years of age (see Appendix A). 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. Furthermore, 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, 1990a). The broad range of characteristics included in the norming sample of the DAS makes it unique among intelligence measures. As with other measures of intelligence (e.g., Stanford-Binet IV), clinicians and researchers are interested in the relationship between the DAS and preschool screening measures.

## Problem to be Studied

The purpose of this study was to determine the relationship between performance on the Bracken Basic Concept Scale (BBCS) (Bracken, 1984) and the Differential Ability Scales (DAS) (Elliott, 1990a). More specifically, the following research questions were studied:

1. Is there a significant relationship between the BBCS Total Test score and the DAS General Conceptual Ability (GCA) score?
2. Is there a significant relationship between the BBCS Total Test score and the DAS Verbal Cluster score?
3. Is there a significant relationship between the

BBCS Total Test score and the DAS Nonverbal Cluster score?

4. Is there a significant relationship between the BBCS Total Test score and the DAS diagnostic subtests?
5. Is there a significant relationship between the BBCS Total Test score and the DAS core subtests?
6. Is there a significant relationship between the BBCS subtests and the DAS core subtests?
7. Is there a significant relationship between the BBCS subtests and the DAS diagnostic subtests?

## Significance of the Study

The essential task of a norm-referenced screening test is to determine if a given child's performance is significantly different from the performance of the norm group, indicating that further evaluation is warranted (Hamilton & Swan, 1981). Until recently, very few screening instruments have been developed that contain sufficient technical adequacy to contribute significantly in the identification of at-risk children (Bracken, 1987). The Bracken Basic Concept Scale (BBCS) (Bracken, 1984) has recently been recognized as a reliable and valid measure in the screening of preschoolers. The BBCS was originally constructed to be a brief measure of basic conceptual terms and to

identify children in need of a more comprehensive assessment. As with most screening instruments, the BBCS does not provide the same quality or quantity of information derived from intellectual measures (e.g. the Stanford-Binet IV). However, as with most screening measures, the BBCS was not developed to assess similar skills as intellectual measures. Ideally, screening instruments should demonstrate moderately high relationships with intellectual measures but not so high as to warrant substituting one for the other (Carvajal, McVey, Sellers, Weyand, & McKnab, 1987). The relationship of the BBCS with measures of intelligence has yet to be investigated. If the BBCS is unable to accurately identify those children in need of further diagnostic assessment its use should be limited. By investigating the BBCS's relationship with measures of intelligence, its value as a screening instrument can be determined. This study contributed significantly by investigating the relationship of the BBCS with the Differential Ability Scales (DAS) (Elliott, 1990a), a recently developed measure of cognitive ability.

This study was unique compared to prior research that has studied the relationships between screening and cognitive measures. The DAS differs from other intelligence scales currently available that provide global composite scores (Intelligence Quotients). 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. Elliott (1990a) also described the GCA score of the DAS 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. This study provided unique results of the relationship between a screening and cognitive measure not typically reported in the literature.

This study also investigated the relationship between the BBCS and the diagnostic subtests of the DAS. By studying these relationships, it was determined whether or not administering the diagnostic subtests might provide additional diagnostic information beyond the core subtests that comprise the GCA (McIntosh & Gridley, 1990). This is an important issue for the clinician since the administration of the diagnostic subtests is optional. In addition, the BBCS takes approximately 15 - 20 minutes to administer, while the DAS takes approximately 35 - 45 minutes to administer. Therefore, if the BBCS can be found to be a good predictor of ability, its use as a screening measure of ability would be time and cost effective.

## Basic Limitations

1. The study was limited to children in the 3 year, 6 month, through 5 year, 11 month age range. Therefore, the findings are not generalizable to children who do not fall within this age range.

# CHAPTER II

## REVIEW OF THE LITERATURE

Early childhood professionals acknowledge the importance of early identification of handicapped and at-risk preschoolers (Bailey & Wolery, 1989). The identification and intervention in the early stages of a handicap is recognized as more feasible than later remediation due to maximization of development and lowered incidence of later special education services when formal schooling begins; this realization has led to an increased concern in preschool assessment procedures (Adelman, 1982; Reynolds, Egan & Lerner, 1983; Satz & Fletcher, 1988; Ulman & Kausch, 1979; Ysseldyke, Thurlow, O'Sullivan & Bursaw, 1986). Recognition in the advances of research methodology, instrumentation and theory have spurred state and federal legislation (e.g., P.L. 99-457, 1986) to implement programs aimed at identification of handicapped and at-risk preschoolers.

A significant contribution stemming from this legislation has been the recognition of the importance of screening as a primary method in identifying children

in need of a more comprehensive evaluation. Screening has become a primary strategy in identifying children in need of services that are not typically enrolled in comprehensive service delivery systems (Bailey & Wolery, 1989). Due to the lack of such delivery systems, brief, low-cost forms of assessment that allow screening of large numbers of children are needed. However, there are several limitations associated with this type of screening process (Bailey & Wolery, 1989; Gracey, Azzara & Rheinhertz, 1984; Harrington, 1984; Paget & Nagle, 1986; Thomas & Grimes, 1990). The potential for premature labeling (Paget & Nagle, 1986; Reynolds & Kamphaus, 1990), the rapid developmental change within children (Dunst & Rheingrover, 1981; Litchenstein, 1982; Thomas & Grimes, 1990), and the limited generalizability of test results (Litchenstein, 1981; Miller & Sprong, 1986) are common limitations cited in the literature. While these limitations are important to address, there are several benefits associated with the preschool screening process.

Although the limitations of premature labeling are often discussed in the literature (Paget & Nagle, 1986; Reynolds & Kamphaus, 1990), legislation has not failed to realize the inappropriateness of such labeling. While it is true that for school-aged children, the law stipulates that data be reported to support diagnostic labels in order to justify placement and services, this

is not the case for preschool-aged children. Under Public Law 99-457 (1986), the federal government does not require the states to document children through use of diagnostic categories (Thomas & Grimes, 1990). Therefore, the states are able to serve children from 3 to 5 years of age without having to apply labels.

Developmental levels pose a unique problem for the preschool clinician. Young children often differ in their rate of acquisition of skills and transitions between developmental levels making it difficult for the clinician to identify delays. "The situational variability of the preschool child's behavior and the individual rate of rapid, uneven growth make it difficult to make an accurate appraisal of what the child 'generally' does" (Reynolds & Kamphaus, 1990, p. 754). According to Reynolds and Kamphaus (1990), the clinician must seek to determine the child's skills in relation to his or her previous experiences and level of maturation.

The composition and representation of the standardization sample is critical in selecting an instrument (Satz & Fletcher, 1988). Many screening instruments were standardized using only normal children (Hamilton & Swan, 1981). The exclusion of handicapped children in the standardization sample makes it difficult to interpret discrepancies in rates of development for handicapped children. Relatedly,

"individual differences in the rate and nature of developmental changes place limitations on the extent to which early deficits are indicative of the need for special intervention" (Litchenstein, 1982, p. 70). The limited generalizability of test results for preschoolers exist, in part, because intelligence quotients (IQs) were developed as a measure of a relatively stable feature, and not designed to be sensitive to dynamic change and growth in preschoolers (Thomas & Grimes, 1990). "All that can be said about instability in IQ performance is that a person's IQ, relative to the IQs of other individuals in the reference group, changes its rank order position across occasions" (Dunst & Rheingrover, 1981, p. 52). According to Scarr (1981), "whenever one measures a child's [cognitive] functioning, one is also measuring cooperation, attention, persistence, ability to sit still, and social responsiveness to an assessment situation" (p. 1161). Differences in learning opportunities and experiences account for the majority of the variation in the interpretation of test data for preschool aged children (Reynolds & Kamphaus, 1990). Although many limitations exist in the area of preschool assessment, benefits such as providing information on developmental strengths and weaknesses, providing information for specific teaching approaches, and more importantly, determining the need for specialized

services, all substantiate the implementation of preschool assessment procedures (Schakel, 1986). It is generally accepted that a child's performance on a test has little or no meaning as an event unless it can be compared to some other event (Hamilton & Swan, 1981). Consequently, preschool tests should focus on those concepts or domains of knowledge which are critical in establishing a basis for future growth and development.

Basic concepts help children to understand and describe relationships among objects, locations of objects and people, characteristics of objects (e.g., quantity, positions, movements, presence, and dimensions), and sequences of events (Thomas & Grimes, 1990). A test which measures current understanding of basic concepts of preschool aged children would provide a reference for individualized instruction, affording children the opportunity to master unknown concepts and to maximize their learning potential. The importance of basic conceptual knowledge and its influence on intellgence during the early years has also been well substantiated (Kaufman, 1978).

The cognitive domain is one of the most often assessed developmental domains for preschool children (Harrington, 1984). According to Bailey and Wolery (1989), cognitive skills are those related to children's mental development and include basic sensorimotor skills, pre-academic skills, including concept

development, prereading skills, and premath skills. There are two primary reasons for conducting cognitive screening: (a) to determine the nature of any condition likely to limit progress, and (b) to aid in program planning should a problem be identified (Thomas & Grimes, 1990). In the view of Thomas and Grimes (1990), screening is designed to identify the problems of the child's cognitive functioning that may interfere with later academic learning. Screening is designed to identify those children at-risk of developing difficulties in later academic learning, making the process of identifying someone at-risk a future judgement (Adelman, 1982); thus, the predictive utility of screening instruments is extremely important.

As it relates to screening measures, predictive validity refers to the extent to which the screening test agrees with children's performance on outcome measures later in time (Bailey & Wolery, 1989). Reynolds and Kamphaus (1990) question the value of assessment instruments with little predictive utility, proposing that if a test maintains value without predictive utility, two positions must be assumed: (a) items on tests are independently important, and (b) items are symptomatic of underlying cognitive abilities. However, without validity coefficients, the technical adequacy of the test cannot be established.

In addition, several studies have reported that the

hit rate or predictive utility of preschool screening tests are less than adequate (Adelman, 1982; Satz & Fletcher, 1988; Ullman & Kausch, 1979) in that no currently available procedure intended for large scale use can claim to identify a large number of problems without making many false positive errors. Alteration of the cut-off scores used in identification can reduce the number of false positives, but the number of correct identifications is also reduced (Adelman, 1982). The indication that children do not have developmental delays, when, in fact, they do, results in a false negative error (Satz & Fletcher, 1988). The results of a false negative error are considered more serious than that of a false positive error, because children in need of services will not be referred and their delays may become more severe (Bailey & Wolery, 1989). More accurate screening instruments would result in a hit rate better than chance, but would still be less than perfect (Wilson & Reichmuth, 1985). Another important consideration concerning assessment of preschoolers focuses on the age of the child being tested.

While some practitioners believe that assessment beginning in infancy is feasible, others maintain that the predictive value of measurement indexes does not emerge until approximately two years of age. Bailey and Wolery (1989) advocate serial screening beginning in infancy so that delays beginning later in the preschool

period (e.g., ages 3-4) may be identified. In contrast, Dunst and Rheingrover (1981) indicate that tests administered to children under 2 years of age do not predict preschool, school age, or adult intelligence; however toward the late preschool years, the predictive value of these instruments emerge. Although there are considerable limitations involving the predictive validity of preschool assessment instruments, the predictive validity for the handicapped population is somewhat higher than that for "normals."

In a study conducted by Detterman and Daniels (1989), it was concluded that tests of basic cognitive ability have higher intercorrelations in lower ability groups than in higher ability groups. Sattler (1988) also recognized that the predictive power of assessment instruments used with mentally retarded infants was much greater than when used with normal infants. Three reasons have been recognized as contributing to differences in predictive validity among handicapped and normal infants: (a) cognitive tasks correlate more highly among themselves at lower ability levels than at higher ability levels, (b) cognitive tasks correlate more highly with IQ at lower ability levels than at higher ability levels, and (c) subtests of IQ tests intercorrelate more highly at lower ability levels than at higher ability levels (Detterman & Daniels, 1989). These studies suggest that predictions related to future

performance or handicaps are more accurate with low functioning or at-risk preschoolers compared to normals. At the same time, the results indicate that clinicians should be conservative when making predictions about future performance based on screening results.

The Bracken Basic Concept Scale (BBCS) (Bracken, 1984) is a fairly recently developed screening instrument designed to measure the current understanding of basic conceptual terms of children 2 1/2 years to 7 years, 11 months. Bracken (1987) and Sterner and McCallum (1988) reported adequate reliability and validity for the BBCS. Total test internal consistency coefficients for ages 3-0 through 6-0 ranged from .94 to .98 on the BBCS, while test-retest reliability for mixed ages on the BBCS was reported to be .97 (Bracken, 1987).

In a study conducted by Sterner and McCallum (1988), the relationship among the BBCS, the Gesell Developmental Exam (GDE), and the Wide Range Achievement Test-Revised (WRAT-R) were investigated. A significant positive correlation ($r$ = .59) was found between the BBCS Total Test score and the GDE Developmental Quotient, indicating a moderately strong relationship between basic concept knowledge and developmental age (Sterner & McCallum, 1988). Intercorrelations between the BBCS Total Test score and the WRAT-R subtests ranged from .50 to .60, while intercorrelations between

the GDE Developmental Quotient and WRAT-R subtests ranged from .33 to .48 (Sterner & McCallum, 1988). These results suggest that basic concept knowledge is a better predictor of achievement than developmental age. As a measure of basic conceptual terms in easle format, the BBCS is similar to the Peabody Picture Vocabulary Test-Revised (PPVT-R). The PPVT-R is often used as an estimate of verbal intelligence by means of measuring expressive vocabulary (Davis & Kramer, 1985).

In a study comparing scores on the Stanford-Binet Fourth Edition (SB-IV), Peabody Picture Vocabulary Test-Revised (PPVT-R), and the Columbia Mental Maturity Scale (CMMS), the relationship between the SB-IV and PPVT-R was .56, while the relationship between the SB-IV and the CMMS was .40 (Carvajal, Hardy, Harmon, Sellers, & Holmes, 1987). This suggests that the SB-IV and PPVT-R measure similar skills; however, the correlation is not so great that one instrument may be substituted for the other. These results suggest that screening measures that assess language related concepts are relatively good predictors of intelligence. Few studies have been conducted on the utility of the BBCS as a screening instrument and its relationship with measures of intelligence. Due to the increasing popularity of the BBCS among clinicians, the need for information concerning the predictive utility of the BBCS is paramount. The predictive validity of the BBCS in

relation to a diagnostic instrument or measures of intelligence, however, has yet to be established.

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 A). 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. Furthermore, 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, 1990a). The broad range of characteristics included in the norming sample of the DAS makes it unique among intelligence measures.

The concurrent validity of the DAS was substantiated using the Wechsler Preschool and Primary

Scales of Intelligence-Revised (WPSSI-R), and the Stanford Binet Intelligence Scale, Fourth Edition (SB-IV). 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 Cluster score and the WPPSI-R Verbal IQ score and the DAS Nonverbal Cluster score and the WPPSI-R IQ score were .74 and .75, respectively. The correlations between the DAS GCA and SB-IV composite was .77. The DAS Verbal Cluster score correlated the highest with the SB-IV Verbal Reasoning standard age score with a coefficient of .72. The DAS Nonverbal Cluster score correlated the highest with the SB-IV Abstract-Visual Reasoning standard age score ($r$ = .64), while its correlation with the SB-IV composite score was .69.

The DAS was administered after the Woodcock-Johnson Psycho-Educational Battery Preschool Skills Cluster (WJ-PSSC) to 23 Louisiana preschool children aged 3:6-5:11, with a mean age of 4:6 ($SD$ = 9 months). 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 correlate moderately with the WJ-PSSC (Verbal Ability $r$ = .56, Nonverbal Ability $r$ = .67, and GCA $r$ = .67).

The DAS and Peabody Picture Vocabulary Test-Revised (PPVT-R) were 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 took all of the DAS subtests normed for their age; thus, almost all of the first-graders took Naming Vocabulary, Early Number Concepts, and Picture Similarities, in addition to the School-Age Level subtests, but few of the third-graders took these Preschool Level subtests. The DAS Verbal Cluster score correlated moderately with the PPVT-R (r = .84). As expected, the PPVT-R correlated substantially higher with the DAS Naming Vocabulary subtest (r = .76) than with any other DAS subtest score.

The previous research established the concurrent validity of the DAS in relation to several commonly used preschool assessment instruments. As with other measures of intelligence (e.g., Stanford-Binet IV), clinicians and researchers are interested in the relationship between the DAS and preschool screening measures. This study considered the relationship between the Bracken Basic Concept Scale (BBCS) (Bracken, 1984) and the Differential Ability Scales (DAS) (Elliott, 1990a).

# CHAPTER III

# METHODS

## Subjects

The subjects in this study included 60 preschool children between the ages of 3 years, 6 months and 5 years, 11 months (*M* = 4 years, 9 months; *SD* = 6.4 months). Of the 60 preschool subjects, 38 were males and 22 were females. The subjects were predominantly Caucasian (97%) with 3% representing minority groups. Subjects' economic background ranged from low socioeconomic level to low-middle socioeconomic level. Twenty-eight preschoolers came from a preschool in a rural, mid-western, college town in Oklahoma. The remaining 32 preschoolers came from a small rural town in Indiana. The subjects were administered the *Bracken Basic Concept Scale* (BBCS) and *Differential Ability Scales* (DAS) in counterbalanced order to control for response effect due to treatment order. Scores on the BBCS and DAS for the preschool children came from an existing database and was considered archival data. Due to the utilization of archival data, the Oklahoma State

University Institutional Review Board granted this study exempt review approval.

## Instruments

### Bracken Basic Concept Scale

The instruments utilized in this study were the Bracken Basic Concept Scale (BBCS) (Bracken, 1984) and the Differential Ability Scales (DAS) (Elliott, 1990a). The BBCS is a screening instrument which assesses an individual child's conceptual knowledge by measuring 258 concepts (Bracken, 1984). The BBCS standardization sample consisted of 523 males and 586 females from various ethnic categories and geographic regions (Bracken, 1984).

The BBCS yields both a Total Test score and a School Readiness Composite (SRC) score. The Total Test score is represented by a mean of 100 and a standard deviation of 15. The School Readiness Composite (SRC) is comprised of the Color, Letter Identification, Numbers/Counting, Comparisons, and Shapes subtests, and the remaining six BBCS subtests, which comprise the BBCS Total Test score (see Appendix B), have standard scores with a mean of 10 and a standard deviation of 3. The descriptions of the BBCS subtests are as follows:

School Readiness Composite. The School Readiness Composite is comprised of the 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 by the examiner.

Letter Identification. This subtest measures knowledge of upper and lower case letters. The child points to the letter specified.

Numbers/Counting. This subtest measures understanding of discrete values assigned to and indicated by numerals ranging from zero to nine.

Comparisons. This subtest requires a child to match and/or differentiate objects based on one or more of their salient characteristics.

Shapes. This subtest measures basic shapes in one-, two-, and three-dimensions. Shapes such as line, diagonal, and curve are included in the one-dimensional category. Two-dimensional shapes are represented by shapes such as circle, triangle, and square. Shapes such as cub and pyramid are included in the three-dimensional category.

Direction/Position. This subtest includes relational terms which describes a direction of placement (e.g. right, left, center), describes the position of an object (e.g., open, upside-down), or describes where one object is relative to

another (e.g., the child in front of the chair).

Social/Emotional. Terms describing kinship, gender, relative ages, and social appropriateness (e.g., right and wrong) are included in the social aspect of the subtest. Basic words expressing feeling, such as angry, happy, and tired represent the emotional domain.

Size. Concepts which describe one, two, and three dimensions of an object are included in the size category.

Texture/Material. This subtest includes terms which describe the salient characteristics of an object, especially external characteristics, as well as basic materials (e.g., wood, glass, and metal).

Quantity. Quantity terms describe the degree to which objects exist and the space with which these objects occupy. Therefore, this subtest measures a child's understanding of terms that describe a relative degree of existence.

Time/Sequence. Occurrences along a temporal or sequential continuum and the degree of speed and/or order with which those events occur on the continuum are measured in this subtest.

Split half reliability estimates reported for the BBCS range from .47 to .96 for subtest scores and .94 to .98 for the total test score. The median subtest and total

test reliabilities are .85 and .97, respectively (Bracken, 1984). Test-retest reliabilities reported for the BBCS subtest scores ranged from .67 to .98, with a median reliability coefficient of .91. For the Total Test, test-retest reliability was .97. Intercorrelations among the subtests ranged from .29 to .78. Subtest-total test correlations over 5 age groups ranged from .56 to .91 (Bracken, 1984).

Validity estimates indicate that the BBCS has a moderately high relationship with other screening measures such as the Peabody Picture Vocabulary Test-Revised (PPVT-R) Forms L ($r$ = .74) and M ($r$ = .88), and the Token Test for Children ($r$ = .68) (Bracken, 1984).

Differential Ability Scales

The Differential Ability Scales (DAS) (Elliott, 1990a) were designed as a measure of cognitive ability which yields interpretable scores for a wide range of abilities at the composite or subtest levels. The DAS was developed to provide not only a global IQ estimate, but more specifically, to provide specific information about children's strengths and weaknesses across a range of cognitive domains. Such information is considered essential in identifying the nature of a child's learning difficulties (Elliott, 1990a).

The structure of the upper preschool level of the cognitive battery of the DAS (see Appendix A) is comprised of the General Conceptual Ability (GCA) score

at the highest level, the Verbal and Nonverbal Ability clusters at the second level, and the core subtests at the lowest level. The GCA score must be derived from a set of subtests that measure a common dimension of ability in order to be interpretable. The homogeneous characteristics of each subtest allows for interpretation in terms of content. The contribution of subtests to a composite score should be similar in a sense that they correlate highly with a common group factor or psychometric g. Only those subtests with high g loadings contribute to the GCA score on the DAS. This characteristic of the DAS ensures that a valid measure of intellectual ability is obtained (Elliott, 1990b). Five of the six core subtests contributing to the GCA for preschool children aged 3:6 to 5:11 form two clusters: Verbal Ability and Nonverbal Ability. The GCA score is an age-based standard score with a mean of 100 and a standard deviation of 15 (Elliott, 1990a). Two subtests combine to form the Verbal Cluster score, and three subtests combine to form the Nonverbal Cluster score. One independent subtest, the Early Number Concepts subtest, also contributes to the GCA score. Complementing the six core subtests are five diagnostic subtests. The two clusters and descriptions of the core subtests that comprise each cluster are as follows:

Verbal Ability. The Verbal Ability cluster is comprised of the Verbal Comprehension and Naming

Vocabulary subtests.

Verbal Comprehension. This subtest measures receptive language through understanding oral directions and using basic language concepts. Memory is also measured in this subtest, as the child is required to point to pictures, and to manipulate objects after the examiner has given oral directions.

Naming Vocabulary. This subtest measures memory, language development, and expressive language through knowledge of picture names. The child is presented with objects and pictures, and is asked to name each.

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

Picture Similarities. This is a nonverbal reasoning task in which a row of four pictures is shown to the child, and the child is asked to place a card under the picture with which the card shares a concept or characteristic. This subtest measures visual attention to detail and the level of the child's general knowledge base.

Pattern Construction. This subtest measures analysis and synthesis through spatial visualization and reasoning of part-whole relationships. The child constructs designs from

flat squares with black and yellow patterns.

Copying. This is a perceptual-motor task in which the child copies line drawings. This subtest measures visual-perceptual matching and fine-motor coordination.

Early Number Concepts. This subtest measures both verbal and nonverbal skills through knowledge of prenumerical and numerical concepts. The child uses colored chips or pictures to answer questions about quantity, size, or other numerical concepts.

Diagnostic Subtests. The diagnostic subtests are comprised of the Matching Letter-Like Forms, Recall of Digits, Recall of Objects, and Recognition of Pictures subtests.

Matching Letter-Like Forms. This is a visual discrimination task in which the child must find an identical match to an abstract figure from six choices. This subtest measures visual-perceptual matching through the ability to follow verbal instructions and verbal cues.

Recall of Digits. This is a task of short-term auditory memory in which the child repeats a sequence of digits that has been presented orally at the rate of two digits per second. This subtest measures attention and concentration through the oral recall of sequences of numbers.

Recall of Objects. This is an immediate and

delayed recall task. The child is presented with the names and pictures of 20 common objects on a card. This subtest measures verbal mediation strategies and concentration and attention through immediate and delayed verbal recall of the names of the objects previously shown.

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

Internal reliabilities of the DAS core, diagnostic, and composites for the upper preschool level are given in Table 1. Internal reliabilities ranged from .66 (Recall of Objects-Immediate) to .90 (Pattern Construction), for the DAS core and diagnostic subtests. Reliabilities for the DAS composite scores ranged from .86 (Verbal Ability) to .95 (General Conceptual Ability) Test-retest subtest reliabilities ranged from .38 to .81 for ages 3:6-4:5, and from .54 to .89 for ages 5:0-6:3. Test-retest reliabilities for composite scores ranged from .79 (Nonverbal Ability) to .90 (GCA) for ages 3:6 to 4:5, and from .86 (Nonverbal Ability) to .94 (GCA) for ages 5:0 to 6:3.

The concurrent validity of the DAS was substantiated using the Wechsler Preschool and Primary

TABLE I

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

| | Age | | | |
|---|---|---|---|---|
| Subtest | 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 | .88 | .89 | .86 | .90 |
| Nonverbal Ability | .88 | .89 | .88 | .90 |
| GCA | .94 | .94 | .94 | .95 |

Note. N = 175 for each age range from 3:6-4:11; N = 200 for the age range from 5:00-5:11. 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.

Scale of Intelligence-Revised (WPPSI-R) and the Stanford-Binet Intelligence Scale, Fourth Edition (SB-IV). 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 score and the WPPSI-R Verbal IQ and the DAS Nonverbal Ability score and the WPPSI-R IQ score were .74 and .75, respectively. The correlation between the DAS GCA and SB-IV composite was .77.

## Data Analysis

Pearson-Product Moment correlation coefficients were computed for subtests of the Bracken Basic Concept Scale (BBCS) and Differential Ability Scales (DAS), and for both tests with each other to determine the degree of relationship. In addition, the means, standard deviations, and ranges for the BBCS and DAS subtests and composites were computed for the entire sample.

# CHAPTER IV

## RESULTS AND DISCUSSION OF RESULTS

### Introduction

To determine the relationship between the Bracken Basic Concept Scale (BBCS) (Bracken, 1984) and the Differential Ability Scales (DAS) (Elliott, 1990a), the following questions were generated:

1. Is there a significant relationship between the BBCS Total Test score and the DAS General Conceptual Ability (GCA) score?
2. Is there a significant relationship between the BBCS Total Test score and the DAS Verbal Cluster score?
3. Is there a significant relationship between the BBCS Total Test score and the DAS Nonverbal Cluster score?
4. Is there a significant relationship between the BBCS Total Test score and the DAS diagnostic subtests?
5. Is there a significant relationship between the BBCS Total Test score and the DAS core subtests?

6. Is there a significant relationship between the BBCS subtests and the DAS core subtests?
7. Is there a significant relationship between the BBCS subtests and the DAS diagnostic subtests?

The data were processed using Oklahoma State University's CMS computer system. The Pearson product-moment correlation program used is part of the Statistical Package for the Social Sciences (SPSS-User's Manual, 1988). The .05 level was established for judgements regarding statistical significance.

## Descriptive Statistics

Means, standard deviations, and ranges for the Bracken Basic Concept Scale (BBCS) subtests for the entire sample are shown in Table 2. All of the subtests approximated the standardization sample mean of 10, with the exception of the School Readiness Composite ($M$ = 8.23). The subtest standard deviations were similar to that of the standardization sample ($SD$ = 3), ranging from 2.61 to 3.56. The BBCS Total Test score ranged from 59 to 125. The standard deviation of the Total Test score ($SD$ = 15.07) closely approximated that of the standardization sample ($SD$ = 15), while the mean of the Total Test score ($M$ = 95.45) was somewhat lower than that of the standardization sample ($M$ = 100).

TABLE II

BBCS SCHOOL READINESS COMPOSITE, SUBTEST, AND TOTAL TEST RANGES, MEANS, AND STANDARD DEVIATIONS FOR THE ENTIRE SAMPLE

| Subtest | Range | Mean | SD |
|---|---|---|---|
| School Readiness Composite | 2 - 17 | 8.23 | 3.21 |
| Direction/Position | 1 - 15 | 9.65 | 2.70 |
| Social/Emotional | 3 - 16 | 9.60 | 3.08 |
| Size | 1 - 16 | 9.63 | 3.56 |
| Texture/Material | 2 - 15 | 9.47 | 2.77 |
| Quantity | 3 - 15 | 9.50 | 2.79 |
| Time/Sequence | 4 - 16 | 9.32 | 2.61 |
| Total Test Score | 59 - 125 | 95.45 | 15.07 |

Note. N = 60.

Means, standard deviations, and ranges for the Differential Ability Scales (DAS) core subtests, diagnostic subtests, and Clusters for the entire sample are shown in Table 3. The means and standard deviations of the DAS subtests ($M$ = 50, $SD$ = 10) and Clusters ($M$ = 100, $SD$ = 15) are similar to those reported in the DAS Technical Manual (Elliott, 1990b). Of the core subtests, the preschool children, as a group, achieved their lowest average score on the Early Number Concepts ($M$ = 46.17, $SD$ = 9.81) subtest which measures knowledge of prenumerical and numerical concepts.

The core subtest with the smallest standard

deviation was Verbal Comprehension (SD = 7.47). The subtest with the largest standard deviation was Pattern Construction (SD = 11.96). Among the diagnostic subtests, Recall of Objects-Immediate exhibited the lowest mean (M = 45.80, SD = 10.8). This subtest measures verbal mediation strategies and concentration and attention. Preschool-aged children often maintain limited attention spans, thus making this subtest more difficult for them in comparison to the other diagnostic subtests. As a result, the reduced mean could be due to the distractible nature of preschool-aged children, moreso than poor verbal mediation strategies.

The means of the DAS Cluster scores closely approximated that of the standardization sample. As a group, the preschool children scored within the average range on General Conceptual Ability (GCA). This classification was based on the normative descriptions in the DAS's Administration and Scoring Manual (Elliott, 1990a). Comparisons to determine whether the mean Ability Cluster scores were significantly different from the mean GCA score were done using the values for statistical significance as presented on page 56 of the DAS Administration and Scoring manual (Elliott, 1990a). No significant differences were demonstrated between mean Ability Cluster scores and the mean GCA score for this sample. To compare the Ability Cluster scores with one another, a 14-point difference is required for

significance at the .05 level. No significant differences were found. Among the Cluster means, the General Conceptual Ability (GCA) score was the lowest ($M$ = 97.77). The lower GCA mean can be contributed to the inclusion of the Early Number Concepts subtest in the GCA score. The Early Number Concepts subtest is not included in the Verbal and Nonverbal Ability Clusters (see Appendix A), instead, it independently contributes to the GCA score. As previously evidenced, the Early Number Concepts subtest exhibited the lowest mean ($M$ = 46.17) of the core subtests. Since this subtest is not included in the Verbal or Nonverbal Ability Clusters, yet still contributes independently to the GCA score, it lowers the mean GCA score for the sample.

The intercorrelations among the BBCS subtest scores for the entire sample are shown in Table 4. The School Readiness Composite correlated, consistently, the highest with the other BBCS subtests, ranging from .66 to .79. The School Readiness Composite appeared to be measuring a large conceptual domain that is similar to the other BBCS subtests. The lowest correlations were demonstrated between the Size subtest and the other BBCS subtests ($r$ = .60 to .67). This subtest measures conceptual knowledge of one- two- and three-dimensional shapes. Compared to the intercorrelations among the BBCS subtests, the Size subtest appeared to be the least related to the other subtests. This is further

demonstrated by the lower correlation between the Size subtest and Total Test score ($r$ = .75). High to very high relationships were demonstrated between the BBCS subtests and BBCS Total Test scores.

TABLE III

DAS CORE SUBTESTS, DIAGNOSTIC SUBTESTS, AND CLUSTER ABILITY SCORE RANGES, MEANS, AND STANDARD DEVIATIONS FOR THE ENTIRE SAMPLE

| Subtest | Range | Mean | SD |
|---|---|---|---|
| Core: | | | |
| Verbal Comprehension | 30 - 60 | 47.25 | 7.47 |
| Picture Similarities | 20 - 71 | 52.95 | 11.46 |
| Naming Vocabulary | 33 - 74 | 50.93 | 8.40 |
| Pattern Construction | 20 - 67 | 48.70 | 11.96 |
| Early Number Concepts | 22 - 67 | 46.17 | 9.81 |
| Copying | 22 - 67 | 46.73 | 10.56 |
| Diagnostic: | | | |
| Matching Letter-Like Forms | 30 - 80 | 51.47 | 10.25 |
| Recall of Digits | 20 - 73 | 50.28 | 11.37 |
| Recall of Objects-Immediate | 24 - 71 | 45.80 | 10.82 |
| Recall of Objects-Delayed | 32 - 71 | 51.02 | 10.27 |
| Recognition of Pictures | 29 - 66 | 48.80 | 9.27 |
| Clusters: | | | |
| Verbal | 77 - 126 | 98.27 | 11.73 |
| Nonverbal | 47 - 129 | 99.05 | 19.08 |
| GCA | 57 - 126 | 97.77 | 15.85 |

Note. $N$ = 60.

TABLE IV

INTERCORRELATIONS AMONG THE BBCS SUBTESTS AND TOTAL TEST SCORE FOR THE ENTIRE SAMPLE

| Subtest | 2 | 3 | 4 | 5 | 6 | 7 | 8 |
|---|---|---|---|---|---|---|---|
| 1. School Readiness Composite | 77** | 78** | 66** | 72** | 79** | 78** | 91** |
| 2. Direction/Position | - | 71** | 60** | 71** | 85** | 78** | 91** |
| 3. Social/Emotional | | - | 68** | 75** | 73** | 66** | 85** |
| 4. Size | | | - | 66** | 67** | 66** | 75** |
| 5. Texture/Material | | | | - | 68** | 68** | 81** |
| 6. Quantity | | | | | - | 76** | 90** |
| 7. Time/Sequence | | | | | | - | 89** |
| 8. Total Test Score | | | | | | | - |

Note. Decimal omitted. N = 60

** p < .01

Table 5 shows intercorrelations among DAS core subtests and diagnostic subtests for the entire sample. Little relationship was shared between the core subtests and the diagnostic subtests Recall of Objects (Immediate and Delayed) and Recognition of Pictures. However, the Matching Letter-Like Forms and Recall of Digits subtests correlated to a low to moderate degree with the DAS core subtests, indicating that these subtests are measuring similar abilities. Since the core subtests are salient measures of g, this would also indicate that Matching Letter-Like Forms and Recall of Digits are to some degree related to general ability.

TABLE V

INTERCORRELATIONS AMONG DAS CORE AND DIAGNOSTIC SUBTESTS FOR THE ENTIRE SAMPLE

| Subtest | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 |
|---|---|---|---|---|---|---|---|---|---|---|
| Core: | | | | | | | | | | |
| 1. VC | 47** | 57** | 52** | 70** | 55** | 51** | 57** | 43** | 21 | 30* |
| 2. PS | - | 59** | 59** | 60** | 66** | 44** | 42** | 33* | 23 | 41** |
| 3. NV | | - | 53** | 53** | 47** | 50** | 54** | 47** | 16 | 34** |
| 4. PC | | | - | 54** | 73** | 47** | 54** | 44** | 44** | 34** |
| 5. EN | | | | - | 57** | 57** | 63** | 50** | 35** | 35** |
| 6. COPY | | | | | - | 54** | 56** | 38** | 34** | 29** |
| Diagnostic: | | | | | | | | | | |
| 7. MLLF | | | | | | - | 61** | 40** | 34** | 13 |
| 8. ROD | | | | | | | - | 35** | 28* | 04 |
| 9. RO-I | | | | | | | | - | 58** | 41** |
| 10. RO-D | | | | | | | | | - | 33* |
| 11. ROP | | | | | | | | | | - |

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

Note. Decimals omitted. $N$ = 60.

* $p < .05$, ** $p < .01$

For the entire sample, intercorrelations among DAS Core and Diagnostic subtests and Clusters are presented in Table 6. In examination of the coefficients, it was expected that a stronger relationship would exist between the GCA and the Verbal Comprehension ($r$ = .76) and the Naming Vocabulary subtests ($r$ = .75), yet they correlated only moderately. The lower correlations

among the GCA and these subtests may be due to the inclusion of the Nonverbal subtests in the GCA score.

TABLE VI

INTERCORRELATIONS AMONG DAS CORE AND DIAGNOSTIC SUBTESTS AND CLUSTERS FOR THE ENTIRE SAMPLE

| | Cluster | | |
|---|---|---|---|
| Subtest | Verbal | Nonverbal | GCA |
| Core: | | | |
| Verbal Comprehension | .87** | .57** | .76** |
| Picture Similarities | .59** | .83** | .82** |
| Naming Vocabulary | .90** | .59** | .75** |
| Pattern Construction | .58** | .87** | .82** |
| Early Number Concepts | .68** | .63** | .81** |
| Copying | .56** | .91** | .83** |
| Diagnostic: | | | |
| Matching Letter-Like Forms | .56** | .54** | .62** |
| Recall of Digits | .62** | .58** | .67** |
| Recall of Objects-Immediate | .51** | .41** | .51** |
| Recall of Objects-Delayed | .20 | .38** | .38** |
| Recognition of Pictures | .36** | .37** | .41** |
| Cluster: | | | |
| Verbal | - | .64** | .84** |
| Nonverbal | | - | .93** |
| GCA | | | - |

Note. $N$ = 60

* $p < .05$, ** $p < .01$

Intercorrelations among DAS core subtests, DAS diagnostic subtests, DAS Clusters, BBCS subtests, and the BBCS Total Test score for the entire sample are shown in Table 7. For the most part, low correlations were found between the BBCS subtests and the DAS diagnostic subtests Recall of Objects (Immediate and Delayed) and Recognition of Pictures, indicating that these subtests are measuring different abilities. However, moderate correlations exist between the BBCS subtests and the DAS diagnostic subtests Matching Letter-Like Forms and Recall of Digits, indicating that these subtests are measuring similar abilities. The correlations between the DAS core subtests and the BBCS subtests were not substantially high, indicating that each subtest shares some common characteristics, while still measuring different abilities. A significant relationship exists between the BBCS Total Test score and the DAS core subtests. As previously evidenced, the DAS diagnostic subtests Matching Letter-Like Forms and Recall of Digits correlate moderately with the BBCS Total Test score, while the diagnostic subtests Recall of Objects (Immediate and Delayed) and Recognition of Pictures correlated to a low degree with the BBCS Total Test score. A significant relationship exists between the BBCS Total Test score and the DAS Nonverbal Cluster score, with a high correlation of .73. The correlation between the BBCS Total Test score and the DAS Verbal

Cluster is somewhat lower ($r$ = .67), yet still exhibits a moderate correlation. The significant relationship between the BBCS Total Test score and the DAS General Conceptual Ability score is evidenced by a high correlation ($r$ = .80), indicating that the two instruments share a marked relationship, perhaps measuring much of the same construct.

## Discussion of Results

The results of this study indicated that the BBCS is a good screening measure of ability. A high relationship ($r$ = .80) was found between the BBCS Total Test score and the DAS General Conceptual Ability (GCA) score. This high relationship indicates that the two measures assess similar skills, but is not high enough to warrant the substitution of one for the other. The BBCS Total Test score correlated to a moderate to high degree with the DAS Verbal ($r$ = .67) and Nonverbal Cluster ($r$ = .73) scores. Although these relationships would be considered adequate between a screening measure and an ability measure (Carvajal, Hardy, Harmon, Sellers, & Holmes, 1987), the best relationship was between the BBCS Total Test score and DAS GCA score. Interestingly, there was little difference in the correlations between the BBCS Total Test score and DAS Cluster scores. It was expected that the BBCS Total Test score would have had the highest correlation

TABLE VII

INTERCORRELATIONS AMONG THE BBCS, DAS CORE AND DIAGNOSTIC SUBTEST SCORES, AND DAS CLUSTERS FOR THE ENTIRE SAMPLE

| | BBCS | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| DAS | SRC | D/P | S/E | Size | T/M | Quan | T/S | Total |
| Core: | | | | | | | | |
| VC | .61** | .66** | .50** | .50** | .57** | .64** | .48** | .64** |
| PS | .65** | .50** | .53** | .46** | .50** | .56** | .51** | .63** |
| NV | .57** | .53** | .43** | .38** | .46** | .56** | .53** | .59** |
| PC | .65** | .66** | .49** | .42** | .50** | .61** | .59** | .65** |
| EN | .63** | .64** | .51** | .62** | .67** | .66** | .55** | .68** |
| COPY | .67** | .63** | .56** | .44** | .49** | .60** | .52** | .67** |
| Diagnostic: | | | | | | | | |
| MLLF | .59** | .61** | .66** | .53** | .56** | .61** | .50** | .66** |
| ROD | .58** | .56** | .45** | .41** | .47** | .56** | .48** | .58** |
| RO-I | .32* | .44** | .24 | .35** | .39** | .37** | .44** | .41** |
| RO-D | .25 | .41** | .20 | .20 | .29* | .32* | .32* | .35** |
| ROP | .36** | .24 | .18 | .28* | .25 | .21 | .29* | .32* |
| Cluster: | | | | | | | | |
| Verbal | .66** | .67** | .52** | .48** | .57** | .67** | .57** | .67** |
| Nonverb | .73** | .67** | .58** | .48** | .55** | .65** | .62** | .73** |
| GCA | .78** | .75** | .61** | .57** | .65** | .75** | .67** | .80** |

VC = Verbal Comprehension; PS = Picture Similarities; NV = Naming Vocabulary; PC = Picture Completion; EN = Early Number Concepts; COPY = Copying; 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; Nonverb = Nonverbal; SRC = School Readiness Composite; D/P = Direction/Position; S/E = Social/Emotional; T/M = Texture/Material; Quan = Quantity; T/S = Time/Sequence; Total = Total Test Score.

Note. $N$ = 60.

* $p < .05$, ** $p < .01$

with the Verbal Cluster score since they are each language based. Instead, the BBCS appears to measure verbal and nonverbal related skills.

Correlations between the BBCS Total Test score and the DAS subtests ranged from low to moderate. The highest relationships were between the BBCS Total Test score and the DAS core subtests. Among the diagnostic subtests, Matching Letter-Like Forms and Recall of Digits correlated the highest with the BBCS Total Test score. The Recall of Objects and Recognition of Pictures subtests had low correlations with the BBCS Total Test score. These latter two subtests appear to be measuring different abilities than the BBCS.

Moderate relationships were found between the BBCS subtests and the DAS core subtests. This suggests that each subtest on the BBCS and DAS are measuring relatively different abilities, supporting independent interpretation at the subtest level. The DAS subtests do provide additional information beyond the BBCS. However, the BBCS and DAS subtests appear to be measuring similar abilities, and this can be seen in the high relationship between the BBCS Total Test score and the DAS GCA score.

Among the BBCS subtests, the School Readiness Composite (SRC) correlated the highest with the DAS GCA ($r$ = .78), a correlation similar to the one found between the BBCS Total Test score and the DAS GCA ($r$ =

.80). This indicates that the SRC need only be administered to obtain as good an estimate of ability on the DAS. However, this should be done with caution since this will decrease the number of subtests used in predicting ability on the DAS. The most reliable estimate of ability would be the BBCS Total Test score until further research is conducted with the SRC.

# CHAPTER V

# SUMMARY, CONCLUSIONS, AND RECOMMENDATIONS

## Summary

Identification and intervention in the early stages of a handicap is recognized as more feasible due to maximization of development and lowered incidence of later special education services when formal schooling begins; this realization has led to an increased concern in preschool assessment procedures (Adelman, 1982; Reynolds, Egan & Lerner, 1983; Satz & Fletcher, 1988; Ullman & Kausch, 1979; Ysseldyke, Thurlow, O'Sullivan & Bursaw, 1986). State and federal legislation (e.g., P. L. 99-457) provide evidence of the recognition of the inherent benefit in programs focusing on the identification of handicapped and at-risk preschoolers.

Significant to this legislation is the recognition of the importance of screening in identifying children in need of further evaluation. Screening is important, in that it serves as a means of identifying children not typically enrolled in comprehensive service delivery systems (Bailey & Wolery, 1989). Brief, low-cost forms

of assessment that allow screening of large numbers of children are needed due to the lack of such service delivery systems. However, limitations associated with screening and diagnostic instruments make accurate assessment of preschoolers difficult (Bailey & Wolery, 1989; Gracey, Azzara & Rheinhertz, 1984; Harrington, 1984; Paget & Nagle, 1986; Thomas & Grimes, 1990).

The potential for premature labeling (Paget & Nagle, 1986; Reynolds & Kamphaus, 1990), the rapid developmental change within children (Dunst & Rheingrover, 1981; Litchenstein, 1982; Thomas & Grimes, 1990), the need to assess within a context of situational specificity (Paget & Nagle, 1986; Thomas & Grimes, 1990), the limited generalizability of test results (Litchenstein, 1981; Miller & Sprong, 1986), the poor reliability of instruments (Bracken, 1987), and inadequate predictive validity of instruments (Adelman, 1982; Satz & Fletcher, 1988; Ullman & Kausch, 1979) comprise the most often cited limitations associated with preschool instruments.

When new preschool assessment instruments are introduced, the determination of the technical adequacy of the instrument is paramount in order to establish the clinical utility of the instrument. One such instrument, the Bracken Basic Concept Scale (BBCS) (Bracken, 1984), is a recently developed screening instrument designed to measure the current understanding

of basic conceptual terms of children aged 2 1/2 years to 17 years, 11 months. The BBCS was originally constructed to be a brief measure of basic conceptual terms and to identify children in need of a more comprehensive assessment. As with most screening instruments, the BBCS does not provide the same quality or quantity of information derived from intellectual measures (e.g. the Stanford-Binet IV). However, as with most screening measures, the BBCS was not developed to assess similar skills as intellectual measures. Ideally, screening instruments should demonstrate moderately high relationships with intellectual measures but not so high as to warrant substituting one for the other (Carvajal, McVey, Sellers, Weyand, & McKnab, 1987). The relationship of the BBCS with measures of ability has yet to be investigated. If the BBCS is unable to accurately identify those children in need of further diagnostic assessment its use should be limited. By investigating the BBCS's relationship with measures of ability, its value as a screening instrument can be determined. This study contributed significantly by investigating the relationship of the BBCS with the Differential Ability Scales (DAS) (Elliott, 1990a), a recently developed measure of cognitive ability designed to assess children 2 1/2 through 17 years of age.

This study was unique compared to prior research that has studied the relationships between screening and

cognitive measures. The DAS differs from other intelligence scales currently available that provide global composite scores (Intelligence Quotients). 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. Elliott (1990a) also described the GCA score of the DAS 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. This study provided unique results of the relationship between a screening and cognitive measure not typically reported in the literature.

This study also investigated the relationship between the BBCS and the diagnostic subtests of the DAS. By studying these relationships, it was determined whether or not administering the diagnostic subtests might provide additional diagnostic information beyond the core subtests that comprise the GCA (McIntosh & Gridley, 1990). This is an important issue for the clinician since the administration of the diagnostic subtests is optional.

Subjects in the study included 60 preschool children between the ages of 3 years, 6 months and 5

years, 11 months (M = 4 years, 9 months; SD = 6.4 months). Of the 60 preschool subjects, 38 were males and 22 were females. The subjects were predominantly Caucasian (97%) with 3% representing minority groups. Subjects' economic back ground ranged from low socioeconomic level to lower-middle socioeconomic level. Subjects consisted of 28 children from Oklahoma and 32 children from Indiana. The subjects were administered the Bracken Basic Concept Scale (BBCS) and the Differential Ability Scales (DAS) in counterbalanced order to control for response effect due to treatment order.

Pearson-Product Moment correlation coefficients were computed for the Bracken Basic Concept Scale (BBCS) and Differential Ability Scales (DAS), and for both tests with each other to determine the degree of relationship present.

The results of this study indicated that the BBCS is a good screening measure of ability. A high relationship (r = .80) was found between the BBCS Total Test score and the DAS General Conceptual Ability (GCA) score. This high relationship indicates that the two measures assess similar skills, but is not high enough to warrant the substitution of one for the other. The BBCS Total Test score correlated to a moderate to high degree with the DAS Verbal (r = .67) and Nonverbal Cluster (r = .73) scores. Although these relationships

would be considered adequate between a screening measure and an ability measure (Carvajal, Hardy, Harmon, Sellers, & Holmes, 1987), the best relationship was between the BBCS Total Test score and DAS GCA score. Interestingly, there was little difference in the correlations between the BBCS Total Test score and DAS Cluster scores. It was expected that the BBCS Total Test score would have had the highest correlation with the Verbal Cluster score since they are each language based. Instead, the BBCS appears to measure verbal and nonverbal related skills.

Correlations between the BBCS Total Test score and the DAS subtests ranged from low to moderate. The highest relationships were between the BBCS Total Test score and the DAS core subtests. Among the diagnostic subtests, Matching Letter-Like Forms and Recall of Digits correlated the highest with the BBCS Total Test score. The Recall of Objects and Recognition of Pictures subtests had low correlations with the BBCS Total Test score. These latter two subtests appear to be measuring different abilities than the BBCS.

Moderate relationships were found between the BBCS subtests and the DAS core subtests. This suggests that each subtest on the BBCS and DAS are measuring relatively different abilities, supporting independent interpretation at the subtest level. The DAS subtests do provide additional information beyond the BBCS.

However, the BBCS and DAS subtests appear to be measuring similar abilities, and this can be seen in the high relationship between the BBCS Total Test score and the DAS GCA score.

Among the BBCS subtests, the School Readiness Composite (SRC) correlated the highest with the DAS GCA ($r$ = .78), a correlation similar to the one found between the BBCS Total Test score and the DAS GCA ($r$ = .80). This indicates that the SRC need only be administered to obtain as good an estimate of ability on the DAS. However, this should be done with caution since this will decrease the number of subtests used in predicting ability on the DAS. The most reliable estimate of ability would be the BBCS Total Test score until further research is conducted with the SRC.

## Conclusions

The results of this study indicated that the BBCS is a good screening measure of ability. In consideration of whether a significant relationship existed between the BBCS subtests and the DAS diagnostic subtests, low correlations were found between the BBCS subtests and DAS diagnostic subtests Recall of Objects and Recognition of Pictures, indicating that these subtests are measuring different abilities. Moderate correlations existed between the BBCS subtests and DAS diagnostic subtests Matching Letter-Like Forms and

Recall of Digits, indicating that these subtests are measuring similar abilities. The correlations between the DAS core subtests and BBCS subtests were not substantially high, indicating that each subtest shares some common characteristics, while still measuring different abilities. A significant relationship existed between the BBCS Total Test score and the DAS core subtests. The DAS diagnostic subtests Matching Letter-Like Forms and Recall of Digits correlated moderately with the BBCS Total Test score, while the diagnostic subtests Recall of Objects and Recognition of Pictures correlated to a low degree with the BBCS Total Test score. A significant relationship existed between the BBCS Total Test score and DAS Nonverbal Cluster score, with a high correlation of .73. The correlation between the BBCS Total Test score and the DAS Verbal Cluster was somewhat lower than that of the Total Test score and the DAS Nonverbal Cluster, with a moderate correlation of .67. A high correlation ($r$ = .80) was found between the BBCS Total Test score and the DAS General Conceptual Ability (GCA) score. This high relationship indicated that the BBCS and DAS assess similar skills, but was not high enough to warrant the substitution of one instrument for the other.

## Recommendations and Suggestions for Further Research

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

1. A comparison of the intercorrelations between the BBCS and DAS with identified subjects from special populations (e.g., at-risk, mentally handicapped) may be conducted.
2. In order to determine the constructs shared between the BBCS and DAS, a factor analytic study may be conducted.
3. A comparison of the intercorrelations between the BBCS and DAS with younger preschool-aged children (e.g., ages 2:6 through 3:5) may be conducted.

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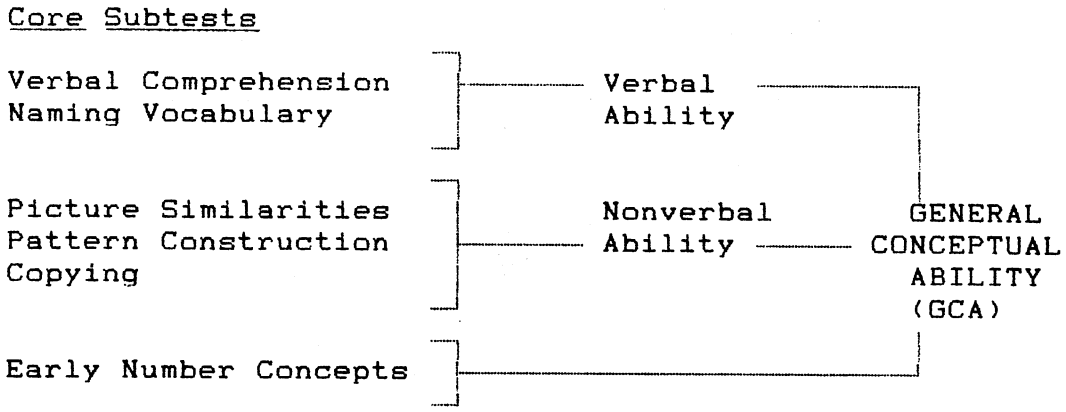
APPENDIX A

UPPER PRESCHOOL STRUCTURE OF THE

DIFFERENTIAL ABILITY SCALES

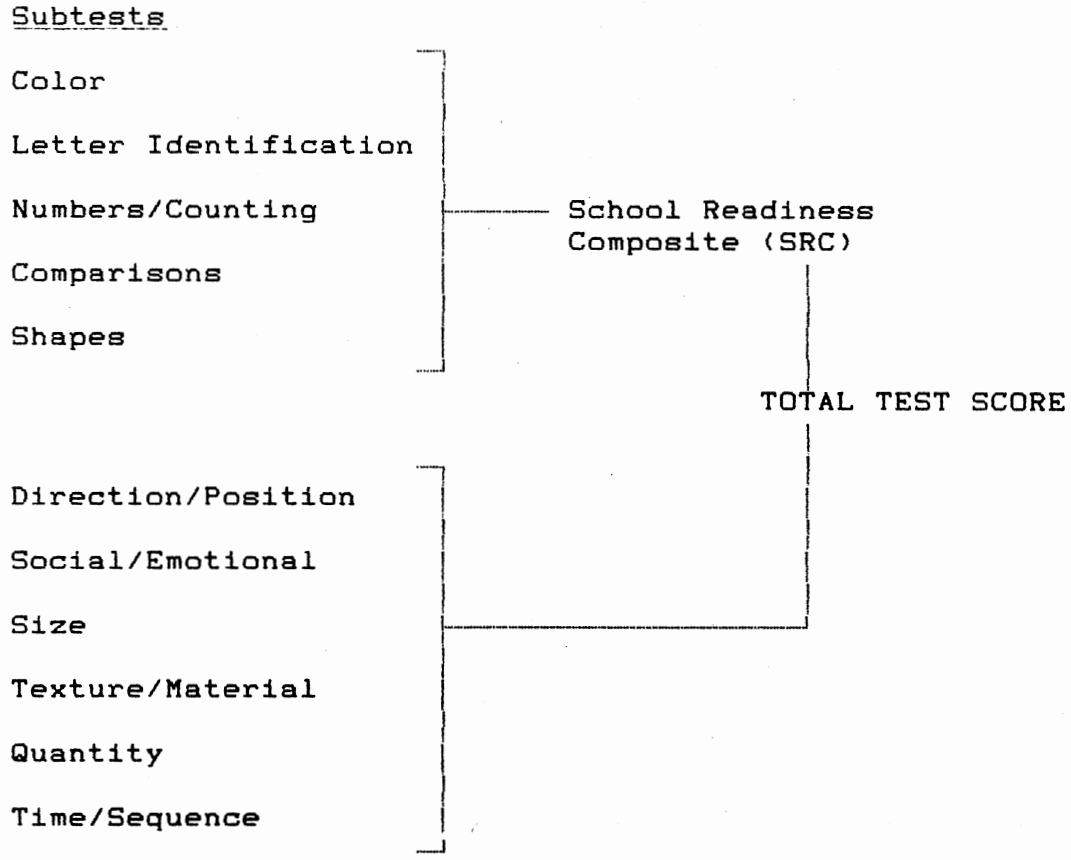



Diagnostic Subtests

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

APPENDIX B

STRUCTURE OF THE BRACKEN BASIC CONCEPT SCALE



# VITA

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