SELF-CONCEPT AMONG SEVENTH GRADE STUDENTS: ITS RELATIONSHIP TO INTELLIGENCE AND ACADEMIC ACHIEVEMENT

A Thesis

by

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SELF-CONCEPT AMONG SEVENTH GRADE STUDENTS: ITS RELATIONSHIP TO INTELLIGENCE AND ACADEMIC ACHIEVEMENT. (July 1985)

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The purpose of the present study was to investigate the effects of intelligence and academic achievement on total self-concept and six subcomponents of self-concept. The subjects consisted of 83 male and 78 female seventh grade students of varying intelligence and achievement levels. Test of Cognitive Skills (TCS) and California Achievement Test (CAT) scores were collected from the cumulative files of each subject as measures of intelligence and academic achievement, respectively. The Piers-Harris Children's Self-Concept Scale was administered to all of the subjects.

Seven multiple regression analyses were conducted with total self-concept and the following six subscales serving as dependent variables: behavior, intellectual and school status, physical appearance and attributes, anxiety, popularity, and happiness and satisfaction. Intelligence and achievement were predictor variables. Results of the analyses revealed no interaction effects. Intelligence accounted for a significant proportion of variance in total self-concept ($p < .01$), behavior ($p < .05$), intellectual and school

status ($p < .01$), and popularity ($p < .05$). Conversely, IQ was not responsible for a significant proportion of the variance in physical appearance and attributes, anxiety, and happiness and satisfaction. Achievement did not add significantly to the variance due to IQ in any of the dependent measures.

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DEDICATIONS

I would like to dedicate this project to my parents, Mr. W. Dean Buff and Mrs. Geraldine B. Buff. Without their continued encouragement and support, my graduate education would not have been possible.

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INTRODUCTION

Self-concept refers to the "way an individual perceives himself and his behavior, and his opinion of how others view him" (Calhoun & Morse, 1977, p. 321). In the last 25 years, this construct has been attracting much interest, particularly in the fields of education and psychology. Many studies have examined the relationship of self-concept to both academic achievement and intelligence. Researchers have sought to clarify many issues, such as whether children with positive self-concepts perform better in school than children with negative self-concepts, whether low self-concept is an explanation for underachievement, and whether brighter persons think more highly of themselves than their less intelligent peers. Various other terms have been used to describe the construct self-concept as used herein. They include self-esteem, self-perception, and personal adjustment.[1]

Self-Concept Among Gifted Achievers and Underachievers

Many researchers have investigated the relationship of self-concept to academic achievement (e.g., Fink, 1962; Kanoy, Johnson, & Kanoy, 1980; Shaw & Alves, 1963; Yates, 1975). Most of these studies involved the comparison of the self-concepts of gifted underachievers to the self-concepts of gifted achievers. Shaw, Edson, and Bell (1960) investigated self-concepts of 11th and 12th graders who had achieved IQs of 113 or higher on the Primary Mental Abilities

Test. Achievers possessed grade point averages (GPA) of 2.0 or above, and underachievers possessed GPAs of 1.75 or below. The Sarbin Adjective Checklist was administered to the students. The researchers concluded that achieving males felt more positively about themselves than did underachieving males, as indicated by endorsement to the following adjectives: stable, realistic, optimistic, enthusiastic, reliable, clear thinking, and intelligent. Male underachievers exceeded male achievers on the following adjectives: immodest, reckless, relaxed, mischievous, and argumentive. These adjectives were assumed to indicate poor self-concept. Female underachievers felt as positively about themselves as female achievers.

Combs (1963) examined self-concept and academic achievement on a sample of gifted 11th grade boys, all of whom had IQs of 115 or higher. Two groups of 25, controlled with respect to race, nationality, age, grade, courses taken, and socioeconomic status, were compared. Underachievers were defined as those students whose grade point averages fell below the first quartile while achievers were defined as those students whose GPAs fell above the median. Self-concept was measured by what Combs referred to as an "apperceptive device." Responses were electronically recorded on magnetic tape and these recordings were later analyzed in terms of six self-perception measures which were developed for the study. In comparison to achievers, underachievers viewed themselves as less adequate and less acceptable to others. Furthermore, they were not as accepting of peers and adults.

Shaw and Alves (1963) compared self-concepts of 78 11th and 12th graders, all of whom had IQs of 110 or higher on the California Test of Mental Maturity. All students whose GPAs were 3.0 or higher were classified as achievers, and those whose GPAs were 2.5 or below were classified as underachievers. Self-concept was measure by Bills Index of Adjustment and Values (IAV). In addition to self-concept, the IAV measures self-acceptance, ideal self, perception of peer self-concept, peer self-acceptance, and peer ideal self. The researchers found that underachieving males had more negative self-concepts than achieving males. The underachieving males reported themselves as being less self-accepting and viewed their peers as lacking in self-acceptance also. Achieving females tended to have more positive self-concepts than underachieving females. Female underachievers were significantly more negative in their perception of the degree of self-acceptance which others have of themselves.

Yates (1975) compared the self-concepts of third, fourth, and fifth grade achievers and underachievers. All of the students had IQs of 125 or higher as measured by the Wechsler Intelligence Scales for Children-Revised (WISC-R). Achievers were defined as those students who were more than two years above grade level on the Wide Range Achievement Test (WRAT) and underachievers were defined as those students who were not more than two years above grade level on this same instrument. The Piers-Harris Children's Self-Concept Scale was used to measure the children's self-concepts. A positive relationship was found between self-concept scores and academic

achievement. In addition, achievers, regardless of sex or grade, obtained significantly higher self-concept scores than underachievers.

The previously cited studies (Combs, 1963; Shaw & Alves, 1963; Shaw et al., 1960; Yates, 1975) investigated the association of self-concept to academic achievement among achieving and underachieving gifted children. All of the researchers concluded that male achievers' self-concepts were more positive than those of male underachievers. Of the studies which included females in their samples, two (Shaw & Alves, 1963; Yates, 1975) found that the relationship between self-concept and achievement was positive. Another (Shaw et al., 1960) found no relationship between self-concept and achievement for females.

Other investigators have found that the achievement levels of both gifted achievers and underachievers were unrelated to self-concept. A study by Kanes (1961) used a sample of children whose IQs were 120 or higher as measured by the Stanford-Binet. California Test (CAT) scores were used as the achievement measure. For each student, estimated achievement levels were computed to calculate a discrepancy between each child's estimated and actual achievement level. Achievement discrepancy scores were plotted for each grade level. Pupils whose achievement discrepancy was -1 standard deviation or lower were classified as underachievers while those whose achievement discrepancy was +1 standard deviation or higher were classified as overachievers. The Rogers Test of Personality Adjustment was given to all students. Using this measure as the dependent variable, no significant differences between achieving and

underachieving students were obtained. However, a chi-square analysis revealed that there was a trend for the underachieving group to have what Kanes referred to as "unrealistic self-concepts," or scores in the extreme low and high categories, while the over-achieving group had what Kanes referred to as "realistic self-concepts," or scores in the average category.

Kanoy et al. (1980) used a regression line equation, based on student IQ, to predict GPAs of fourth graders, all of whom had scored 116 or higher on the Cognitive Abilities Test. Grade Point Averages were based upon third grade arithmetic, reading, and language grades. Discrepancy scores were then calculated by subtracting predicted GPA from actual GPA. Achievers were defined as those students whose discrepancy scores ranked at the top 50% and underachievers were defined as those whose scores ranked at the bottom 20%. The Piers-Harris Children's Self-Concept Scale was used as the self-concept measure. An ANOVA indicated that there was no difference in overall self-concept between achievers and underachievers. However, the achievers had significantly higher scores on the Intellectual and School Status subscale than did underachievers.

Saurenman and Michael (1980) used a sample of fourth, fifth, and sixth graders with Stanford-Binet IQs ranging from 132 to 170 to examine self-concept among gifted achievers and underachievers. High achievers and low achievers were those whose scores on the California Test of Basic Skills were above the 90th percentile and below the 75th percentile, respectively. The Dimensions of Self-Concept was the instrument used to attain self-concept scores. This

test is composed of five scales representing the constructs of aspiration, anxiety, academic interest and satisfaction, leadership and initiative, and identification versus alienation. Analysis of variance indicated that only the scores on the academic interest and satisfaction subscale were significantly higher for achievers.

In sum, Kanes (1961), Kanoy et al. (1980), and Saurenman and Michael (1980) failed to obtain a significant difference in overall self-concept for achieving and underachieving gifted students. However, the two latter studies found that on measures of self-concept specifically relating to academics, the achievers viewed themselves more positively than the underachievers. Kanes discovered that gifted underachievers tended to have more unrealistic self-concepts than gifted overachievers.

Self-Concept Among Achieving and Underachieving Children of Average Intellectual Ability

Fink (1962) investigated the self-concepts of achieving and underachieving ninth graders of average intellectual ability. Achievers' GPAs were above the median GPA for the sample and underachievers' GPAs were below the median GPA. Independent judgments of the self-concept of each student were made by two school psychologists and one clinical psychologist based upon data from the following sources: California Psychology Inventory, Bender Visual-Motor Gestalt Test, Draw-a-Person Test, Gough Adjective Checklists, personal data sheets, and a brief essay entitled, "What I will be in 20 years." The results revealed a positive relationship between

adequacy of self-concept and level of achievement for boys. However, achievement and self-concept were unrelated for girls.

Zimmerman and Allebrand (1965) compared a group of poor readers and a group of good readers who were equated on the basis of age, sex, ethnic composition, and intelligence. Subjects were drawn from the fourth and fifth grade classes of an urban school district. Poor readers were students who had an average or above average IQ on the California Test of Mental Maturity and who were reading at least two years below grade level. Good readers also had an average or above average IQ but were reading at grade level or above. All children were administered the California Test of Personality. Results revealed that good readers scored higher than the poor readers in the areas of personal worth, feelings of belongingness, sense of personal freedom, self-reliance, and community relations. Also, they indicated significantly fewer withdrawal tendencies and nervous symptoms. The researchers concluded that good readers were more apt to describe themselves as "well adjusted and motivated by internal drives which result in effortful and persistent striving for success" (p. 30).

Studies Examining the Relationship of IQ to Self-Concept

Some investigators have attempted to determine the relationship between self-concept and IQ. Opie and Lemasters (1975) investigated the self-concepts of a group of 12 male slow learners in grades five, six, eight, and nine. The boys IQs were reported to range from 81 to 90 but the IQ measure was not specified. Self-concepts were assessed by means of structured group interviews designed to

increase the likelihood of a spontaneous, open exchange. Percentages of responses pertaining to feelings about self, physical abilities, and academic ability were calculated. Ninety-four percent of the students' responses indicated positive feelings about self. Eighty-eight percent suggested high self-concept of physical ability while 63% suggested low self-concept of academic ability. Opie and Lemasters concluded that low-average students do not tend to have low self-concepts.

Milgrim and Milgrim (1976) compared the self-concepts of a group of gifted Israeli children to a group of Israeli children of average intelligence. The gifted children's WISC-R IQs were in the Superior range or above. All children were in grades four through eight. An Israeli adaptation of the Tennessee Self-Concept Scale was used to measure self-concept. Statistical analyses indicated that for grades four through six, the gifted children had higher overall self-concepts but the nongifted children had higher self-concepts in relation to body image. However, for grades seven and eight, the overall self-concepts of nongifted children were superior to those of the gifted children. The authors concluded that precocious intellectual development may be more threatening at these grade levels than at earlier grade levels because children in grades seven and eight may be more peer conscious.

Klein and Cantor (1976) investigated self-concept of gifted and nongifted children in grades kindergarten through four. Some of the children were administered the Piers-Harris Children's Self-Concept Scale and others were administered the Coopersmith Self-Esteem

Inventory. Gifted students had achieved IQs of 130 or higher on either the Stanford-Binet or the Wechsler scales. Based on the total group of gifted and nongifted students, two groups were formed: a high self-concept group comprised of the top 27% and a low self-concept group comprised of the bottom 27%. Because the percentages of gifted and nongifted children in the high self-concept group were approximately equal, it was suggested that intellectual giftedness was not associated with high self-concept. Because a higher percentage of the nongifted kindergarteners fell into the high self-concept group than the gifted kindergarteners, Klein and Cantor also concluded that gifted kindergarten children were more likely to have poorer self-concepts than nongifted children. These conclusions were based on descriptive percentages of students in the high and low self-concept groups rather than on statistical data analysis.

Hoffman (1978) analyzed the relationships between self-concepts and IQs among 88 intellectually average and above average sixth grade boys. Self-concepts were measured by the Piers-Harris Children's Self-Concept Scale and IQs were assessed by the Short Form Test of Academic Aptitude. Correlational analysis of the data yielded no significant relationship between IQ and overall self-concept. Correlations between IQ and six separate aspects of self-concept as measured by the Piers-Harris scale were not discussed.

In the research investigating the relationship of IQ to self-concept, conflicting results were obtained. Opie and Lemasters (1975) found that slow learners do not tend to have low self-concept.

Milgrim and Milgrim (1976) discovered that gifted children had higher self-concepts than nongifted children in grades four through six, but the opposite was true for grades seven and eight. Hoffman's (1978) research revealed no relationship between IQ and self-concept among gifted and nongifted sixth grade boys. Klein and Cantor (1976) found no difference between the self-concepts of intellectually average and gifted children with the exception of kindergarteners.

Studies Examining Both the Relationships Between IQ and Self-Concept and Between Achievement and Self-Concept

Some studies have examined both the relationships between IQ and self-concept and between achievement and self-concept (e.g., Brookover, Thomas, & Patterson, 1962; Dean, 1977; Riedel, 1980; Schnee, 1972). Schnee performed an interesting study in which he hypothesized that if IQ was related to achievement, and achievement to self-concept, then it is reasonable to expect that IQ would be related to self-concept. Fifth and eighth graders were given the Stanford Achievement Tests to assess achievement and the Otis-Lennon Mental Abilities Test to assess IQ. To measure self-concept, the Coopersmith Self-Esteem Inventory was administered to fifth graders while an instrument devised by the experimenter was administered to eighth graders. Although IQ was positively related to achievement, and achievement was positively related to self-concept, there was no relationship between IQ and self-concept.

Dean (1977) examined the influence that self-concept had on a verbal free recall task and a nonverbal paired associate learning

task with a sample of seventh grade gifted children. IQ was measured by the Lorge-Thorndike Intelligence Test. Self-concept was measured by the Coopersmith Self-Esteem Inventory. Children were assigned to high and low self-concept groups on the basis of a median split on the self-esteem inventory. Statistical analysis of the data indicated that there was no significant difference in IQ for the high and low self-concept groups. Also, the high self-concept groups performed significantly better than low self-concept groups on the learning tasks. However, there was no difference between school GPA among the high self-concept group and the low self-concept group.

Riedel (1980) investigated the relationships of IQ and self-concept and of self-concept and achievement among a large sample of Black, White, and Hispanic seventh and eighth graders. The CAT, the Short Form Test of Academic Aptitude, and the Coopersmith Self-Esteem Inventory were used to assess achievement, IQ and self-concept, respectively. Correlational analyses yielded a positive relationship between self-concept and achievement for Whites, although the correlation coefficients accounted for only a small portion of the variance. There was no significant relationship between self-concept and achievement for Black and Hispanic students. Also, no significant relationship existed between self-concept and intelligence.

Although the three previously discussed studies indicated no significant relationship between self-concept and IQ, each of them did indicate positive relationships between self-concept and achievement. The findings of Riedel (1980) were instructive because

although the relationship between self-concept and achievement was significant, self-concept accounted for a low percentage of the variance in achievement. In Dean's (1977) study, two measures of achievement, a verbal free recall task and a nonverbal paired associate learning task, were positively related to self-concept, while a third measure of achievement, GPA, was not.

Other research has found positive relationships between self-concept and IQ and between self-concept and achievement. Brookover et al. (1962) used 110 seventh graders to investigate self-concept, IQ, and achievement. Utilizing scores on the California Short Form Test of Mental Maturity and the Self-Concept of Ability Scale, they found that there was a significant and positive correlation between GPA and scores on the Self-Concept of Ability Scale when IQ was controlled. These researchers have shown that for males, when self-concept of ability was utilized in a multiple correlation with IQ to predict GPA, the correlation coefficient jumped from .48 when IQ alone was a predictor of GPA to .67 when both IQ and self-concept were predictors of GPA. Likewise, for females, the correlation coefficient jumped from .53 when IQ alone was a predictor of GPA to .72 when IQ and self-concept were predictors of GPA. As for the relationship between IQ and self-concept, the correlation coefficient was significantly different from zero; however, it was low.

Bledsoe (1967) also conducted a study assessing the relationship between self-concept and achievement and the relationship between self-concept and IQ. Fourth and sixth graders' achievement, IQs and self-concepts were measured by the CAT, the California Test of Mental

Maturity, and a self-concept scale consisting of a checklist of 30 trait-descriptive adjectives. Bledsoe found that the relationship between self-concept and achievement and the relationship between self-concept and IQ were positive for boys. However, there was no significant relationship among these variables for girls. The researcher concluded that boys seem to perceive traits and abilities as measured by IQ and achievement tests as more important to their self-concept than do girls.

Williams and Cole (1968) analyzed results of the Tennessee Self-Concept Scale, the California Test of Personality, the California Short Form Test of Mental Maturity, and the CAT Reading and Arithmetic subtests on a sample of 80 sixth graders. Their results indicated positive relationships between IQ and self-concept, between self-concept and reading achievement, and between self-concept and mathematical achievement.

Statement of the Problem

Most researchers have found that academic achievement and overall self-concept are positively related (e.g., Combs, 1963; Fink, 1962; Shaw & Alves, 1963; Williams & Cole, 1968; Yates, 1975). On the other hand, the literature relating IQ to self-concept shows a great deal of inconsistency. While some investigators (Bledsoe, 1967; Milgrim & Milgrim, 1976; Williams & Cole, 1968) have found that IQ and self-concept are positively related, other researchers (Klein & Cantor, 1976; Milgrim & Milgrim, 1976) have found that IQ and self-concept are negatively related. Still other investigators (Dean, 1977; Hoffman, 1978; Klein & Cantor, 1976; Opie & Lemasters,

1975; Schnee, 1972) have reported no relationship between IQ and self-concept.

One probable cause for the inconsistent results of the previously cited studies is that numerous instruments were used to assess self-concept (e.g., Bills Index of Adjustment and Values, Tennessee Self-Concept Scale, Sarbin Adjective Checklist, Dimensions of Self-Concept, Piers-Harris Children's Self-Concept Scale, and California Test of Personality). The use of so many different instruments makes it difficult to compare results of various studies.

Another possible reason for the lack of consistent findings on the relationship between IQ and self-concept is the manner in which many researchers defined their groups. Self-concept groupings were often made by placing students whose self-concept scores fell below a certain level into a low self-concept group and by placing students whose self-concept scores fell above a certain level into a high self-concept group. For example, in Dean's (1977) study, students whose self-concept fell above the median were categorized as having high self-concept, while those whose self-concept fell below the median were categorized as having low self-concept. IQ groupings were made in a similar manner. For instance, Milgrim and Milgrim (1976) defined nongifted students as those with IQs of less than 120 and gifted students as those with IQs of 120 or higher. By grouping individuals as such, the statistical analysis treats each subject in a specific category as if he/she were the same as other subjects in that category. For example, if two children--one with an IQ of 90 and one with an IQ of 115--were placed into the same category, they

would be treated in the statistical analysis as if they were intellectually the same. This categorizing of continuous variables leads to less powerful statistical analyses which may be responsible for inconsistent findings in the literature.

A final and perhaps, most important reason that the results of IQ/self-concept research are inconsistent is that in the majority of the studies, only composite self-concept scores were used. Because self-concept is a global term comprising a variety of behaviors, it is possible that positive relationships exist between IQ and certain aspects of self-concept while negative relationships exist between IQ and other components of self-concept. If this is true, global measures of self-concept may be uncorrelated with IQ. Also, nonsignificant relationships between IQ and specific components of self-concept could obscure significant relationships between IQ and other components of self-concept measured by the same self-concept instrument. For example, academic self-concept may correlate with IQ but other aspects of self-concept may not. Using only a composite self-concept score, it is likely that no relationship will exist between IQ and overall self-concept. Thus, the relationship between IQ and academic self-concept would be overlooked.

The present study will assess the relationship of IQ and achievement to six aspects of self-concept, in addition to a composite self-concept score. The sample will include seventh graders whose IQs extend from the Educable Mentally Handicapped range to the Very Superior range. Children will not be grouped by IQ, achievement, or self-concept in the analysis of the data.

METHOD

Subjects

Subjects were 161 seventh graders from a large rural junior high school in North Carolina. Seventy-eight of the students were females and 83 were males. All of the students had been attending school in the same county for at least one and one-half years. The children's CAT percentiles for the total battery ranged from 1 to 99. Cognitive Skills Indices on the Test of Cognitive Skills ranged from 58 to 139.

Instruments

Piers-Harris Children's Self-Concept Scale. The Piers-Harris Children's Self-Concept Scale (Piers & Harris, 1969) consists of 80 yes/no items intended to measure self-concept of children ages 8 to 18 years. Students are instructed to circle "yes" if the statement is generally like them and "no" if it is not. Children are encouraged to respond in the way that they "really feel inside" (p. 1), and are ensured that there are no right or wrong answers. In addition to total self-concept, the Piers-Harris provides six subcategories of self-concept, referred to as "cluster scales" (Piers, 1984). These cluster scales are: behavior, intellectual and school status, physical appearance and attributes, anxiety, popularity, and happiness and satisfaction. Items which comprise

each of the cluster scales are listed in the Revised Manual (Piers, 1984) on pages 1 and 2. Information pertaining to the psychometric properties of the scale is found in Appendix A.

Test of Cognitive Skills (TCS). The TCS, a major revision of the Short Form Test of Academic Aptitude (SFTAA), was designed for the purpose of measuring the skills important to success in school. It is divided into five levels that span grades 2 through 12. Level 3, which has an administration time of about 53 minutes, was used in this study. The TCS has four subtests: Sequences, Analogies, Memory, and Verbal Reasoning. The Sequences subtest measures the ability to comprehend a principle implicit in a sequence of numbers, figures, or letters. The Analogies subtest measures the ability to classify objects according to common attributes and to see concrete or abstract relationships. The Memory subtest measures the ability to recall previously presented material. Finally, the Verbal Reasoning subtest measures the ability to reason logically and to discern relationships. Scores available for each subtest and the total test are: number of correct responses (NCR), age and grade percentile ranks, scale scores, and stanines. In addition, total test performance can be described by the Cognitive Skills Index (CSI), which is a linearly transformed standard score based on a mean of 100 and a standard deviation of 16. (Information on the psychometric properties of the test can be found in Appendix A.)

California Achievement Tests (CAT), Form C, Level 16. The CAT, Form C, Level 16, is a norm referenced test battery designed to measure achievement of students within the grade range of 5.6 to

6.9. The test measures achievement in the areas of reading, spelling, language, math, and reference skills. The reading section of the test includes both reading vocabulary and reading comprehension. The language section includes both language mechanics and language expression. The math section contains items measuring mathematics computation and mathematics concepts and applications. Teachers or other examiners administer the CAT to groups of students with the aid of an examiner's manual. In addition to providing norm-referenced information, the tests provide criterion-referenced information. Scores available for the total test and the subcomponents are: percentiles, raw scores, scale scores, and grade equivalents. The approximate time required for administering the total battery is 172 minutes. (See Appendix A for information on the psychometric properties of the CAT.)

Procedures

After obtaining permission from the school system, the TCS composite scale scores and the 1984 CAT total battery scale scores were collected from each subject's cumulative file. Students whose scores were not available due to transfers or other reasons were not included in the study. Piers-Harris Children's Self-Concept Scales were distributed to seventh grade English teachers. The teachers were asked to administer the scales to their English classes at their convenience within the following three days. Each teacher also received written instructions (see Appendix B). Administration of the scales simply required that the teachers read the directions appearing on the front cover of the scale to each class. These

instructions read as follows:

> Here are a set of statements that tell how some people feel about themselves. Read each statement and decide whether or not it describes the way you feel about yourself. If it is true or mostly true for you, circle the word 'yes' next to the statement. If it is false or mostly false for you, circle the word 'no'. Answer every question, even if some are hard to decide. Do not circle both 'yes' and 'no' for the same statement. Remember that there are no right or wrong answers. Only you can tell us how you feel about yourself, so we hope you will mark the way you really feel inside. (Piers & Harris, 1969, p. 1)

Due to absences from class, only 195 out of 224 available students completed the scale. After the scales were scored, they were given to the school system to be placed in the students' cumulative files and to be used by guidance personnel. Of the 195 students who completed the self-concept scale, 34 lacked TCS and/or CAT scores in their cumulative files. Therefore, 161 subjects were included in the study.

Seven multiple regression analyses were performed. Each involved the following predictor variables: IQ, achievement, and IQ x achievement. The dependent measures on the seven analyses were the raw scores derived from the various subcategories of the Piers-Harris and the total raw score. Achievement will be quantified by total scale scores of the CAT while IQ will be quantified by the total scale scores of the TCS. An alpha level of .05 was adopted for the interpretation of results.

RESULTS

Table 1 lists the means and standard deviations of the two predictor variables and the seven dependent measures for both the present study sample and the standardization samples for the TCS, the CAT, and the Piers-Harris. Both the means and standard deviations for all of the variables were approximately the same for the study and standardization samples.

Simple correlations among all of the variables are shown in Table 2. The relationship between the IQ and achievement was significant at the .001 level. Both IQ and achievement were positvely related to the following dependent measures: behavior, intellectual and school status, popularity, and total self-concept ($p < .05$). However, IQ and achievement were not significantly related to physical appearance and attributes, anxiety, and happiness and satisfaction. All of the dependent variables were significantly correlated with one another ($p < .05$).

Seven multiple regression analyses were performed in which IQ and achievement served as predictor variables, while total self-concept and six subcomponents of self-concept functioned as dependent variables. Achievement, IQ and self-concept were treated as continuous variables, rather than as categorical variables. Following a procedure recommended by Kerlinger and Pedhazur (1973), the

Table 1

Means and Standard Deviations of the California Achievement Test, the Test of Cognitive Skills, and the Piers-Harris Children's Self-Concept Scale

	$Mean_1$	$Mean_2$	SD_1	SD_2
CAT (total scale score)	513.47	497.00	56.12	64.8
TCS (total scale score)	538.58	577.00	84.99	82.3
Piers-Harris				
1. Behavior	12.47	11.44	3.45	3.22
2. Intellectual and School Status	12.01	11.62	3.66	3.57
3. Physical Appearance and Attributes	8.64	8.31	3.20	3.05
4. Anxiety	9.61	9.54	3.19	3.11
5. Popularity	8.50	8.27	2.62	2.70
6. Happiness and Satisfaction	8.35	8.05	1.92	2.04
7. Total Self-Concept	57.11	56.04	12.25	11.79

Note. $Mean_1$ = mean for study sample.

$Mean_2$ = mean for standardization sample.

SD_1 = standard deviation for study sample.

SD_2 = standard deviation for standardization sample.

Table 2

Intercorrelations Between the California Achievement Test, the Test of Cognitive Skills, and the Piers-Harris Children's Self-Concept Scale

	TCS	CS1	CS2	CS3	CS4	CS5	CS6	Total
CAT	.8598***	.1879**	.2887**	.1472	.0483	.1685**	.1008	.2182*
TCS		.1602**	.2724**	.1423	.0574	.1927**	.1343	.2096*
CS1			.5917***	.1963*	.2898**	.3066**	.4139***	.6580***
CS2				.5926***	.5254***	.5391***	.4645***	.6113***
CS3					.5722***	.6501***	.6024***	.6813*
CS4						.6103***	.6150***	.7584***
CS5							.4804***	.6902***
CS6								.6835***
Total								

Note. CAT = California Achievement Test (total scale score)

TCS = Test of Cognitive Skills (total scale score)

CS1 = Piers-Harris Cluster Scale 1, Behavior

CS2 = Piers-Harris Cluster Scale 2, Intellectual and School Status

CS3 = Piers-Harris Cluster Scale 3, Physical Appearance and Attributes

CS4 = Piers-Harris Cluster Scale 4, Anxiety

CS5 = Piers-Harris Cluster Scale 5, Popularity

CS6 = Piers-Harris Cluster Scale 6, Happiness and Satisfaction

Total = Total self-concept

*$p < .05$. **$p < .01$. ***$p < .001$.

interaction was tested first. If the interaction was not significant, the main effect for IQ was entered into the equation prior to the main effect for achievement. This procedure was based on the assumption that IQ was causally related to achievement.

The behavior cluster scale was used as the dependent measure for the first multiple regression analysis conducted. Because the IQ x achievement interaction ($F(1, 157) = .11$, $p > .05$) did not approach significance, an analysis was then conducted to determine whether IQ contributed significantly to the variance in the behavior cluster scales. This finding was statistically significant ($F(1, 159) = 4.19$, $p < .05$). Multiple regression was then conducted to determine if the achievement variable added significantly to the proportion of variance in the behavior cluster scale over and beyond the variance due to IQ. The outcome ($F(1, 158) = 1.57$, $p > .05$) was not significant.

The intellectual and school status cluster scale functioned as the dependent measure in the second analysis. The IQ x achievement interaction ($F(1, 157) = 0$, $p > .05$) was not significant. However, IQ accounted for a significant amount of the variance in scores on the intellectual and school status cluster scale ($F(1, 159) = 12.75$, $p < .01$). Achievement did not add significantly to the variance attributable to IQ ($F(1, 158) = 1.97$, $p > .05$).

In the third analysis, the physical appearance and attributes cluster scale served as the dependent measure. Again, the IQ x achievement interaction was not significant ($F(1, 157) = .04$, $p > .05$). IQ did not account for a significant amount of variance

in the physical appearance and attributes cluster scale ($F(1, 159) = 3.2$, $p > .05$). In addition, achievement did not contribute significantly to the proportion of variance in this cluster scale over and above the variance due to IQ ($F(1, 158) = .39$, $p > .05$).

The anxiety cluster scale served as the dependent measure in the fourth analysis. The IQ x achievement interaction ($F(1, 157) = 2.27$, $p > .05$) was not significant. Intelligence did not account for a significant amount of variance in the anxiety measure ($F(1, 159) = .53$, $p > .05$). Also, achievement accounted for an insignificant proportion of variance in the anxiety cluster scale beyond that attributed to IQ ($F(1, 158) = 0$, $p > .05$).

For the fifth analysis, the popularity cluster scale was employed as the dependent measure. Once again, the IQ x achievement interaction ($F(1, 157) = .88$, $p > .05$) was not significant. Intelligence accounted for a significant proportion of the variance in the popularity cluster scale ($F(1, 159) = 6.1$, $p < .05$). However, achievement did not add significantly to the variance in the popularity measure over and above the amount due to IQ ($F(1, 158) = .01$, $p > .05$).

The sixth analysis used the happiness and satisfaction cluster scale as the dependent variable. The IQ x achievement interaction was not significant ($F(1, 157) = .67$, $p > .05$). Intelligence did not account for a significant proportion of the variance in the happiness and satisfaction measure ($F(1, 159) = 2.9$, $p > .05$). Also, achievement did not account for a significant proportion of variance in the

dependent measure over and beyond the variance attributed to IQ ($F(1, 158) = .13$, $p > .05$).

In the final analysis, total self-concept functioned as the dependent measure. The interaction of IQ x achievement was not significant ($F(1, 157) = .87$, $p > .05$). Intelligence accounted for a significant proportion of variance in total self-concept ($F(1, 159) = 7.31$, $p < .01$). However, as in the first six analyses, achievement did not add significantly to the proportion of variance in the dependent measure over and above the variance due to IQ ($F(1, 158) = .92$, $p > .05$).

DISCUSSION

Among the seven multiple regression analyses, no interaction effects were found. Intelligence accounted for a significant proportion of the variance in four of the dependent measures: behavior, intellectual and school status, popularity, and total self-concept. The proportion of variance due to IQ in the remaining three measures was not significant. These variables were: physical appearance and attributes, anxiety, and happiness and satisfaction. For all of the dependent measures, achievement did not account for a significant proportion of variance over and beyond the variance which was due to IQ.

The finding that total self-concept was positively correlated with IQ supports the research of Bledsoe (1967), Brookover et al. (1962), and Williams and Cole (1968). However, it is inconsistent with the research of Dean (1977), Hoffman (1978), Opie and Lemasters (1975), Riedel (1980), and Schnee (1972). The studies which found a positive and significant relationship between self-concept and IQ used the California Test of Mental Maturity to assess intelligence. The present study, which demonstrated the same results, used the Test of Cognitive Skills to measure intelligence. Because the Test of Cognitive Skills is a revision of the Short Form Test of Academic Aptitude (SFTAA), and the SFTAA is a revision of the California Test

of Mental Maturity, it would seem likely that the three tests are similar to one another. Support for this notion is found in the correlations between the SFTAA and the California Test of Mental Maturity, and in the correlations between the SFTAA and the Test of Cognitive Skills. Correlations between the former two tests range from .63 to .84 (Salvia & Ysseldyke, 1981), while the correlations between the latter two tests range from .69 to .83 (CTB/McGraw-Hill, 1983). Thus, because these tests do appear to be similar, one would suspect that studies employing the SFTAA as an IQ measure would find IQ to be positively and significantly related to self-concept, because this outcome was found with the California Test of Mental Maturity and the Test of Cognitive Skills. However, this was not the case. The two researchers who utilized the SFTAA to measure intelligence found no relationship among IQ and self-concept (Hoffman, 1978; Riedel, 1980). In other words, three very similar IQ tests were not related to measures of self-concept in the same way. Two intelligence measures were positively related to self-concept, while one was not related to self-concept. This outcome lends support to the proposition that the various self-concept measures utilized in the literature may not be measuring the same constructs and thus, may contribute to much of the confusion in the literature.

The present finding that IQ and total self-concept are positively correlated partially supports and partially contradicts the studies conducted by Milgrim and Milgrim (1976) and by Klein and Cantor (1976). Milgrim and Milgrim found a positive relationship between IQ and self-concept for children in grades four through six

but a negative relationship for children in grades seven and eight. Their IQ measure was the WISC-R. Klein's and Cantor's (1976) study used IQ scores from the WISC-R and the Stanford-Binet for children in grades kindergarten through four. Results of this research indicated no relationship between self-concept and IQ for children in grades one through four but suggested a negative relationship between self-concept and IQ for kindergarten children. Because the Stanford-Binet and WISC-R are individually administered and thought to be valid and highly reliable instruments (Sattler, 1982), data from the studies performed by Milgrim and Milgrim (1976) and Klein and Cantor (1976) suggest that the relationship between IQ and self-concept might depend on grade in school.

Results of the present study reveal that a significant amount of the variance in the scores on the intellectual and school status cluster scale can be attributed to IQ. This outcome supports the findings of Brookover et al. (1962) who found that IQ scores are positively related to scores on the Self-Concept of Ability Scale. Therefore, the results of the present study and the findings of Brookover et al. suggest that a child's conception of himself/herself as a student is an aspect of self-concept that is positively related to IQ.

There was a positive correlation between achievement and the intellectual and school status cluster scale. This reinforces findings of Kanoy (1980), who found that gifted achievers had significantly higher scores than gifted underachievers on the intellectual and school status cluster scale of the Piers-Harris. In addition,

the results of Saurenman's and Michael's (1980) research are supported. These researchers found that gifted achievers had a significantly higher score than gifted underachievers on the Academic Interest Dimension of the Dimensions of Self-Concept instrument. Therefore, the results of the present study and the research by Kanoy and Saurenman and Michael suggest that one's perception of his/her academic ability and his/her actual achievement are positively related.

The present study found that a significant proportion of the variance in scores on the behavior cluster scale was due to IQ. This outcome implies that children with higher IQs either lack behavior problems or tend to deny them and that children with lower IQs tend to acknowledge behavioral difficulties.

Achievement was positively related to the behavior cluster scale. Kanoy (1980) found no difference between the behavior cluster scale scores of a group of gifted underachievers versus a group of gifted achievers. The contradiction in the results of the present study and Kanoy's research may possibly be due to the difference between samples of the two studies. The present study used seventh graders of varying intelligence levels while Kanoy's study used 29 fourth graders whose IQs were 116 or higher.

A significant proportion of the variance in the popularity cluster scale was due to IQ. Therefore, it appears that children with higher IQs may feel popular with classmates while those with lower IQs may feel isolated and left out of things and may be shy and lacking in interpersonal skills. A review of the literature revealed no previous research attempted on the relationship of IQ and

conception of one's popularity. Thus, the positive relationship found in the present study is assumed to be a new finding.

In addition, achievement was positively related to the popularity cluster scale. In Kanoy's research, however, there was no relationship between achievement and this subscale of self-concept among gifted fourth graders. As stated earlier, the difference in the findings of Kanoy and this author may be due to the differences in the two samples.

Among the physical appearance and attributes cluster scale, IQ did not contribute a significant proportion of variance. In other words, IQ was not significantly related to attitudes concerning physical characteristics, nor to attributes such as leadership and the ability to express ideas. The present finding contradicts research by Milgrim and Milgrim (1976) and Opie and Lemasters (1975). Milgrim and Milgrim found that nongifted children had a more positive self-concept with regard to body image than gifted children. Opie and Lemasters discovered that boys of low average intelligence seem to be positive about their self-concept in relation to sports and physical education. Explanations for these contradictions could be due to the different techniques used to assess self-concept and IQ. While the present study used the Piers-Harris Children's Self-Concept Scale and the Test of Cognitive Skills to measure self-concept and IQ, respectively, Milgrim and Milgrim used the Tennessee Self-Concept Scale and the WISC-R. Opie and Lemasters based self-concept on subjective opinions and did not specify what instrument was used to assess IQ. Furthermore, while the present study consisted of subjects

of varying ability levels, the Milgrim and Milgrim investigation consisted of only gifted students and the Opie and Lemaster study consisted of only slow learners.

Achievement was not related to the physical appearance and attributes scale. This outcome is consistent with Kanoy's (1980) finding which used a group of gifted students.

Achievement and IQ were not responsible for a significant proportion of variance in scores on the anxiety cluster scale. More specifically, there was no relationship between IQ and emotions such as shyness, sadness, worry, nervousness, and fear, nor between achievement and these emotions.

IQ was not responsible for a significant proportion of the variance in the happiness and satisfaction cluster scale. As described by Piers (1984), this subcomponent of self-concept measures the degree to which a person is happy, satisfied, and easy to get along with. A review of the literature suggested no previous research in this area; therefore, the present finding appears to be new information.

The correlation between achievement and the happiness and satisfaction cluster scale was not significant. This finding is consistent with the research conducted by Kanoy in 1980.

In sum, positive relationships were found between IQ and the following: total self-concept, intellectual and school status, behavior, and popularity. Intelligence was not correlated to the remaining three subscales: physical appearance and attributes, anxiety, and happiness and satisfaction. In each case, achievement

was correlated with the dependent measures that correlated with IQ. Likewise, achievement was not related to those measures of self-concept that were not related to IQ.

In all of the dependent measures, achievement did not account for a significant proportion of variance over and beyond the variance attributed to IQ. A primary reason for this outcome was probably the highly significant relationship between the TCS and the CAT ($r(159) = .86$, $p < .001$). This relationship is similar to that found between the TCS and the CAT in the TCS standardization sample. In the present study sample, TCS scores were responsible for 74% of the variance in CAT scores, while in the standardization sample, sixth graders' TCS scores were responsible for 67% of the variance in CAT scores.

The magnitude and direction of the correlation coefficients for each dependent measure and the TCS were very similar to the magnitude and direction of correlation coefficients for the corresponding dependent measure and the CAT. For example, the correlation coefficient for total self-concept and the TCS ($r(159) = .21$, $p < .05$) and the correlation coefficient for total self-concept and the CAT ($r(159) = .22$, $p < .05$) were almost identical. Similarly, the correlations for the TCS and each subcomponent of self-concept were very similar to the corresponding correlations for the CAT and each subcomponent of self-concept (see Table 2). This finding, in addition to the highly significant relationship between the CAT and the TCS may raise a question as to whether or not the two tests are measuring different constructs.

Compared to correlations between other group IQ and achievement measures, the correlation of the TCS and CAT in the present study was within the ranges of others, but falls at the upper extreme. For example, the correlation between the Metropolitan Achievement Test (MAT) and the Otis-Lennon School Ability Test ranged from .55 to .89 while the correlation between the MAT and the Henmon-Nelson ranged from .41 to .73 (Salvia & Ysseldyke, 1981). However, correlations between individual IQ tests and achievement measures are not as high as the correlation found in the present study. For example, Anastasi (1982) cites studies which report correlations between the Wechsler Scales and achievement measures as clustering between .50 and .60 and between the Stanford-Binet and achievement measures as falling between .40 and .75. Although it is recognized that any instrument designed to assess intelligence also measures achievement to some degree, it is likely that the IQ test used in the present study is more similar to an achievement test than many other tests designed to measure intelligence.

The authors of the Technical Report (CTB/McGraw-Hill, 1983) contend that the TCS has construct validity because its predecessor, the SFTAA, had construct validity. They also point out that previous research supports the construct validity of two TCS subtests--Sequences and Analogies. The remaining two subtests, Verbal Reasoning and Memory, are not mentioned. Evidentally, previous research had not yet distinguished these subtests as aptitude rather than achievement tests. Therefore, it is possible that half of the

TCS is primarily measuring IQ while the other half is primarily measuring achievement.

Limitations

As stated previously, the IQ measure used in this study, the TCS, correlated very highly with the achievement measure. This high correlation, combined with a lack of evidence for construct validity on two out of four of the TCS subtests, may provide reason to suspect that the TCS is measuring achievement to a large degree. If the TCS is measuring achievement to a greater extent than is reasonable for an IQ test, then the results of this research must be interpreted with this crucial factor in mind.

Another limitation of this study is that the subjects selected were not a representative sample of all school children. The study sample consisted of seventh graders living in a rural county in North Carolina. Furthermore, students selected were those in which existing data were available; thus, students who were absent on the days of testing and students who had transferred from other counties were excluded from the study. A sample of randomly selected children in all grades and from various parts of the county would have been preferable.

A final limitation in the present study is that for each of the IQ, achievement, and self-concept measures, group tests were administered. Results of these tests must be interpreted with caution for various reasons: poor reading, lack of motivation, fatigue, sickness, worry, anxiety, inability to follow directions, and

carelessness in marking answers. Furthermore, these tests were administered by several persons in various classrooms.

Suggestions for Future Research

Research on the relationships between self-concept and IQ has utilized various self-concept measures. Because these measures are likely to be based on different aspects of self-concept, or different weightings of these aspects, it is difficult to adequately compare the studies. What is needed is more research that examines the relationship of IQ to various components of self-concept. By identifying relationships among IQ and specific aspects of self-concept, contradicting findings in the literature on the relationship between self-concept and IQ might be better understood.

In addition, research needs to be conducted in which study samples are more representative of the general school-age population. In contrast to samples representing students living in only one area of the country, students need to be chosen in such a way that results of the research can be generalized to all school children. Also, samples need to consist of students of many ability levels.

Research is also needed which examines the effect of grade on the relationship of IQ to self-concept. It is possible that for some grades there is no significant relationship between IQ and self-concept, while for others, there is. With grade serving as an independent variable, differences in results of many previous studies might be better understood.

For statistical analyses to be more sensitive to differences, it is essential that, in the future, subjects not be placed into

IQ, achievement, or self-concept groups when continuous data are available. By categorizing individuals as such, all of the persons in a specific category are treated as if they were equal. For instance, if a high IQ group consisted of students whose IQs were 115 and above, an individual with an IQ of 115 is assumed to be intellectually the same as an individual with an IQ of 150. Such categorization of continuous variables leads to less powerful statistical analyses. Thus, information which could be quite valuable is lost.

Finally, research is needed which examines the validity of the TCS. If the two subtests, Memory and Verbal Reasoning, are not distinguishable from achievement measures, then using this test in the future as an IQ test is inappropriate.

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FOOTNOTE

FOOTNOTE

[1]Many studies are cited in this paper which use terms other than "self-concept." Opie and Lemasters (1975), Riedel (1980), and Schnee (1972) consistently use the term "self-esteem." Dean (1977) utilizes both the terms "self-concept" and "self-esteem" interchangeably. Combs (1963) describes the construct as "perception of self." Zimmerman and Allebrand (1965) refer to "personal adjustment" as defined by the make-up of the subscales on the California Test of Personality.

APPENDIX A

Psychometric Properties of the Piers-Harris Children's Self-Concept Scale, the California Achievement Tests, and the Test of Cognitive Skills

Psychometric Properties of the Piers-Harris Children's Self-Concept Scale

Standardization

The Revised Manual (Piers, 1984) provides limited information on the standardization of the Piers-Harris. The original normative sample consisted of 1,183 public school children. All of the children lived in a small town in Pennsylvania. No significant sex or grade differences were found among the sample. For the sample as a whole, the distribution was highly negatively skewed indicating a tendency to respond in the direction of positive self-concept. In addition to data on the original sample, normative data is available on varying populations. Taken as a whole, the mean for this group of 3,692 school children is somewhat higher and the standard deviation is somewhat lower than the mean and standard deviation for the original normative sample. Piers (1984) states that the original sample may underestimate problems in self-concept in populations where the population mean is substantially higher than that of the normative sample.

The norms for the cluster scales were based on a sample of 485 public school children, 279 of whom were in elementary school, 55 of whom were in junior high, and 151 of whom were in senior high. The total score for this sample is significantly higher than the total score for the original normative sample; however, the two samples are not directly comparable. However, the total score mean

and standard for this sample of 485 students is similar to the mean of the original normative sample cited in the Revised Manual.

Reliability

In the Revised Manual, many studies are cited which have investigated the reliability of the Piers-Harris. As for test-retest reliability in general populations, reliability coefficients ranged from .71 to .77 with test-retest intervals of four months and from .65 to .81 with test-retest intervals of five months. Test-retest reliability in special populations range from .42 for mentally retarded and emotionally disturbed students to .96 for students with mild articulation disorders.

The Piers-Harris appears to have good internal consistency. Piers (1984) cites several studies which have investigated the internal consistency of this instrument. In research using the Kuder Richardson Formula 20, reliability estimates range from .88 to .93 for children in grades 6 and 10. In a study using the Spearman-Brown formula, an overall reliability coefficient of .91 was found. Other studies report alpha coefficients ranging from .89 to .92.

Data on the standard error of measurement for the Piers-Harris also indicate high reliability. Based on the normative sample of 485 school children and 97 children from three psychiatric clinics, "the standard error of measurement was computed for the overall reliability estimate of .90 and a standard deviation of 13.87 for the total scale" (Piers, 1984, p. 57). Therefore, if the same individual was administered the Piers-Harris a large number of times,

two-thirds of the total scores should fall within about four scale points above or below his or her theoretical true score (Piers, 1984).

Validity

According to the Revised Manual, items on the Piers-Harris were selected carefully in order to ensure content validity. The items were written to cover areas in which children reported qualities that they liked or disliked about themselves. During the item analyses, the items with low discriminating power were dropped. This resulted in an emphasis in two areas described by Jersild; Just Me, Myself; and Personality, Character, Inner Resources, Emotional Tendencies. According to Piers (1984), these two categories are presumed to be a better reflection of a child's general self-concept than narrower categories described by Jersild such as Enjoyment of Recreation and Special Talents.

The Revised Manual cites many studies which have assessed the validity of the Piers-Harris by relating performance on the scale to teacher and peer ratings. Correlations between the Piers-Harris and teacher ratings of self-concept ranged from .02 for students with moderate articulation problems to .54 for students without handicaps. Correlations between the Piers-Harris and peer ratings for self-concept ranged from .26 to .49.

Many studies are cited in the Revised Manual that have examined the relationship of the Piers-Harris and other self-concept, personality, and behavioral measures in an attempt to investigate concurrent validity. Among other self-concept measures, the highest

correlation (.85) was found between the Piers-Harris and Lipsett's Self-Concept Scale while the lowest correlation (.32) was found between the Piers-Harris and the Personal Attribute Inventory for Children. Among personality and behavioral measures, the Piers-Harris was found to be negatively correlated to Big Problems (-.64) and Health Problems (.48) on the SRA Junior Inventory and negatively correlated to anxiety (.59 to .69) on the Children's Manifest Anxiety Scale. In contrast, the Piers-Harris was found to be positively correlated to scores on the Children's Social Desirability Scale on the Nowicki-Strickland Locus of Control and on the Intellectual Achievement Responsibility Questionnaire.

Also cited in the Revised Manual are several factor analytic studies which have investigated the underlying dimensions of the Piers-Harris. Some have replicated many or all of the factors identified in the original analysis by Piers in 1963. One study found that these same factors replicate across different racial and ethnic minorities; another found that they replicate across differing age groups; while still another found that they replicate on a sample of mentally retarded students. However, many of these studies have identified additional factors not identified by Piers. Also, factor instability has been identified within the same sample, leading researchers to conclude that the Piers-Harris may be far more unidimensional than multidimensional. Piers (1984) states that care should be taken when interpreting specific cluster scales, especially for individual children.

Psychometric Properties of the California Achievement Test (CAT)

Standardization

The Technical Bulletin 1 (CTB/McGraw-Hill, 1979) states that the standardization sample for the CAT C and D was comprised of approximately 200,000 kindergarten through 12th graders. These students were drawn by stratified random sampling procedures from the national public and Catholic school populations. Two standardizations took place, one for the Fall of 1976 and the other for the Spring of 1977. All subjects were tested both times. The sample was stratified on the basis of geographic region, school district size, and individual school demographic characteristics. Many school districts also administered the Prescriptive Reading Inventory, the Diagnostic Mathematics Inventory, or the SFTAA. Each of these three tests was administered to between 15% and 20% of the Fall norm group. These test scores were used to aid in establishing equations for CAT C and D math and reading scores and anticipated achievement on the CAT C and D from the SFTAA. Also, the Fall CAT C performance was used as a baseline for expected achievement on the CAT C and D in the Spring. In the Spring of 1977, all students were administered either CAT C or D on a random basis. This provided the data necessary for equating Form C with Form D. In addition, the norm group was randomly assigned adjacent levels of the CAT C and D to provide the overlapping data necessary for articulation of scores across test levels.

Reliability

In the Technical Bulletin 1, the reliability of the CAT is reported in various ways. Internal consistency data is reported for the subtests and the total test performance for each level of both the CAT C and the CAT D. Kuder Richardson formula 20 (KR 20) coefficients range from .59 to .95 for the subtests and from .90 to .98 for the total score. Data on the standard errors of measurement are also reported for the various subtests and levels of the CAT C and CAT D. These measures provide evidence of good internal consistency.

Another manner in which the reliability of the CAT was assessed was by repeating administrations after a short interval. This was done by gathering both test-retest and alternate form correlations. For test-retest data, students were administered the same form of the CAT with a two to three week interval between administrations. For most total scores, correlations exceeded .75. For alternate form data, one form was administered followed by the other after two to three weeks. Correlations for most total scores exceeded .90. Thus, the resulting correlations indicate stability of measurement.

In addition, the reliability of the CAT was described by correlations of repeated administrations using six month intervals. Specific ways in which the data was examined, including the actual range of correlations, follows: (a) test-retest correlations for each level of form C (.71 to .93), (b) alternate form correlations (.68 to .93), and (c) correlations between adjacent levels within and across forms (.69 to .92).

Validity

The procedures followed to ensure content validity of the CAT are discussed in the Technical Bulletin 1. One of these is the formulation of objectives. In order to achieve this goal, curriculum guides and other instruction materials were requested from all state departments and most major cities. Using these materials, basic skills common to most curricula were identified. These basic skills were thus compared with the objectives of the Prescriptive Reading Inventory and the Diagnostic Mathematics Inventory, instruments whose objectives were developed through analysis of widely used basal texts. Finally, the resulting objectives formed the basis for the CAT category objectives. Detailed descriptions of these objectives are found in the Technical Bulletin 1.

Items were selected in such a way as to establish content validity. Professional item writers, most of whom were experienced teachers, wrote the items and stimulus materials according to specified guidelines. All items were reviewed for racial, ethnic, and sex bias by persons of various ethnic groups who held responsible positions in educational fields. Also, CTB/McGraw-Hill conducted statistical research to identify items that appeared to be racially biased and then revised or eliminated them. Teachers' comments concerning the test contents were also given serious consideration in developing the CAT.

In addition, items were carefully tried out in order to ensure content validity. By administering 10 tryout books at each level of the test, the authors were able to try out each item at three

grades--the grade that the item was mainly intended for and the grades immediately above and below that grade. Item selection decisions were based on the following: discrimination in difficulty among the grades at each level, discrimination in difficulty among five groups of students of varying achievement levels, degree of consistency with the entire test, and influence on reliability.

Psychometric Properties of the Test of Cognitive Skills (TCS)

Standardization

The Technical Report (CTB/McGraw-Hill, 1983) discusses the standardization of the TCS in great detail. The standardization sample for the TCS consisted of approximately 83,000 2nd through 12th graders. In an attempt to randomly select students, basic sampling units were developed. They included public school districts, Catholic dioceses and archdioseses, and other private schools grouped by county. Each of these basic sampling units were partitioned into cells based on geographic region size, and/or performance on standardized achievement tests. From each cell, a district was randomly selected from each district. For each school selected, if there was a sufficient number of students in each grade, the sampling for that district was complete. If there was not a sufficient number of students in the school, an additional school was randomly selected. Additional schools were selected from each district until a sufficient number of students had been accumulated for each grade. The students were then tested by school personnel. The only special education students excluded were those that the school districts did not include in their group achievement testing programs.

Reliability

Information on the reliability of the TCS is described in the Technical Report by internal consistency and standard error of measurement. To measure internal consistency, the Kuder-Richardson formula 20 (KR 20) was applied to the four subtests of the TCS for

each grade level. Kuder-Richardson coefficients of the 12 grade levels range from .72 to .90 on the Sequences subtest, from .74 to .86 on the Analogies subtests, from .77 to .89 on the Memory subtest, and from .72 to .84 on the Verbal Reasoning subtest. Considerable information on the subtest standard errors of measurement is given in the Technical Report. Based on these data, the TCS appears to be satisfactorily reliable. However, the TCS Technical Report does not provide any test-retest information.

Validity

The TCS was designed to measure cognitive abilities that are necessary for success in school. According to the Technical Report, previous research provides evidence that the TCS measures a construct that can be operationally distinguished from the achievement construct. This evidence is based on the finding that for each of the 16 subtests of the SFTAA (the predecessor of the TCS), an aptitude measure was successfully distinguished from an achievement measure. Criteria for distinguishing between aptitude and achievement was based on the following assumptions: (a) that an academic aptitude test functions as a measure of learning rate relative to an achievement test, (b) that an achievement test is a measure of the amount of school material learned, and (c) that grade in school is a measure of learning time. The achievement measure used in this research was the 1970 edition of the CAT. According to CTB/McGraw-Hill (1983), results of this research are generally relevant to the TCS in that it, like the SFTAA, was designed to measure academic aptitude. The authors of the Technical Report state that "the

previous research supports the construct validity of TCS inasmuch as two of the TCS subtests, Sequences and Analogies, have essentially the same rationale as their counterparts in SFTAA" (p. 5).

Care was taken in the test development to ensure construct validity. The items were developed and written by professional item writers, all of whom had teaching experience. For two of the subtests, Memory and Verbal Reasoning, all new items were written. For the remaining two subtests, Analogies and Sequences, many new items were written and many items of the SFTAA were revised. The items and test directions were carefully reviewed for editorial accuracy and content. To ensure that all words used were appropriate for the target grades at each test level, reference was made to The Living Word Vocabulary and the EDL Core Vocabularies in Reading, Mathematics, Science and Social Studies. Items were reviewed to ensure conformity to CTB/McGraw-Hill's guidelines on bias. Reviewers of various ethnic groups who held responsible positions in the educational field identified items that they considered biased in language, subject matter, or representation of people. In addition, much consideration in the final development of the TCS was given to teacher comments on the content, illustrations, instructions, and time limits.

Items were carefully tried out and selected. The tryout sample consisted of 600 students, 200 of which were Blacks and Hispanics. Students were administered items believed to be appropriate for their current grade and for the grades immediately above and below this grade. Items were chosen which achieved the following

statistical goals of the test: to minimize the standard error of measurement, to maximize fit, to minimize bias, and to chose items whose answer choices performed in a reasonable manner.

Statistical data related to validity of the TCS include correlations between the SFTAA and TCS and between the CAT/C and the TCS. Correlations between the total scale scores on the SFTAA and TCS range from .62 to .81. Correlations between the scale scores of the CAT and the TCS range from .61 to .86.

APPENDIX B

Instructions for Teachers

Instructions for Administering the Piers-Harris Children's Self-Concept Scale

1. Have students put name, date, and teacher's name on front cover.
2. Read directions to students.
3. Make sure that students answer all 80 questions.
4. Try to relay an attitude of seriousness to students. In order for the study to be valid, it is important that students answer the questions honestly.
5. Administer during English classes on Tuesday, Wednesday, or Thursday of this week.
6. Return to guidance office by Friday, April 26.

Thank you,

Ann Buff

VITA

Ann Marie Buff was born in High Point, North Carolina on August 22, 1961. She graduated from Asheville Country Day School in 1979. During the same year, Miss Buff entered the University of North Carolina at Asheville. In May, 1983, she received a Bachelor of Arts in Mathematics and Psychology.

In August, 1983, Miss Buff began graduate study at Appalachian State University in the School Psychology program. While attending graduate school, she was awarded assistantships in the Psychology Department and in the College of Learning and Human Development. She served as a practicum student at the elementary and high schools in Sparta, North Carolina and at the Mountain City Mental Health Center in Mountain City, Tennessee. She worked as an intern school psychologist for the Lincoln County school system in Lincolnton, North Carolina. Miss Buff received a Master of Arts and Certificate of Advanced Study in August, 1985. In September, 1985, she began work towards a doctorate in School Psychology at the University of Georgia.

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