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A Preliminary Examination of the CHC Cognitive Ability Profiles of Children with High IQ and High Academic Achievement Enrolled in Services for Intellectual Giftedness

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This study examined group-level profiles across the Cattell–Horn–Carroll (CHC) broad ability composites from the Woodcock–Johnson III (Woodcock, McGrew, & Mather, 2001) for a sample of 34 children with intellectual giftedness and a matched sample of average-achieving children. The children with intellectual giftedness scored significantly higher than the average-achieving children and significantly higher than the normative mean across all composites except Long-Term Retrieval. As a group, the children with intellectual giftedness tended to score highest on composites with high g loadings and low specificity estimates, but this trend was only moderate. Implications for assessment and identification of children with intellectual giftedness are discussed.²

In 1970, the congressional mandate Section 806, “Provisions Related to Gifted and Talented Children,” was added to the Elementary and Secondary Education Amendments of 1969 (Public Law 91-230). According to the definition outlined in Section 806, an academically gifted child is one who has high capability in one or more of the following areas: (a) intellectual ability, (b) creative and productive thinking, (c) leadership ability, (d) visual and performing arts, and (e) specific ability areas (Marland, 1972). Traditionally, identification of gifted children by states and their corresponding local education agencies is based on a comprehensive assessment of overall intellectual ability, academic achievement, and displays of creativity and talent at school and at home.

Making Sense of Intellectual Ability Research

Judgments about overall intellectual ability are typically based on global ability composite scores derived from norm-referenced intelligence tests. Such global ability composite scores demonstrate excellent predictions of measured academic and educational achievement, performance of daily life activities, and vocational success (Kaufman & Harrison, 1986;

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Sparrow & Gurland, 1998). A recent search of the Buros Institute of Mental Measurements website (www.unl.edu/buros/index.html) yielded 250 published assessment instruments measuring “intelligence and general aptitude.” It is clear from this finding that, at least in the domain of intellectual abilities, a great number of tests and other instruments assessing key constructs associated with giftedness are available to school psychologists and others involved in the identification of children with giftedness.

In recent years, a theory of cognitive abilities has come into prominence that aids in the clarification of the ability constructs measured by such instruments. It is the Cattell–Horn–Carroll (CHC) theory, which describes a hierarchical model of cognitive abilities based on the extended *Gf-Gc* theory (Horn & Blankson, 2005) and Carroll’s (1993) three-stratum theory (see McGrew, 2005). The model includes narrow abilities (stratum I), broad abilities (stratum II), and arguably, general intelligence, or *g* (stratum III). Stratum I includes approximately 70 narrow abilities that represent specialized abilities. There appears to be a consensus that stratum II includes 10 broad abilities—Fluid Reasoning, Crystallized Intelligence, Short-Term Memory, Visual Processing, Auditory Processing, Long-Term Retrieval, Processing Speed, Reading and Writing Ability, Quantitative Knowledge, and Reaction Time/Decision Speed—but the existence of a single general factor at stratum III has been much debated.³ Some researchers (e.g., Carroll, 1993; Jensen, 1998) have argued (a) that this factor well-represents what is shared among the broad abilities and (b) that it is the only cognitive ability that is tapped by all ability measures. In contrast, other researchers (e.g., Horn & Blankson) relegate *g* to a conglomerate of more specific cognitive abilities and argue for a focus on the somewhat independent broad abilities. Because CHC theory provided the model for test development for a number of recently published intelligence test batteries, such as the *Woodcock–Johnson® III Tests of Cognitive Abilities* (WJ III® COG; Woodcock, McGrew, & Mather, 2001), the *Stanford–Binet Intelligence Scales, Fifth Edition* (SB5; Roid, 2003), and the *Kaufman Assessment Battery for Children, Second Edition* (KABC-II; Kaufman & Kaufman, 2004), a better understanding of the CHC cognitive abilities of children with giftedness is needed.

CHC Profiles of Children with Giftedness

Two studies explicitly examining the CHC broad ability profiles of children with giftedness have been delineated in materials accompanying published test batteries. Roid (2003) reported that a group of children with giftedness demonstrated scores on the SB5, on average, in the superior range across the Fluid Reasoning, Knowledge, Quantitative Reasoning, and Visual–Spatial Processing composites and in the high average range on the Working Memory composite.⁴ The children scored highest on the Visual–Spatial Processing composite. In addition, Kaufman and Kaufman (2004) reported that a group of children with giftedness scored on the KABC-II, on average, in the high average range across the Short-Term Memory, Visual Processing, Long-Term Storage and Retrieval, Fluid Reasoning, and Crystallized

³ Across sources, Crystallized Intelligence may be referred to as Knowledge, Crystallized Ability, or Comprehension–Knowledge; Short-Term Memory as Working Memory; Visual Processing as Visual–Spatial Processing or Visual–Spatial Thinking; Long-Term Retrieval as Long-Term Storage and Retrieval; and Quantitative Knowledge as Quantitative Reasoning.

⁴ We used the following terms to describe standard score ranges: Very Superior (131 and above), Superior (121 to 130), High Average (111 to 120), Average (90 to 110), Low Average (80 to 89), and Low (70 to 79).

Ability composites. The children scored highest on the Crystallized Ability composite and lowest on the Long-Term Storage and Retrieval composite.

Only one peer-reviewed journal article, Rizza, McIntosh, and McCunn (2001), has examined the patterns of performance of children who appeared to be gifted on measures of the CHC broad abilities. Children were drawn from the WJ III standardization sample and included (a) children with intellectual giftedness (based on the WJ III General Intellectual Ability–Extended score at or above 125) and (b) children without giftedness (based on the WJ III General Intellectual Ability–Extended score below 125) who were matched on sex, age, race, and father’s level of education. The profiles of the CHC broad ability composites from the WJ III (Woodcock et al., 2001) revealed that the children with giftedness scored in the superior range across the Short-Term Memory, Fluid Reasoning, Long-Term Retrieval, and Comprehension–Knowledge composites and in the high average range on the Visual–Spatial Thinking, Auditory Processing, and Processing Speed composites. The children with giftedness scored highest on the Short-Term Memory composite and lowest on the Processing Speed composite. Group comparisons revealed that the children with giftedness scored significantly higher across all of the CHC broad ability composites than their non-gifted counterparts.

Although the Rizza et al. (2001) study provides important, preliminary insights into the patterns of performance of children with high levels of general intelligence, it is notable that the children with giftedness met only a single criterion for giftedness, a normatively high General Intellectual Ability–Extended score. Thus, it is not apparent that these children with giftedness met eligibility criteria for giftedness according to federal or state guidelines. Furthermore, the children without giftedness met no other criteria than a General Intellectual Ability–Extended score lower than the group with giftedness. The design of this study also led to a lack of independence between (a) the measure used to select children with and without giftedness (the General Intellectual Ability–Extended score) and (b) the measures of the CHC broad abilities, the WJ III CHC factor clusters, used in the profile analysis. The General Intellectual Ability–Extended score stems from the differential weighting of performance on the same 14 tests that contribute to the CHC factor clusters. The consistently higher scores for the children with giftedness is not at all unexpected due to the relationship between the selection criterion and the outcome criteria. In addition, as a result of the design of this study, the pattern of CHC factor cluster scores in the profiles seems to be consistent with the weighting of the WJ III test scores contributing to the General Intellectual Ability–Extended score.

Purpose of the Study

Much like Rizza et al. (2001), this study drew on CHC theory and examined the patterns of performance on measures of seven CHC broad abilities for a sample of children with giftedness and for a sample of matched children with average achievement. The study extended the understanding of the CHC broad ability profiles of children with giftedness through the use of the following methods and analyses. First, the study included children with giftedness who (a) were previously identified as intellectually gifted via a psychoeducational assessment conducted by their schools, (b) demonstrated levels of general intelligence above the vast majority of their peers, (c) demonstrated high levels of achievement in reading and mathematics, and (d) demonstrated no history of psychiatric, motor, or sensory disorders. Second, seven CHC broad ability scores for the children with giftedness were obtained from testing completed independently of that conducted for initial identification and eligibility. Third, analyses examining the CHC broad ability profiles of the group of children with

giftedness and a group of children with average achievement were conducted. Finally, the study examined the influence of the *g* saturation and the specificity of the broad ability measures on the patterns of performance of children with giftedness and their average-achieving counterparts across the CHC broad ability measures (Bergeron & Floyd, 2006).

Method

Participants

Gifted. The group of children with giftedness included 34 children from a suburban school district in the Mid-South. In order to ensure that these children met stringent criteria for giftedness based on common standards, they were selected from a larger population of children with giftedness based on four criteria. First, children had been deemed eligible for special education services based on criteria for intellectual giftedness outlined by their state. There were four options by which children could be classified as intellectually gifted. The criteria for these four options are summarized in Table 1.

Table 1
State Eligibility Guidelines for Intellectual Giftedness Used in the Initial Stage of Identification of Children with Giftedness

Eligibility option	Academic achievement: Test performance	Global ability composite	Academic achievement: School performance	Creative thinking
1	1 score at or above the 96th percentile	Score at or above 130		
2	2 scores at or above the 90th percentile	Score at or above 130	GPA in top 3% of class, high score on teacher checklist, or receipt of academic awards	High score on creativity test or teacher checklist
3	2 scores at or above the 95th percentile or 3 scores at or above the 90th percentile	Score between 123 and 129	GPA in top 3% of class, high score on teacher checklist, or receipt of academic awards	High score on creativity test or teacher checklist
4	3 scores at or above the 95th percentile or 4 scores at or above the 90th percentile	Score between 118 and 122	GPA in top 3% of class, high score on teacher checklist, or receipt of academic awards	High score on creativity test or teacher checklist

Note: GPA = Grade point average.

Second, in order to ensure that (a) the children in fact had very high levels of general intelligence and (b) the children were selected based on the same intelligence test battery, all children were required to have evidenced a Full Scale IQ of 125 or greater on the *Wechsler Intelligence Scale for Children*, *Third Edition* (WISC-III[®]; Wechsler, 1991)⁵ during their eligibility testing or upon subsequent assessment ($M = 130.2$, $SD = 4.0$, range = 125 to 139).⁶ Note that, due to this criterion, all children eligible for intellectual giftedness through option 3 in the first stage of identification (see Table 1) were omitted from further consideration. Third, children were required to have demonstrated advanced achievement as evidenced by scores above the 75th percentile on a reading composite ($M = 94.8$, $SD = 5.4$) and on a

⁵ The *Wechsler Intelligence Scale for Children, Fourth Edition* (WISC[®]-IV; Wechsler, 2003) was unavailable when these data were collected during winter and spring of 2003.

⁶ Children completed the WISC-III when they were within the following range of ages: 7 years, 9 months to 11 years, 6 months ($M = 109.9$ months, $SD = 12.0$ months). Children completed the WISC-III approximately 1 year to 6 years before participating in this study ($M = 43.4$ months, $SD = 19.4$ months).

mathematics composite ($M = 94.1$, $SD = 6.0$) from a group-administered achievement test.⁷ Fourth, children must have displayed no history of psychiatric, motor, or sensory disorders. Children meeting all four of these criteria ranged in age from 9 years, 8 months to 14 years, 9 months ($M = 153.3$ months, $SD = 18.6$ months). They included 17 boys and 17 girls. The sample was almost exclusively White (97.1%). Large percentages of the children's mothers and fathers held bachelor's degrees or higher (Mothers = 79.4%, Fathers = 79.4%). The primary language of the children was English.

Average-Achieving. Like Bergeron and Floyd (2006), the study matched each child with giftedness with an average-achieving participant from the WJ III standardization sample (Woodcock et al., 2001). Average achievement was determined based on two composite scores from the *Woodcock-Johnson III Tests of Achievement*: Reading Comprehension and Math Reasoning. These composites most closely reflected the domains from the group-administered achievement tests that were used as selection criteria for the children with giftedness. To be included in the average-achieving group, children were required to demonstrate an age-based standard score on both composites that ranged from 90 to 110, which is reflective of the range of percentile ranks from 25 to 75.

The children with average achievement were matched with the children with giftedness on the following variables: chronological age in years, sex, race, and father's education level. Although an adequate number of matches was found based on the criteria of chronological age in years, sex, and race, exact matches could not be found for eight children with giftedness because of insufficient cases with father's education of a bachelor's degree or higher. For these eight cases, matches were selected based on chronological age in years, sex, and race, and on the next highest level of father's education from participants in the standardization sample. The 34 children in the average-achieving group ranged in age from 9 years, 7 months to 14 years, 8 months ($M = 153.7$ months, $SD = 18.4$ months). There was no significant difference between the children with giftedness and the children in the comparison group on the variables age in months, $t(66) = -1.92$, $p = .92$ (two-tailed), and father's education level, $t(66) = -1.92$, $p = .06$ (two-tailed).

Measures

Children with giftedness completed 14 tests from the WJ III COG to produce seven broad ability composites. All tests were scored according to age-based norms. The seven broad ability composites, median internal consistency reliability estimates, g loadings, and specificity estimates for each composite are presented in Table 2. Output from the *WJ III Compuscore® and Profiles Program* (Schrank & Woodcock, 2001) revealed that none of the 14 tests and none of the seven composites demonstrated a ceiling violation for this age range. Thus, the maximum raw score for each test yielded age-based standardized test scores and composites that exceeded two standard deviations above the mean.

Table 2 reproduces the g loadings for the seven broad ability composites offered by Barry and Floyd (2005). These values represent the correlations between the composite scores and the single factor presumed to be general intelligence. Using guidelines for interpreting subtests, g loadings of .70 or higher are considered *high*, those from .50 to .69 *medium*, and those below

⁷ Children completed the achievement tests when they were within the following range of ages: 7 years, 7 months to 14 years, 7 months ($M = 105.3$ months, $SD = 14.5$ months). Children completed the WISC-III approximately 5 months to 7 years before participating in this study ($M = 48.0$ months, $SD = 22.7$ months).

Table 2
*Select Psychometric
 Properties of the
 WJ III CHC
 Broad Ability Composites*

Broad ability composite	Average reliability ^a	<i>g</i> loading ^b	Specificity ^c
Comprehension–Knowledge	.94	.76	44%
Long-Term Retrieval	.87	.69	47%
Visual–Spatial Thinking	.79	.46	60%
Auditory Processing	.88	.61	55%
Fluid Reasoning	.95	.78	44%
Processing Speed	.91	.53	67%
Short-Term Memory	.86	.60	55%

^a Mean reliability estimates, obtained using Fisher’s *z* transformations from reliability estimates reported in the *Technical manual. Woodcock–Johnson III* (by K. S. McGrew and R. W. Woodcock, 2001, Itasca, IL: Riverside. Adapted with permission of the author.), are reported for the 9- to 13-year-old age range. Rasch analysis was used to calculate the reliability of speeded tests and tests that employed multiple-point scored items. Split-half procedures were used for the remaining tests. Cluster reliabilities were calculated based on the obtained reliabilities for their component tests.

^b Composite *g* loadings were derived from principal axis factoring of all seven composites for the 9- to 13-year-old age range of the WJ III norming sample. From “Woodcock–Johnson III CHC factor clusters: *g* loadings and specificity estimates,” by A. Barry & R. G. Floyd, 2005. Poster session presented at the annual meeting of the American Psychological Association, Washington, DC. Adapted with permission of the author.

^c Specificity estimates for each composite for the 9- to 13-year-old age range were obtained by using the following steps. Multiple regression was used to obtain the squared multiple correlations (SMC) between each composite and all of the remaining composites. The SMC for each composite (considered *common variance*) was subtracted from its average reliability coefficient to obtain the specificity estimate (Barry & Floyd, 2005).

.50 *low* (McGrew & Flanagan, 1998). Table 2 also reproduces the specificity estimates for the seven broad ability composites offered by Barry and Floyd (2005). Specificity estimates represent the percentage of reliable variance that is unique in a variable. Using guidelines for interpreting subtests, to have ample specificity a composite score must have a specificity estimate that is greater than 25% and greater than the percentage of variance associated with random error. All composites demonstrated more than ample specificity (Kaufman, 1994).

Procedures

Children with giftedness were recruited by letters to parents that were distributed to children through their gifted education classrooms. Once consent was obtained from parents, school records were reviewed to determine if children met selection criteria. If they met these criteria, testing with the WJ III was completed during normal school hours in one session that lasted approximately 2 hours. The graduate-level examiners completed at least one graduate course focusing on the administration, scoring, and interpretation of psychological tests and had submitted evidence of their competency.

Results

Analyses were completed that are consistent with Bergeron and Floyd (2006). Table 3 includes descriptive statistics for each of the seven broad ability composites for both the children with giftedness and the average-achieving group. The children with giftedness displayed the following pattern on the broad ability composites from highest to lowest: Fluid Reasoning, Comprehension–Knowledge, Visual–Spatial Thinking, Short-Term Memory, Auditory Processing, Processing Speed, and Long-Term Retrieval. For this group, the mean standard scores for all composites except Long-Term Retrieval fell within the high average range. The mean standard score for Long-Term Retrieval fell within the average range.

Table 3
*WJ III CHC Broad Ability
 Composite Means and
 Standard Deviations
 for the Children with
 Giftedness and the
 Average-Achieving Group*

Broad ability composite	Gifted		Average-achieving	
	<i>M</i>	<i>SD</i>	<i>M</i>	<i>SD</i>
Comprehension–Knowledge	115.32	10.27	99.71	10.37
Long-Term Retrieval	104.94	10.83	102.35	11.21
Visual–Spatial Thinking	114.35	10.64	100.91	11.69
Auditory Processing	111.41	10.72	102.53	10.72
Fluid Reasoning	117.38	9.85	100.85	9.71
Processing Speed	111.21	17.47	99.38	12.93
Short-Term Memory	112.97	11.93	106.18	12.61

Preliminary data analysis was used to ensure that the assumptions of profile analysis were not violated (Tabachnick & Fidell, 2006). Profile analysis is an application of the multivariate repeated-measures ANOVA when applied to dependent variables that are all on the same scale.⁸ There were no univariate outliers (with $p = .001$, two-tailed test) or multivariate outliers (using Mahalanobis distance with $p = .001$ for the χ^2 value) within groups. No variable was significantly skewed ($p = .001$), and sample sizes for groups were equal. There were almost five times the number of participants per group than dependent variables.

When the profiles of broad ability composite scores from the children with giftedness and from the children in the average-achieving group were compared, the levels test indicated that the children with giftedness scored significantly higher than the average-achieving group across the composite scores as a set, $F(1, 66) = 49.68, p < .001$, partial $\eta^2 = .43$. Planned contrasts, using an adjusted alpha rate of .007, indicated that the children with giftedness scored higher than the average-achieving group on every composite except the Long-Term Retrieval and Short-Term Memory composites. However, the parallelism test, using Wilks' criterion, indicated that the groups exhibited different patterns of highs and lows on the WJ III composite scores, $F(6, 61) = 5.28, p < .001$, partial $\eta^2 = .34$. When averaged over groups, the WJ III composite score profile deviated significantly from flatness using Hotelling's criterion, $F(6, 61) = 2.64, p = .024$, partial $\eta^2 = .21$, indicating "scatter" across composite scores.

Mean scores from each group were tested to determine if they were significantly different from those of the normative population ($M = 100, SD = 15$). Using an adjusted alpha rate of .007, a series of one-sample z -tests revealed that the sample of children with giftedness scored significantly higher than the population mean on every composite except the Long-Term Retrieval composite. The average-achieving group scored similarly to the population mean on all composites except the Short-Term Memory composite.

To examine the relations between the rank ordering of the broad ability composite score means and the rank ordering of the (a) g loadings and (b) specificity estimates, Spearman

⁸ Although this statistical analysis appears to yield some of the same types of results as the individual-level profile (or ipsative) analysis of subtest scores that has been the focus of much criticism and debate (see Watkins, 2003; Watkins, Glutting, & Youngstrom, 2006), the focus of this analysis, as with ANOVAs and other analyses, is on the group-level data.

rank-order correlation coefficients were obtained. The correlation between the rank ordering of the composite score means for the children with giftedness and the rank ordering of the g loadings (presented in Table 1) was .52. The corresponding correlation for the average-achieving group was -.10. These findings indicate that, for children with giftedness as a group, the relation between the g loadings and the deviation of the mean scores from the mean of the population (100) was positive and moderate.⁹ For the children with giftedness, the correlation between the rank ordering of the composite score means and the rank ordering of the specificity estimates (presented in Table 2) was -.51. The corresponding correlation for the average-achieving group was -.08. In direct contrast to the relation with g loadings for the children with giftedness, the relation between the specificity estimates and the deviation of the mean scores for children with giftedness from the mean of the population was negative and moderate.

Discussion

The current study was designed to make several contributions to the literature by examining a sample of children with giftedness that were selected based on stringent criteria and by performing theory-driven analyses. The performance of children with giftedness was compared to a group of average-achieving children across seven measures of CHC broad abilities from the WJ III (Woodcock et al., 2001). The children with giftedness displayed the following pattern of CHC broad ability composites from highest to lowest: Fluid Reasoning, Comprehension–Knowledge, Visual–Spatial Thinking, Short-Term Memory, Auditory Processing, Processing Speed, and Long-Term Retrieval. This ordering is somewhat discordant with the rank ordering of the broad ability composites as reported in Rizza et al. (2001). Because the groups were selected on very different criteria, it is not unexpected that the Spearman rank-order correlation coefficient between the rank ordering of mean standard scores from the seven composites shared by both studies was only .36.

For the children with giftedness, all mean standard scores for the CHC broad ability composites except Long-Term Retrieval were significantly higher than the mean score for the population, and the majority of these scores were in the high average range. When compared to the average-achieving group, the children with giftedness scored significantly higher on all CHC broad ability composites except Long-Term Retrieval and Short-Term Memory. Whereas these findings were generally consistent with those found when comparing the scores for the children with giftedness to the normative mean, for unknown reasons the mean Short-Term Memory score for the average-achieving group was more than one-third of a standard deviation above the mean (and this group's highest score), so it was not significantly different from that of the children with giftedness. The relatively low Long-Term Retrieval composite score for the gifted group also was an anomaly, especially considering its relatively high g loading. The only supportive evidence of such a finding was apparent in Kaufman and Kaufman (2004). They reported that all CHC broad ability composites from the KABC-II were in the high average range for their sample of children with giftedness, but the Long-Term Storage and Retrieval composite represented their lowest score.

Several explanations were investigated to understand the performance of the children with giftedness on the Long-Term Retrieval composite. Initially, examiner error was ruled out by

⁹ We recognize that there is no standard rule-of-thumb for providing nominal labels for Spearman rho values. We used the following labels: *negligible to very weak* (0 to .19), *weak* (.20 to .39), *moderate* (.40 to .69), *strong* (.70 to .89), and *very strong* (.90 to 1.0).

comparing mean standard scores across examiners. No significant discrepancies were found. Other plausible explanations explored the effects of task demands and test anxiety. Literature reviewing the Long-Term Retrieval composite states that an individual's level of discomfort with on-demand task recall and corrective feedback may impact performance (Read & Schrank, 2003). Research also indicates that test anxiety may affect an individual's cognitive performance based on the complexity of tasks (Ellis & Hunt, 1993; Zeidner & Schleyer, 1999). While research comparing levels of test anxiety between children with and without giftedness indicates that children with giftedness tend to exhibit lower levels of anxiety than children without giftedness, levels of test anxiety have been found to be dependent upon an individual's reference group (Zeidner & Schleyer, 1998, 1999). As a result, children who do not typically receive corrective feedback may have been influenced by this task component and may have experienced elevated levels of anxiety. Also, because the children in the current study knew they were asked to participate based on their classification of intellectual giftedness, their levels of anxiety may have been elevated because they may have thought they were being compared to their gifted peers. These same factors, however, may not have influenced their performance on other cognitive ability areas such as Fluid Reasoning or Short-Term Memory because characteristics associated with giftedness typically include exceptional reasoning ability, analytical thinking, and the power of concentration (Sattler, 2002).

Another explanation dealt with the influence of formal instruction on the cognitive processes associated with Long-Term Retrieval and age-related developmental patterns (e.g., growth curves). According to the *WJ III Technical Manual* (McGrew & Woodcock, 2001), Long-Term Retrieval exhibits the least amount of developmental change when compared to other cognitive abilities, and the necessary processes used to complete such tasks are minimally influenced by formal instruction and are stable across age levels. In other words, once children reach a certain age, educational experiences do not influence the cognitive processes associated with Long-Term Retrieval. From environmental and developmental perspectives, unless children with giftedness receive skills-training that children without giftedness do not receive, it is expected that children with giftedness would not perform much differently than same-age peers. Thus, *W* scores from the *WJ III Compuscore and Profiles Program* (Schrank & Woodcock, 2001) were examined. The scores indicated minimal differences across age groups, which would explain the similar pattern of performance associated with their same-age peers.

Influence of g and Composite Specificity

Based on research and theory supporting the use and interpretation of cognitive ability measures as indicators of both general intelligence and more specific abilities (e.g., Carroll, 1993; Jensen, 1998), previous research by Bergeron and Floyd (2006), Spitz (1988), and others focusing on children with mental retardation has demonstrated strong negative relations between the rank ordering of cognitive ability measures and their *g* loadings. This study found moderate but positive relations, which indicate that there is some tendency for children with giftedness to score higher on composites with higher *g* loadings. Similarly, when specificity was considered, a moderate trend was evident indicating that children with giftedness are likely to demonstrate lower scores on measures with greater specificity.

Research supporting the *differentiation hypothesis* supports the finding that the influence of general intelligence across cognitive ability measures is much stronger for individuals with low levels of this ability (e.g., those with mental retardation) and that the influence of general intelligence is much weaker for those with high levels of this ability (see Detterman & Daniel, 1989). As a result, the relations between *g* loadings and specificity estimates and the variation in the profiles of CHC broad ability composite scores for children with giftedness

demonstrated in this study was remarkable. However, the focus on general intelligence and more specific cognitive abilities does not seem to explain fully the patterns of scores for this group of children. It is likely that a number of influences on test scores had idiosyncratic effects for the sample of children with giftedness, as they do for all samples.

Limitations

Although these children with giftedness were selected based on selection criteria that considered previous identification, normatively high general intelligence and reading and mathematics skills, and absence of psychiatric, motor, or sensory disorders, some may consider our sample too small and localized to draw inferences about the population. In fact, it should be noted that all 34 children with giftedness were recruited from a school district in the southern United States, all were from middle- to upper-middle class homes, and, except for one child, all were White. It is notable (and unfortunate) that this lack of representation of children from diverse cultures and ethnicities in our sample is characteristic of gifted education programs nationwide (National Research Council, 2002). Additional research with larger samples of children with giftedness who come from a variety of racial groups, backgrounds, socioeconomic statuses, and regions of the United States should be conducted to obtain a more complete picture of the general and specific cognitive abilities of these children.

Implications for Practice

By considering the CHC theory, school psychologists and others engaged in assessment of children with giftedness can focus on the powerful general aptitude, general intelligence, and variety of specific abilities that are sometimes overlooked during such assessments. Recently, Gridley, Norman, Rizza, and Decker (2003) proposed a model for identifying children with intellectual ability strengths using ability measures from the CHC theory. Consistent with those who argue for the single general factor and its measurement via general intelligence composites, the Gridley et al. (2003) model posits criteria including high norm-based scores from measures of general intelligence. Consistent with those who argue for the measurement of most or all of the CHC broad abilities as well as the measurement of some CHC narrow abilities, the model also considers high norm-based scores from measures of these abilities. Perhaps consideration of both measures of general intelligence *and* measures of more specific abilities should be standard practice during assessments of children who have or are expected to have giftedness. As a consequence, such assessment results may guide school psychologists and others engaged in the assessment process to create more individualized and facilitative educational programs for children with giftedness.

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