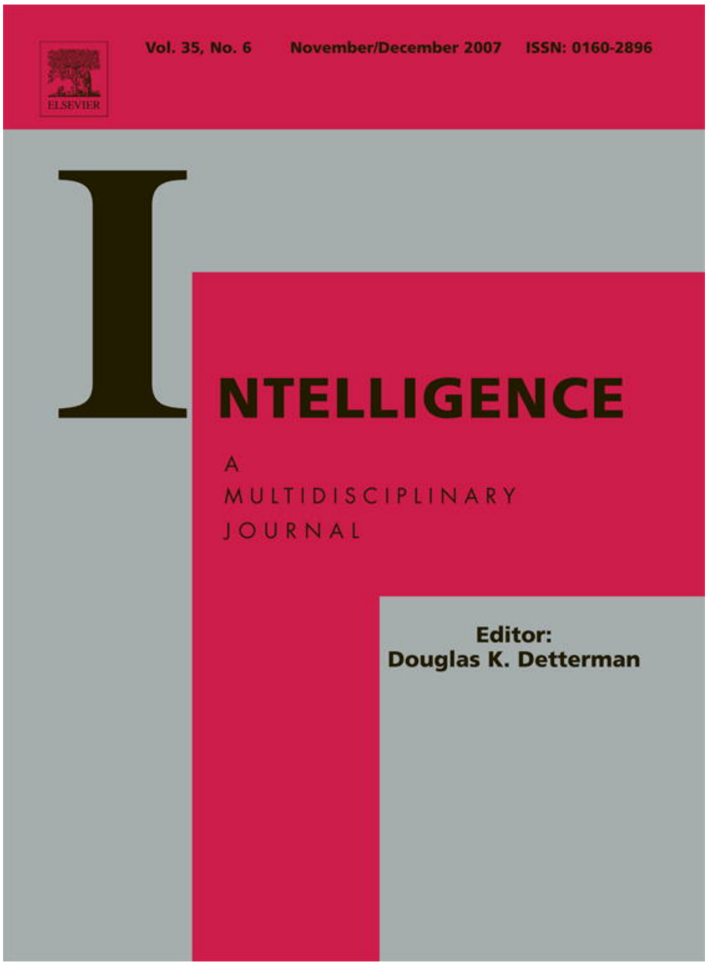
Vol. 35, No. 6
November/December 2007
ISSN: 0160-2896
ELSEVIER
INTELLIGENCE
A
MULTIDISCIPLINARY
JOURNAL
Editor:
Douglas K. Detterman

Available online at www.sciencedirect.com

ScienceDirect

Intelligence 35 (2007) 568 – 579

INTELLIGENCE

Hispanic and non-Hispanic children's performance on PASS cognitive processes and achievement ☆

Jack A. Naglieri [a,*], Johannes Rojahn [a], Holly C. Matto [b]

[a] *Center for Cognitive Development, George Mason University, Department of Psychology, MS# 2C6, United States*
[b] *Virginia Commonwealth, United States*

Received 16 May 2006; received in revised form 6 November 2006; accepted 6 November 2006
Available online 8 January 2007

Abstract

Hispanics have become the largest minority group in the United States. Hispanic children typically come from working class homes with parents who have limited English language skills and educational training. This presents challenges to psychologists who assess these children using traditional IQ tests because of the considerable verbal and academic (e.g., quantitative) content. Some researchers have suggested that intelligence conceptualized on the basis of psychological processes may have utility for assessment of children from culturally and linguistically diverse populations because verbal and quantitative skills are not included. This study examined Hispanic children's performance on the Cognitive Assessment System (CAS; [Naglieri, J.A., and Das, J.P. (1997). Cognitive Assessment System. Itasca, IL: Riverside.]) which is based on the Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence. The scores of Hispanic (N=244) and White (N=1956) children on the four PASS processes were obtained and the respective correlations between PASS and achievement compared. Three complementary sampling methodologies and data analysis strategies were chosen to compare the Ethnic groups. Sample size was maximized using nationally representative groups and demographic group differences were minimized using smaller matched samples. Small differences between Hispanic and non-Hispanic children were found when ability was measured with tests of basic PASS processes. In addition, the correlation between the PASS constructs and achievement were substantial for both Hispanic and non-Hispanic children and were not significantly different between the groups.
Published by Elsevier Inc.

Keywords: Ethnic differences; PASS theory; Achievement; Cognitive processing; Cognitive Assessment System; Intelligence; Hispanic; Hispanics; Latino; IQ; Non-biased assessment; Test bias

The Hispanic population is approximately 37 million or about 13% of the US population, making it the largest minority group (Ramirez & de la Cruz, 2002). This population of Hispanics is dominated by individuals of Mexican origin (66.9%) who reside in the Western (44.2%) and Southern (34.8%) regions of the country. Nearly half of the Hispanic population (45.6%) lives in central cities within a metropolitan area and the majority speak Spanish (28.1 million people in the United States), making it the largest of the four major language groups. Hispanics aged 25 and older are less likely to have a high school diploma than non-Hispanic Whites (57.0% and 88.7%, respectively). Importantly, 27.0% of Hispanics

☆ The authors would like to thank Dr. Earl Hunt for his comments and helpful suggestions on an earlier draft of this manuscript.

* Corresponding author.
E-mail address: naglieri@gmu.edu (J.A. Naglieri).

0160-2896/$ - see front matter. Published by Elsevier Inc.
doi:10.1016/j.intell.2006.11.001

have less than a ninth-grade education compared with only 4.0% of non-Hispanic Whites and only 14.2% of Hispanics are in managerial or professional occupations compared with 35.1% of non-Hispanic Whites (Ramirez & de la Cruz, 2002). The large number of Hispanics in this country makes clear the need for psychological tests that are appropriate for those children who come from these working class homes with parents who have limited academic attainment and English language skills.

The increase in diversity in the US, especially of the Hispanic population, has led researchers to recognize the value of nonverbal tests of general intelligence (e.g., Bracken & McCallum, 1997; Naglieri, 1997; Naglieri & Ford, 2003; Wechsler & Naglieri, 2006) because these tests do not contain traditional verbal (English vocabulary) and quantitative test items. While it is, of course, important to have English language and quantitative skills to be successful in academic and nonacademic settings, assessment of intelligence using tests with verbal and quantitative content can present a barrier for those with limited knowledge of English and limited academic skills. Despite a steadfast adherence to the traditional verbal, quantitative, and nonverbal IQ concepts predicted by Matarazzo (1992), there is increasing evidence of the value of nonverbal tests that measure general ability but do so with test content that does not involve language. Some researchers have argued that nonverbal tests of general ability are a particularly useful way to assess minority children because they yield smaller race and Ethnic differences (which is attributed to the difference in content) while these instruments retain good correlations with achievement, and can help identify minority children for gifted programs (Bracken & McCallum, 1997; Naglieri & Ford, 2003; Naglieri & Ronning, 2000a,b). While these nonverbal tests of general ability are effective for global assessment of children's intelligence, other researchers have argued that assessment of cognitive processes offers additional advantages.

Some researchers have suggested that whereas general intelligence has value, ability should be conceptualized on the basis of basic psychological processes (e.g., Das, 2002; Fagan, 2000; Naglieri, 2002) for several reasons. First, processing tests avoid the knowledge base required to answer verbal and quantitative questions found on most traditional IQ tests (Suzuki & Valencia, 1997). Second, a processing approach could allow for early detection of disabilities which predate academic failure, could have better diagnostic utility, and provide a way to better understand children's disabilities (Ceci, 2000). Third, a processing approach does not rely on test items with language and quantitative content and is therefore deemed more appropriate for assessment of culturally and linguistically diverse populations (Fagan, 2000; Suzuki & Valencia, 1997). Fourth, a cognitive approach to intelligence could have instructional relevance (Das, Naglieri, & Kirby, 1994; Naglieri, 2002, 2003). Fifth, although there is considerable evidence for the validity of general intelligence (see Jensen, 1998) a multidimensional theory of cognitive processing could provide a more comprehensive view of ability (Naglieri, 2002; Sternberg, 1988). Of the various processing options, Suzuki and Valencia (1997) described the Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence and the Cognitive Assessment System (CAS; Naglieri & Das, 1997) used to measure that theory as "an innovative approach to traditional intelligence assessment that assesses a broader spectrum of abilities than has been previously available in IQ testing" (p. 1111). The PASS theory described by Naglieri and Das (1997, 2005) is a view of intelligence that is based on the neuropsychological work of A. R. Luria (1966, 1973, 1980, 1982) and is comprised of four psychological processes.

Naglieri and Das (2005) described the four PASS processes as follows: Planning is a mental activity that provides cognitive control; use of processes, knowledge, and skills; intentionality; organization; and self-regulation. This includes self-monitoring and impulse control as well as generation, evaluation, and execution of a plan. This process provides the means to solve problems and may involve control of attention, simultaneous, and successive processes, as well as acquisition of knowledge and skills. The essence of the construct of Planning and tests to measure it is that they provide a novel problem-solving situation for which children do not have a previously acquired strategy. This is the hallmark of the concept of executive function (Hayes, Gifford, & Ruckstuhl, 1996) and a view that is closely aligned with the definition of Planning provided by Goldberg (2001) particularly in that it includes self-regulation, skillful and flexible use of strategies, allocation of attention and memory, response inhibition, goal setting, and self-monitoring, and self-correction (Eslinger, 1996).

Attention is conceptualized (Naglieri and Das, 2005) as a mental activity that provides focused, selective cognitive activity over time and resistance to distraction. The process is involved when a person must demonstrate focused, selective, sustained, and effortful activity. Focused attention involves directed concentration toward a particular activity and selective attention is important for the inhibition of responses to distracting stimuli. Sustained attention refers to the variation of performance over time, which can be influenced by the different amount of effort required to solve the test. This construct was conceptualized and operationalized similarly to the attention work of Schneider, Dumais, and Shiffrin (1984) and Posner and Boies (1971), particularly the selectivity aspect of attention which relates to intentional discrimination between stimuli.

Simultaneous processing is a mental activity by which a person integrates stimuli into interrelated groups or a whole. Simultaneous processing tests typically have strong spatial aspects for this reason but can involve both nonverbal as well as verbal content as long as the cognitive demand of the task requires the integration of information. The construct of simultaneous processing is conceptually related to the examination of visual–spatial reasoning particularly found in progressive matrices tests such as those originally developed by Penrose and Raven (1936) and now included in nonverbal scales of intelligence tests such as the Wechsler Nonverbal Scale of Ability (Wechsler & Naglieri, 2006) and the Stanford–Binet Fifth Edition (Roid, 2003) as well as the simultaneous processing scale of the Kaufman Assessment Battery for Children Second Edition (Kaufman & Kaufman, 2004).

Successive processing is a mental activity by which the person works with stimuli in a specific serial order to form a chain-like progression. Successive processing involves both the perception of stimuli in sequence and the formation of sounds and movements in order. For this reason, successive processing is involved with recall of information in order as well as phonological analysis and the syntax of language. Successive processing has been conceptually and experimentally related to the concept of phonological analysis (Das et al., 1994). The concept of successive processing is similar to the concept of sequential processing included in the K-ABC2 (Kaufman and Kaufman, 2004) and tests that require recall of serial information such as Digit Span Forward. The four PASS constructs included in the PASS theory represent a merger of cognitive and neuropsychological constructs like executive function (Planning), selective attention (Attention), visual–spatial ability (Simultaneous), and the serial nature of language and memory (Successive).

The PASS theory attracted the attention of Suzuki and Valencia (1997) who recognized its potential but they urged research on such "innovative modifications of traditional intelligence assessment procedures and new instruments … given concerns confronting practitioners in assessing a growing diversity in clientele" (Suzuki & Valencia, 1997, p. 1111). The purpose of this study was to expand our understanding of how Hispanics and non-Hispanics perform on the CAS which is based on the PASS theory. More specifically we first aimed to examine the relationships between PASS and achievement to determine if these four constructs had relevance to academic performance. Second, we intended to evaluate Fagan's (2000) suggestion that measuring intelligence from a processing theory could yield small differences between groups that differ in Ethnic background. Finally, we are responding to Suzuki and Valencia's (1997) calls for research involving diverse populations on the PASS theory. To achieve these goals we examined Hispanic and non-Hispanic children's performance on the four processes and the correlations between PASS and achievement by group.

1. Method

1.1. Participants

The participants in this study were 2200 children and adolescents who were tested during the standardization phase of the CAS which is more fully described by Naglieri and Das (1997). Students who met specific demographic characteristics were individually tested by trained examiners. All subjects were administered the CAS and Woodcock–Johnson Tests of Achievement—Revised (WJ—R; Woodcock & Johnson, 1989) in that order. Naglieri and Das (1997) provide ample information documenting that the stratified sample is nationally representative on the basis of gender, race, ethnicity, region, community setting, classroom placement, and parental education. The advantage of a representative sample is its proportional representation of the specified population and therefore the results have wide generalizability. Its disadvantage for comparisons of two ethnic groups is that groups typically differ considerably on population characteristics, thus confounding the comparison of group differences. Although we first examined the representative samples of Whites and Hispanics, we also controlled for the potentially confounding demographic differences between Hispanic and non-Hispanic children in two ways. First, we retained population representation but controlled demographic variables (gender, region, community setting, parental education, classroom placement (full or part-time special educational placement) and student services (learning disabled, gifted, emotionally disturbed, etc.) by partialling out the effects of these demographic variables on the comparison of the children in the two ethnic groups. Second, we controlled for demographic differences by selecting matched pairs of Hispanic and non-Hispanic children on the basis of gender, region, community setting, parental education, classroom placement and student services assistance.

The representative sample consisted of 244 Hispanic and 1956 non-Hispanic children and adolescents aged 5–

17 years. The non-Hispanic group was comprised of White (80.8%), Black (15.2%), Asian (3.4%), Native American (0.3%) and other (0.4%) races. The mean age of the non-Hispanic children was 118.2 months (SD=43.7) and of the Hispanic children 115.97 (SD=42.5). The Hispanic sample had 40% of parents with less than high school education compared to 20% of the non-Hispanic parents. The participants in the two groups of matched pairs consisted of 144 Hispanic and 144 non-Hispanic participants who were selected from the representative sample. Each pair was matched on sex, age group, and parental education. Demographic characteristics of the representative and the matched groups based upon the description provided by each child's parent are presented in Table 1. As discussed in the introduction and shown in Table 1, the Hispanic and non-Hispanic populations differ with regard to key demographic variables, such as parental education and geographic concentrations.

2. Measures

2.1. Cognitive Assessment System

The CAS is a multidimensional measure of cognitive processing based on the Planning, Attention, Simultaneous, and Successive (PASS) theory of intelligence (see Naglieri, 1999, 2005; Naglieri & Das, 1997). A standard score is provided for each cognitive process (Planning, Attention, Simultaneous, and Successive) along with a Full Scale score. The internal reliability coefficients are high, Planning=.88; Attention=.88; Simultaneous=.93; Successive=.93; and Full Scale=.96. The scales are described below (for further explanation, see Naglieri, 1999).

2.1.1. Planning scale

The Planning scale includes three subtests: Matching Numbers, Planned Codes, and Planned Connections. In

Table 1
Demographic characteristics of the samples by ethnic group classification

	Representative groups				Matched pairs groups			
	Hispanic		Non-Hispanic		Hispanic		White	
	n	%	*n*	%	*n*	%	*n*	%
Gender								
Male	124	50.8	976	49.9	64	44.4	64	44.4
Female	120	49.2	80	50.1	80	55.6	80	55.6
Age groups								
5–7 years	106	43.4	794	40.6	67	46.5	67	46.5
8–10 years	66	27.0	534	27.3	33	22.9	33	22.9
11–13 years	31	12.7	269	13.8	11	7.6	11	7.6
14–17 years	41	16.8	359	18.4	33	22.9	33	22.9
Race								
White	109	44.7	1,561	79.8	80	55.6	144	100.0
Other	125	51.2	8	0.4	64	44.4	0	0.0
Black	1	0.4	293	15.0	–	–	–	–
Asian	0	0.0	65	3.3	–	–	–	–
Native American	6	2.5	5	0.3	–	–	–	–
Parental education								
Less than high school	101	41.4	334	17.1	35	24.3	35	24.3
High school	60	24.6	578	29.6	40	27.8	40	27.8
Some college	57	23.4	572	29.2	50	34.7	50	34.7
4+ years of college	26	10.7	472	24.1	19	13.2	19	13.2
Geographic region								
Midwest	50	20.5	502	25.7	44	30.6	44	30.6
Northeast	11	4.5	400	20.4	15	10.4	15	10.4
South	21	8.6	722	36.9	77	53.5	77	53.5
West	162	66.4	332	17.0	8	5.6	8	5.6
Community setting								
Urban/suburban	224	91.8	1,420	72.6	135	93.8	135	93.8
Rural	20	8.2	535	27.4	9	6.3	9	6.3
Class placement								
Full-time regular ed	228	93.4	1,808	92.4	136	94.4	130	90.3
Full-time special ed	1	0.4	42	2.1	1	0.7	4	2.8
Part-time special ed	8	3.3	101	5.2	7	4.9	10	6.9

the Matching Numbers subtest, children are presented with four pages containing eight rows of numbers. For each row, the child is instructed to underline the two numbers that are the same. The items were constructed so that children can apply strategies such as finding the match by examining the last number as opposed to the first number (e.g., 143, 134, 144, 410, 143, 131) and eliminating one option that does not begin with the same number that most of the others do (e.g., 410). The Planned Codes subtest contains two pages, each with a distinct set of codes (e.g., A = OX; B = XX; C = OO) and empty boxes arranged in seven rows and eight columns. At the top of each page is a legend that contains the codes. The child is instructed to fill in the correct code beneath each corresponding letter. The letters are organized on the page in either a vertical or diagonal arrangement, thus providing the child the opportunity to use a plan, or strategy, of filling in all the A codes, then the B codes and so forth. In the Planned Connections subtest the child is instructed to connect numbers in sequences that appear in a quasi-random order (e.g., 1-2-3, etc.). This is similar to the Trails test often used in neuropsychological assessment (Lezak, 1995). For the last two items, the child connects numbers and letters in sequential order, alternating between numbers and letters (e.g., 1-A-2-B, etc.). Children use various strategies to solve this task such as scanning the page for the next number or letter, lifting the hand to better see the page, and looking back to the previous step to more easily know what comes next (e.g., when the child reaches B in the sequence 1→A→2→B→3→C by looking back to the number 2 the next step is more easily obtained). For a complete list of the strategies used by children on all the Planning tests see Naglieri and Das (1997) and for further discussion of strategy use see Winsler and Naglieri (2003).

2.1.2. Attention scale

The Attention scale includes the Expressive Attention, Number Detection, and Receptive Attention subtests. For Expressive Attention, children 7 years and younger are presented pictures of animals arranged in rows. Animals that are typically small animals are drawn to appear large and large animals are drawn to appear small. The child is instructed to indicate the *real* size of the animal (e.g., if a butterfly was drawn to appear large, the child would respond “small”). Children 8 years and older are given three pages to complete much like the well known Stroop test (Lezak, 1995). For the first page, the child reads color words (i.e., Blue, Yellow, Green, and Red). The words are presented in a quasi-random order. On the second page, the child is instructed to name the colors of a series of rectangles printed in aforementioned colors. On the third page, the color words are printed in a different ink color than the color the words name (e.g., the word Red would appear in blue ink). The Number Detection subtest asks children to find the target stimuli (e.g., the numbers 1, 2, and 3 printed in an open font) among many distracters (e.g., the same numbers printed in a different font). This test is modeled after the work of Schneider et al. (1984) on selective attention. The Receptive Attention subtest contains two pages; for the first page, targets are letters that are physically the same (e.g., BB but not Bb) and for the second page, targets are letters that have the same name (e.g., Bb but not Ab). This test was modeled after the attention research of Posner and Boies (1971).

2.1.3. Simultaneous scale

The Simultaneous scale has Nonverbal Matrices, Verbal Spatial Relations, and Figure Memory. Nonverbal Matrices is a traditional progressive matrix test like those published by Raven (1956) and Naglieri (1997) that includes items that have a variety of shapes and geometric designs that are interrelated through spatial or logical organization. For each item the child is required to decode the relationships and choose the best of six possible answers that completes the matrix. The Verbal Spatial Relations subtest measures the comprehension of logical and grammatical descriptions of spatial relationships. In this subtest, the child is presented with six drawings, arranged in a specific spatial manner, and a printed question. Then, the child is instructed to choose one of the six drawings that best answers the question. A typical item may ask: “Which picture shows a square above a circle?” with six options that include these shapes, and others, in various spatial arrangements. This test was based on the concept that simultaneous processing underlies the understanding of what Luria (1982) described as logical and grammatical relationships and is measured by the Token Test (Lezak, 1995). For Figure Memory the child is presented with a two- or three-dimensional geometric figure for 5 s and then is presented with a response page, with the original geometric figure embedded in a larger, more complex geometric pattern and is asked to identify the original design. This test was modeled after the work of Graham and Kendall (1960).

2.1.4. Successive scale

The Successive scale has *Word Series*, *Sentence Repetition*, and *Sentence Questions*. In Word Series, the examiner reads the child a series of words and then asks them to repeat the words in the same order. This subtest uses the following nine single-syllable, high-frequency words: *Book, Car, Cow, Dog, Girl, Key, Man, Shoe,* and *Wall*. Word Series is similar to other tests that are used to evaluate memory for sequences (e.g., Digit Span forward). For Sentence Repetition the child is read 20 sentences aloud and is asked to repeat each sentence exactly as presented. The sentences are composed of color words (e.g., "The blue yellows the green"), which reduces semantic meaning from the sentences. The Sentence Questions subtest uses the same type of sentences that are used in the sentence repetition subtest, however; now the child is read a sentence and asked a question about it. For example, the examiner reads "The blue yellows the green" and asks the child "Who yellows the green?" The correct answer is "the blue." Both Sentence Repetition and Sentence Questions were developed following Luria's (1966, 1982) explanation of how successive processing underlies a child's understanding of the syntactic organization of language.

2.2. Woodcock–Johnson Tests of Achievement—Revised

The Woodcock–Johnson Tests of Achievement—Revised (WJ—R; Woodcock & Johnson, 1989) is comprised of nine subtests that measure reading, math, and writing skills. The nine subtests are combined in a variety of combinations to form eight WJ—R Achievement cluster scores: Broad Reading (Letter–Word Identification and Passage Comprehension); Basic Reading (Letter–Word Identification and Word Attack); Reading Comprehension (Passage Comprehension and Reading Vocabulary); Broad Math (Applied Problems and Calculation); Basic Math (Calculation and Quantitative Concepts); Math Reasoning (Applied Problems); Basic Writing Skills (Diction and Proofing); and Skills (Letter–Work Identification and Passage Comprehension and Diction). Reported internal reliability coefficients for the clusters range in the mid .90s.

2.3. Data analysis

Standard scores (M=100, SD=15) were used in all analyses. Initial means and SDs for the representative Hispanic and non-Hispanic groups were calculated and the differences between the mean standard scores earned by Ethnic group classification were first examined by computing d-ratios, that describe the differences between the groups in standard deviation units (Cohen, 1988) using the formula:

$$(X_1 - X_2)/\sqrt{[(n_1 * \mathrm{SD}_1^2 + n_2 * \mathrm{SD}_2^2)/(n_1 + n_2)]}.$$

These differences will be described using Cohen's (1988) suggestion that 0.2 is small, 0.5 is medium, and 0.8 a large effect size.

The differences between the ethnic group classifications using the entire representative sample of Hispanics and non-Hispanics were compared using hierarchical regression analysis. The first step of the hierarchical multiple regression analyses identified the relevant contributing factors that accounted for the differences in the PASS and Full Scale scores. In order to examine the amount of variation in PASS and Full Scale score explained by ethnic group classifications after controlling for basic demographic variables each PASS score was entered as the dependent variable in a separate regression analysis with two blocks of predictor variables. In the first block of the regression analysis the variables gender, region, community setting, parental education, classroom placement, and type of educational setting (regular or special education) were entered (model 1); in the second block ethnicity was added (model 2). For nominal variables with more than two categories dummy variables were created and entered in the regressions analyses (i.e., region, classroom placement, and student services). Moderated regression analyses were also used to test for interaction effects, after controlling for those same demographic variables, that would show slope differences between CAS Full Scale and Achievement subscales (Broad Reading, Basic Reading, Reading Comprehension, Broad Math, Basic Math, Math Reasoning, Basic Writing Skills, and Skills) for Hispanic and non-Hispanic children (Aguinis, 2004; Jaccard, Turrisi, & Wan, 1990).

Differences between the matched pairs of Hispanic and non-Hispanic children were examined using linear regression analyses. These analyses were performed to examine the extent to which ethnic group classification accounted for differences in PASS subscale and CAS Full Scale standard scores. Moderated regression analyses were again used to test for significant interaction effects (Aguinis, 2004; Jaccard et al., 1990).

3. Results

3.1. Representative samples

Initial means and SDs for the Hispanic and non-Hispanic groups are presented in Table 2. The d-ratios for the CAS Planning (.18), Attention (.19), and Simultaneous (.39) scales can be described as small in size and the Successive (.57) as medium following from Cohen (1988). CAS subtest d-ratios are consistent with the four PASS Scales in which they are placed with one exception; Verbal–Spatial Relations (.48) showed the largest difference among the Simultaneous subtests. All three Successive subtests showed similar values, suggesting that subtests that involved the use of English language

Table 2
PASS scale and CAS subtest means, SDs and *d*-ratios for representative Hispanic and non-Hispanic samples

	n	Mean	SD	*n*	Mean	SD	*d*-ratio
Planning	1876	100.27	15.23	235	97.57	13.99	0.18
Matching Numbers	1937	10.02	3.06	243	9.63	2.88	0.13
Planned Codes	1894	10.03	2.97	238	9.92	3.02	0.04
Planned Connections	1932	10.08	3.03	241	9.23	2.70	0.28
Simultaneous	1949	100.63	14.86	244	94.87	15.23	0.39
Nonverbal Matrices	1954	10.07	2.99	244	9.33	2.90	0.25
Verbal–Spatial Relations	1954	10.23	3.03	244	8.76	3.38	0.48
Figure Memory	1951	10.16	2.98	244	9.66	3.29	0.17
Attention	1887	100.39	15.08	234	97.50	14.28	0.19
Expressive Attention	1932	10.02	3.06	239	9.49	3.01	0.17
Number Detection	1908	10.08	3.07	241	9.51	3.16	0.18
Receptive Attention	1925	10.01	3.03	240	9.70	3.05	0.10
Successive	1920	100.92	14.53	232	92.43	16.69	0.57
Word Series	1953	10.11	2.98	244	8.80	3.32	0.44
Sentence Repetition	1953	10.21	2.88	243	8.54	3.29	0.57
Sentence Questions	1942	10.21	3.00	244	8.91	3.03	0.43
Successive Speech rate	1914	10.18	2.99	229	8.75	3.38	0.47
Full Scale	1808	100.67	14.98	217	94.61	14.60	0.41

Note: $d\text{-ratio} = (\text{Mean}_1 - \text{Mean}_2)/\sqrt{[(n_1 \times \text{SD}_1^2 + n_2 \times \text{SD}_2^2)/(n_1 + n_2)]}$.

evidenced the largest (although still considered small to medium in size) *d*-ratios. In order to further examine the possible role of English language knowledge on subtest differences between Hispanic and non-Hispanic groups, a one-way ANOVA was conducted in both the Hispanic and non-Hispanic samples to test the relationship between parental education and the Woodcock–Johnson Reading Vocabulary subtest scores their children obtained. Table 3 shows lower vocabulary scores, in both the Hispanic and non-Hispanic group, for parents with less than a high school education as compared to those with a high school graduation or higher education levels ($p < .001$). Pearson correlations between the Woodcock–Johnson Reading Vocabulary subtest scores and the CAS Simultaneous and Successive scale scores for the Hispanic group were $r = .225$ ($p < .01$) and $r = .385$ ($p < .0001$) respectively; and for the non-Hispanic group were $r = .564$ (.0001) and $r = .504$ ($p < .0001$) respectively, suggesting that those subtests on the Woodcock–Johnson and the CAS that involve English language knowledge were related. To further test these findings, we conducted moderated regression analyses that allowed us to examine potential slope differences between the CAS Full Scale and Achievement scores for Hispanic and non-Hispanic groups, *after controlling* for English language knowledge subtests. Results showed that the interaction term across achievement ranged from .0001 to .017 ($p > .05$), showing that even after controlling for verbal knowledge, there was no evidence of slope differences between CAS Full Scale scores and achievement for Ethnicity. These findings together, therefore, suggest that parental education is significantly related to those CAS subtests that involve English language, with particularly lower scores for those children whose parents have less than a high school education as compared to those with some college or higher, regardless of Ethnicity. These results also suggest that differences in parental education levels between the representative groups described in Table 1 may help to explain the between group differences in achievement test scores and those CAS subtests that involve English language.

Multiple regression analyses presented in Table 4 control for differences in demographic characteristics of the Hispanic and non-Hispanic groups. The Beta value ranges for these demographic characteristics across the Full Scale and CAS subscales are as follows: gender (.006 to .159), region (.002 to .157), parental education (.197 to .312), community setting (.002 to .037), classroom

Table 3
W–J vocabulary subtest standard score by parental education for representative Hispanic and non-Hispanic samples

	Parental education (Hispanic)			Parental education (non-Hispanic)			
	n	Mean	SD	*n*	Mean	SD	*d*-ratio
<H.S.	60	89.92	13.17	197	94.16	15.33	−0.29
H. S. graduate	41	100.07	13.44	377	101.31	14.52	−0.09
Some college or higher	57	101.95	14.77	687	107.52	16.99	−0.33

Table 4
Hierarchical regression analysis for ethnicity predicting CAS scores (representative sample)

Predictors	$R^2\Delta$	$F\Delta$	$pF\Delta$	B	β	df
Full Scale						
Model 1	.263	44.73	.000			
Model 2	.008	20.33	.000	4.83	.10	1897
Planning						
Model 1	.161	25.13	.000			
Model 2	.001	2.84	.092	1.88	.04	1978
Attention						
Model 1	.148	22.84	.000			
Model 2	.001	3.47	.063	2.11	.04	1987
Simultaneous						
Model 1	.207	35.55	.000			
Model 2	.008	19.74	.000	4.74	.10	2055
Successive						
Model 1	.167	26.84	.000			
Model 2	.020	49.08	.000	7.71	.16	2017

Notes: Model 1: gender, region, parental education, community setting, classroom placement, student services.
Model 2: ethnicity.
B values are interpreted as the differences between the ethnic groups in original standard score metric (mean = 100 and SD of 15).

placement (.108 to .203), educational setting (.002 to .042). The table shows that the incremental $R^2\Delta$ changes for model 2 were close to zero (.001 to .020) across all five sets of CAS scores, which indicates that after controlling for the variables in model 1 ethnic group classification accounted for only an additional 0.1% to 2% of total variance in the CAS scores. Multicollinearity diagnostics showed that multicollinearity was not a confounding problem. The variance inflation factor for each analysis was well under the 10 point cut-off criterion (VIF's ranged from 1.283 to 1.304), suggesting that ethnic group classification itself is an important construct to examine in its own right with this set of variables. In addition, the correlation between CAS Full Scale scores and parental education for the matched sample data was .147, and the correlation for the representative sample was .330, suggesting that the CAS is not strongly associated with parental education but is strongly associated with achievement. Although statistical significance is indicated for Simultaneous and Successive scales and the Full Scale, the effect size, as indicated by the $R^2\Delta$ value and respective regression coefficients (Standardized [β] and unstandardized [B] regression weights), was negligible for all PASS scales and the CAS Full Scale score. These findings suggest two possible conclusions. One is that parental education is an environmental variable and that there are negligible CAS differences between the Ethnic groups once it is controlled (i.e., ethnic group was not responsible for CAS score differences between Hispanic and non-Hispanic groups). The other possibility is that parental education is related to parental ability, and that controlling for this effectively partials out differences in ability between the groups.

Achievement standard score means, SDs, and Pearson correlations with the CAS Full Scale scores are provided in Table 5 by ethnic group classification. Correlations between CAS and achievement across ethnic group classification were similar across groups. Overall, the correlations ranged from .40 to .71. The median correlations for Hispanics and non-Hispanics on the Achievement Clusters were .51 and .65, respectively. Also presented in Table 5 are the results of moderated regression analyses to test for significant interaction effects (Aguinis, 2004; Jaccard et al., 1990). Moderated regressions suggested that there were no significant slope differences between CAS Full Scale and achievement scores for Hispanic and non-Hispanic children as seen from the negligible and non significant ($p > .01$) $R^2\Delta$ change associated with the interaction effect for each of

Table 5
Means and SDs for achievement variables, correlations between CAS full scale scores and WJ—R achievement scores by ethnicity, and moderated regression analyses (representative sample)

	Hispanics				Non-Hispanics				Difference		
	Mean	SD	n	r[a]	Mean	SD	n	r[a]	p	$R^2\Delta$	$F\Delta$
Broad Reading	97.07	14.44	159	.51	103.14	17.53	1274	.65	.05	.002	3.79
Basic Reading Skills	96.29	14.22	160	.51	101.29	17.62	1268	.63	.07	.001	3.40
Reading Comprehension	97.22	14.23	158	.43	104.32	16.96	1258	.63	.03	.002	4.55
Broad Mathematics	96.54	17.64	158	.50	102.95	19.23	1284	.68	.02	.002	5.74
Basic Mathematics	95.91	17.27	158	.40	101.65	18.48	1283	.69	.00	.005	13.10
Math. Reasoning	96.29	17.26	160	.62	105.00	17.88	1292	.65	.63	.000	0.24
Basic Writing Skills	88.99	15.69	159	.53	96.93	16.56	1242	.65	.33	.000	0.96
Skills	92.45	15.10	159	.59	100.21	16.95	1285	.71	.06	.001	3.44
Median				.51				.65			

[a] Sample sizes for the correlations differed from the samples due to missing variables; n's for Hispanics ranged from 139 to 140; for non-Hispanics 1155 to 1193.

Table 6
Regression analysis for ethnicity predicting CAS scores (matched sample)

Predictors	$R^2\Delta$	F	p	B	β	df
Full Scale	.032	8.30	.004	5.13	.18	254
Planning	.005	1.43	.233	2.01	.07	279
Attention	.004	1.18	.277	1.84	.07	272
Simultaneous	.028	8.24	.004	5.23	.17	287
Successive	.042	11.75	.001	6.71	.21	269

Note: B values are interpreted as the differences between the ethnic groups in original standard score metric (mean = 100 and SD of 15).

these analyses, after controlling for key demographic variables across the groups.

3.2. Matched pair samples

The second approach to control for potentially confounding demographic variables between the two groups called for pair-wise matching on age, gender, region, community setting, parental education, and classroom placement. Linear regression analyses were performed to identify the extent to which ethnic group classification accounted for differences in PASS and Full Scale scores. Table 6 shows that the R^2 values were close to zero across all five CAS scores (.004 to .042), which indicates that ethnic group classification accounted for only an additional 0.4% to 4.2% of variance in the CAS scores. Although statistical significance at the .01 level was indicated for Simultaneous and Successive scales the effect size, as indicated by the $R^2\Delta$ value was negligible for all CAS subscales and the Full Scale. As reported earlier on the multiple regression analyses with the representative sample ethnic group was not responsible for large CAS score differences between Hispanic and non-Hispanic children and adolescents.

Achievement standard score means, SDs, and Pearson correlations with the CAS Full Scale scores are provided in Table 7 by ethnic group classification. Correlations between CAS and achievement were similar across groups. Overall, the correlations ranged from .38 to .68. The median correlations for Hispanics and non-Hispanics on the Achievement Clusters were .49 and .64, respectively. Table 7 also shows slope analysis using moderated regression analyses to test for interaction effects (Aguinis, 2004; Jaccard et al., 1990). There were no significant interaction effects between CAS Full Scale and achievement subscales for Hispanic and non-Hispanic children as seen from the negligible and non significant ($p > .01$) $R^2\Delta$ change associated with the interaction effect for each of these analyses.

4. Discussion

The two main aims of this study were to examine the performance of Hispanic and non-Hispanic children on PASS cognitive processes using the CAS and to assess the relationships between PASS and achievement for samples of Hispanic and non-Hispanic children. To adequately study these questions we examined the differences between groups that are nationally representative and in addition used two complementary analytic methodologies that maximized the sample size (using the entire representative groups and statistically controlling for demographic differences) and minimized demographic differences between the samples (using smaller groups selected so that they were matched on demographic variables). We used these matching methods because our goal was to compare children by Ethnic group classification while controlling for the possible effects of demographic variables (e.g., age, sex, geographic region, parental education levels). The results of these three

Table 7
Means and SDs for achievement variables, correlations between CAS full scale scores and WJ—R achievement scores by ethnicity, and moderated regression analyses (matched sample)

	Hispanics				Non-Hispanics				Difference		
	Mean	SD	n	r^a	Mean	SD	n	r^a	p	$R^2\Delta$	$F\Delta$
Broad Reading	97.61	15.07	96	.50	102.87	16.05	67	.66	.25	.006	1.35
Basic Reading	95.53	14.19	96	.49	101.79	17.00	67	.59	.24	.007	1.38
Reading Comprehension	99.53	15.18	96	.38	102.85	14.89	65	.66	.16	.010	2.02
Broad Mathematics	97.36	19.06	96	.45	101.16	16.73	67	.51	.99	.000	0.00
Basic Mathematics	97.28	17.70	96	.39	99.99	14.31	67	.51	.95	.000	1.01
Math. Reasoning	96.60	18.54	96	.65	104.13	17.02	67	.61	.77	.000	0.09
Basic Writing Skills	90.24	16.57	95	.57	94.61	14.62	64	.66	.96	.000	0.00
Skills	93.02	16.43	95	.62	99.87	15.02	67	.68	.98	.000	0.00
Median				.49				.64			

[a] Sample sizes for the correlations differed from the samples due to missing variables; n's for Hispanics ranged from 82 to 83; for non-Hispanics 61 to 64.

examinations of group differences indicated that Hispanic and non-Hispanic samples differed by 6.1 points in the unmatched condition, 4.8 points when demographic differences were statistically controlled, and 5.1 when the differences were minimized using the matched group design. Importantly, these relatively small differences between the CAS scores earned by Hispanic and non-Hispanic groups did not come at the cost of reduced validity (e.g., low correlations between the CAS and achievement); in fact the correlations between the PASS scales and achievement for Hispanic and non-Hispanic are substantial and not significantly different. Moreover, in each of the three contrast conditions, when the Ethnic groups were compared the results suggest that Hispanic and non-Hispanic samples performed similarly on the PASS processing scales. These results support Fagan's (2000) and Suzuki and Valencia's (1997) expectations that differences between Hispanic and non-Hispanic children would be relatively small when ability is measured using tests of basic psychological processes like those found on the CAS. These findings further support Fagan's (2000) argument that measuring intelligence using tests of cognitive processing could yield smaller differences between groups and retain strong relationships to achievement.

The between group differences found for the CAS Full Scale scores in the representative and matched Hispanic and non-Hispanic samples are similar to CAS findings reported by Naglieri, Rojahn, Matto, and Aquilino (2005) for Blacks and Whites. The differences are also smaller than differences found between these groups on traditional IQ tests (Fagan, 2000; Suzuki & Valencia, 1997) but a direct comparison of tests like that reported by Naglieri and Rojahn (2001) is needed to further examine this issue. These findings are, however, further supported by previous research by Naglieri (1986) who found only small differences between minority and White children on the Kaufman Assessment Battery for Children (Kaufman and Kaufman, 1983).

The four PASS psychological processes measured by the CAS offer a way to conceptualize and measure intelligence which yielded small differences between Hispanic and non-Hispanic children in this study as well as between Black and White children as reported by Naglieri et al. (2005). These findings have important implications for assessment of children who may warrant special educational services. For example, as suggested by Naglieri and Rojahn (2001) use of the PASS theory as measured by the CAS could result in fewer minority children being identified as having mental retardation, and perhaps help address the problem of their over-representation in special education (Oswald, Coutinho, Best, & Singh, 1999). Naglieri and Rojahn (2001) compared WISC-III and CAS scores and found that the PASS processing approach classified a smaller portion of Black children as having mental retardation than the WISC-III. They also found that if CAS scores were used for determination of mental retardation the number of minority children identified would have been reduced by about 30%. Naglieri and Rojahn (2001) attributed the different classification rates to the verbal and academic content included in the WISC-III because the Black children in their sample earned lower Verbal than Performance scores and lower Verbal scores than the White sample of children with mental retardation. Their finding logically applies to Hispanic children particularly because of the low achievement levels of this group and the relationship found between parental education and vocabulary scores. Their data, in conjunction with the present results, suggest that using the PASS theory as operationalized by the CAS may yield small mean score differences as suggested by Fagan (2000) and Suzuki and Valencia (1997). Importantly, the small mean score differences between the Ethnic group classifications did not appear to come at the cost of reduced validity to correlate with achievement test scores. That is, the magnitude of the relationships between the PASS and Full Scale with achievement reported in this study were not significantly different between Hispanic and non-Hispanic samples and were consistent with correlations found between traditional IQ tests and achievement (Naglieri, 1999; Naglieri & Bornstein, 2003; Ramsey & Reynolds, 2004). These correlations suggest that the smaller mean score differences between the Hispanic and non-Hispanic groups may not come at the cost of lower validity and that the psychological processes included in the PASS theory have relevance to academic test scores.

This study like any other has limitations that should be considered. For instance, no measure of both English and Spanish language skills for each of these Hispanic children was available. Future research should include such measurement and children with varying degrees of limited English and Spanish language skills. This is particularly important because of the increasing numbers of Hispanic children in the U.S. population (Ramirez & de la Cruz, 2002). Second, although the present results can be compared to findings for traditional IQ tests, a direct test of the differences between groups using CAS and a traditional IQ test was not conducted (as it was by Naglieri & Rojahn, 2001). Future studies that compare race and Ethnic groups on these tests should include both approaches given to all samples. A third possible limitation that may be raised is that the PASS theory yields smaller differences between Hispanic and non-

Hispanic samples because crystallized ability was not measured. This argument is circular and therefore flawed for at least two reasons. First, the concept of crystallized ability as a component of intelligence is confounded by measures that involve knowledge (e.g., achievement) which has been rejected by advocates of the processing approach to intelligence (Fagan, 2000; Naglieri and Das, 2005). Second, the data presented here and by others (Naglieri, 1999; Naglieri & Bornstein, 2003; Ramsey & Reynolds, 2004) have shown that measures of processing that do not include achievement laden tests of, for example vocabulary and arithmetic, can have reduced racial and ethnic group differences and demonstrate good predictive validity (e.g., correlations to achievement). Similarly, Kaufman and Kaufman (2004) recognized the problem of using "measures of acquired knowledge/crystallized ability (p. 4)" and they recommend it *not* be used when assessing minority children. These findings question the desirability of measuring ability using a crystallized intelligence perspective particularly for children with limited English language and academic skills.

Despite the limitations of this study, the present results, particularly in conjunction with previous findings suggest that redefining intelligence in terms of PASS cognitive processes may reduce the differences between majority and minority groups as suggested by Fagan (2000) and provide a comprehensive way to conceptualize and measure ability. The results reported here and by Naglieri, Rojahn, Matto and Aqulino (2005) also suggest that traditional IQ test questions that have academic-like content can be eliminated from a test of ability without the loss of predictive validity and at the same time may result in a more equitable system for evaluating diverse populations of children. Thus, while the success of traditional IQ measures was largely based on the two principal advantages of predictive validity and ease of administration (Deary, Austin, & Caryl, 2000) these goals may also be achieved using a processing approach to intelligence as suggested by Fagan (2000) and Naglieri (1999) with the added advantage of reduced racial differences. There is, therefore, growing evidence that a processing approach to intelligence (e.g., the PASS theory as measured by the CAS) may be very appropriate for assessment of culturally and linguistically diverse populations (Fagan, 2000; Suzuki & Valencia, 1997).

References

Aguinis, H. (2004). *Regression analysis for categorical moderators.* New York: The Guilford Press.

Bracken, B. A., & McCallum (1997). *Universal nonverbal intelligence test.* Itasca, IL: Riverside.

Ceci, S. J. (2000). So near and yet so far: Lingering questions about the use of measures of general intelligence for college admission and employment screening. *Psychology, Public Policy, and Law*, *6*, 233−252.

Cohen, J. (1988). *Statistical power analysis for the behavioral sciences* (2nd ed.). San Diego, CA: Academic Press.

Das, J. P. (2002). A better look at intelligence. *Current Directions in Psychology*, *11*, 28−32.

Das, J. P., Naglieri, J. A., & Kirby, J. R. (1994). *The assessment of cognitive processes: The PASS theory of intelligence.* Boston: Allyn and Bacon.

Deary, I. J., Austin, E. J., & Caryl, P. G. (2000). Testing versus understanding human intelligence. *Psychology, Public Policy, and Law*, *6*, 180−190.

Eslinger, P. J. (1996). Conceptualizing, describing, and measuring components of executive function: A summary. In G. R. Lyon & N.A. Krasnegor (Eds.), *Attention, memory and executive function* (pp. 367−396). Baltimore: Brookes.

Fagan, J. R. (2000). A theory of intelligence as processing: Implications for society. *Psychology, Public Policy, and Law*, *6*, 168−179.

Goldberg, E. (2001). *The executive brain: Frontal lobes and the civilized mind.* New York: Oxford University Press.

Graham, F. K., & Kendall, B. S. (1960). Memory-for-designs test: Revised general manual. *Perceptual and Motor Skills*, *11*, 147−188.

Hayes, S. C., Gifford, E. B., & Ruckstuhl, L. E. (1996). Relational frame theory and executive function: A behavioral approach. In G. R. Lyon & N.A. Krasnegor (Eds.), *Attention, memory and executive function* (pp. 279−306). Baltimore: Brookes.

Jensen, A. R. (1998). *The g factor: The science of mental ability.* Westport, Connecticut: Praeger.

Kaufman, A. S., & Kaufman, N. L. (1983). *Kaufman assessment battery for children.* Circle Pines, MN: American Guidance Service.

Kaufman, A. S., & Kaufman, N. L. (2004). *Kaufman assessment battery for children*, Second edition Circle Pines, MN: American Guidance Service.

Jaccard, J., Turrisi, R., & Wan, C. K. (1990). *Interaction effects in multiple regression.* Newbury Park, CA: Sage Publications.

Lezak, M. (1995). *Neuropsychologcial assessment* (Third edition). New York: Oxford.

Luria, A. R. (1966). *Human brain and psychological processes.* New York: Harper and Row.

Luria, A. R. (1973). *The working brain.* New York: Basic Books.

Luria, A. R. (1980). *Higher cortical functions in man* (2nd ed.). New York: Basic Books.

Luria, A. R. (1982). *Language and cognition.* New York: Wiley.

Matarazzo, J. (1992). Psychological testing and assessment in the 21st century. *American Psychologist*, *47*, 1007−1018.

Naglieri, J. A. (1986). WISC-R and K-ABC comparison for matched samples of Black and White children. *Journal of School Psychology*, *24*, 81−88.

Naglieri, J. A. (1997). *Naglieri nonverbal ability test.* San Antonio: The Psychological Corporation.

Naglieri, J. A. (1999). *Essentials of CAS assessment.* New York: Wiley.

Naglieri, J. A. (2002). Best practices in interventions for school psychologists: A cognitive approach to problem solving. In A. Thomas & J. Grimmes (Eds.), *Best practices in school psychology* (pp. 1373−1392). (4th ed.). Bethesda, MD: National Association of School Psychologists.

Naglieri, J. A. (2003). Current advances in assessment and intervention for children with learning disabilities. In T. E. Scruggs & M.A. Mastropieri (Eds.), *Advances in learning and behavioral disabilities Volume 16: Identification and assessment* (pp. 163−190). New York: Reed Elsevier.

Naglieri, J. A. (2005). The cognitive assessment system. In D. P. Flanagan & P.L. Harrison (Eds.), *Contemporary intellectual assessment* (pp. 441−460). (Second edition). New York: Guilford.

Naglieri, J. A., & Bornstein, B. T. (2003). Intelligence and achievement: just how correlated are they? *Journal of Psychoeducational Assessment*, *21*, 244−260.

Naglieri, J. A., & Das, J. P. (1997). *Cognitive Assessment System.* Itasca IL: Riverside.

Naglieri, J. A., & Das, J. P. (2005). The PASS theory. In D. P. Flanagan & P.L. Harrison (Eds.), *Contemporary intellectual assessment* (pp. 120−135). (2nd ed.). New York: Guilford.

Naglieri, J., & Ford, D. Y. (2003). Addressing under-representation of gifted minority children using the Naglieri Nonverbal Ability Test (NNAT). *Gifted Child Quarterly*, *47*, 155−160.

Naglieri, J. A., & Rojahn, J. (2001). Evaluation of African–American and White children in special education programs for children with mental retardation using the WISC-III and Cognitive Assessment System. *American Journal of Mental Retardation*, *106*, 359−367.

Naglieri, J. A., & Ronning, M. E. (2000). Comparison of White, African–American, Hispanic, and Asian children on the Naglieri Nonverbal Ability Test. *Psychological Assessment*, *12*, 328−334.

Naglieri, J. A., & Ronning, M. E. (2000). The relationships between general ability using the NNAT and SAT Reading Achievement. *Journal of Psychoeducational Assessment*, *18*, 230−239.

Naglieri, J. A., Rojahn, J. R., Matto, H. C., & Aquilino, S. A. (2005). Black White differences in intelligence: A study of the PASS theory and Cognitive Assessment System. *Journal of Psychoeducational Assessment*, *23*, 146−160.

Oswald, D. P., Coutinho, M. J., Best, A. M., & Singh, N. N. (1999). Ethnic representation in special education: The influence of school-related economic and demographic variables. *Journal of Special Education*, *32*, 194−206.

Penrose, L. S., & Raven, J. C. (1936). A new series of perceptual tests: Preliminary communication. *British Journal of Medical Psychology*, *16*, 97−104.

Posner, M. I., & Boies, S. J. (1971). Components of attention. *Psychological Review*, *78*, 391−408.

Ramirez, Roberto R., & de la Cruz, G. Patricia (2002). The hispanic population in the United States: March 2002. *Current population reports, P20-545* Washington DC: U.S. Census Bureau.

Ramsey, M. C., & Reynolds, C. R. (2004). Relations between intelligence and achievement tests. In G. Goldstein & S. Beers (Eds.), *Comprehensive handbook of psychological assessment* (pp. 25−50). New York: John Wiley.

Raven, J. C. (1956). *Guide to using progressive matrices.* London: H.K. Lewis.

Roid, G. (2003). *Stanford-Binet* (Fifth edition). Itasca, IL: Riverside.

Schneider, W., Dumais, S. T., & Shiffrin, R. M. (1984). Automatic and controlled processing and attention. In R. Parasuraman & D.R. Davies (Eds.), *Varieties of attention* (pp. 1−28). New York: Academic Press.

Sternberg, R. J. (1988). *The triarchic mind: A new theory of human intelligence.* New York: Viking.

Suzuki, L. A., & Valencia, R. R. (1997). Race–ethnicity and measured intelligence. *American Psychologist*, *52*, 1103−1114.

Wechsler, D., & Naglieri, J. A. (2006). *Wechsler Nonverbal Scale of Ability.* San Antonio: Harcourt Assessment.

Winsler, A., & Naglieri, J. A. (2003). Overt and covert verbal problem-solving strategies: Developmental trends in use, awareness, and relations with task performance in children age 5 to 17. *Child Development*, *74*, 659−678.

Woodcock, R. W., & Johnson, M. B. (1989). *Woodcock–Johnson revised tests of achievement: Standard and supplemental batteries.* Itasca, IL: Riverside.