

Factor Structure of the Wechsler Intelligence Scale for
Children-Fourth Edition among Students with Attention Deficit

Hyperactivity Disorder

by

Michelle Boehm

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Graduate Supervisory Committee:

Marley Watkins, Chair
Amanda Sullivan
Linda C. Caterino

ARIZONA STATE UNIVERSITY

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ABSTRACT

The Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV) is one of the most popular intelligence tests used for special education eligibility purposes in the United States. Despite the large prevalence of children and adolescents with Attention Deficit Hyperactivity Disorder (ADHD), the factor structure of the WISC-IV among this population has not been explored. Thus, the factor structure of WISC-IV scores among students with ADHD was investigated via replicatory factor analysis followed by a comparison with the factorial structure of the normative sample using the coefficient of congruence. The four factor model proposed by Wechsler was consistent with the factor structure found in the sample of students with ADHD for all subtests except Picture Concepts and Matrix Reasoning. The Verbal Comprehension and Processing Speed factors appeared to measure the same construct in the study sample as in the normative sample, while the Perceptual Reasoning and Working Memory factors were only fairly similar to the normative sample. It is recommended that clinicians interpret Perceptual Reasoning and Working Memory index scores of students with ADHD cautiously. Limitations of the study, future directions for research, and implications for practitioners are discussed.

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Chapter 1

BACKGROUND

More than one million students in the United States each year are administered intelligence tests for special education eligibility purposes (Gresham & Witt, 1997), and surveys taken by clinical and school psychologists have consistently demonstrated that the Wechsler scales are the most commonly used intelligence tests in the United States (Goh, Teslow, & Fuller, 1981; Hutton, Dubes, & Muir, 1992; Stinnett, Havey, & Oehler-Stinnett, 1994; Watkins, Campbell, Nieberding, & Hallmark, 1995). The Wechsler Intelligence Scale for Children-Fourth Edition (WISC-IV; Wechsler, 2003a) is the most current version of the Wechsler intelligence scales for children and, like previous versions, is likely to be a popular intelligence battery used in the psychological assessment of children and adolescents (Whitaker, 2008). Among the children for whom intelligence tests are commonly used are those with Attention Deficit Hyperactivity Disorder (ADHD), with 8% of children between the ages of 3 and 17 receiving this diagnosis in 2008 (Bloom, Cohen, & Freeman, 2009).

The *WISC-IV Technical and Interpretive Manual* (2003b) indicates that the theoretical foundation of the WISC-IV was influenced by the three-stratum theory of Carroll (1993, 2003), and that this theoretical underpinning should be taken into consideration when interpreting test scores and making recommendations. According to Carroll, cognitive abilities can be divided into three separate strata based on breadth of coverage: A lower-order stratum of approximately 50 or 60 linearly independent narrow abilities, a second stratum of

approximately 8 to 10 linearly independent broad abilities, and a third and highest stratum of *g*, which represents general intellectual ability. The three level structure of the WISC-IV is similar to Carroll's model, consisting of 15 subtests, four composite index scores, and a Full Scale IQ score.

Establishing the construct validity, particularly the structural validity, of a measure is important because empirical analysis of a test's structure provides support for or against the test developer's assertion that the structure of the test is consistent with what it is theoretically designed to measure. Wechsler (2003b) conducted exploratory and confirmatory factor analyses with the WISC-IV normative data and found that four correlated factors, Verbal Comprehension, Perceptual Reasoning, Processing Speed, and Working Memory, best represented the intercorrelations between the 10 core WISC-IV subtests. Wechsler's factor analyses also supported the use of the WISC-IV as an adequate measure of general intelligence. The evidence for four first-order factors and a higher-order general intelligence score correspond to the factor structure proposed by Wechsler.

Other studies investigating the structure of the WISC-IV via its standardization sample have also supported the existence of a four-factor model. Watkins (2006) and Sattler (2008) found evidence supporting the existence of four first-order factors. In addition, Watkins (2006) found that the variance accounted for by *g* in each of the 10 core subtests was considerably greater than the variance accounted for by any of the four orthogonal first-order factors. Keith (2005) conducted a confirmatory factor analysis and found evidence supporting

the existence of four first-order factors within a hierarchical model where subtests were explained by first-order index factors, and these first order factors were partially explained by the second order general intelligence (*g*) factor.

Unfortunately, Wechsler (2003b) did not report factor loadings or factor correlations and did not conduct a higher order factor analysis to confirm and describe the multilevel structure of the WISC-IV. To remedy these shortcomings, Keith, Fine, Taub, Reynolds, and Kranzler (2006) investigated the structure of the WISC-IV standardization sample across ages by conducting a higher order confirmatory factor analysis. They found that the factor structure of the test was best supported by a five-factor Cattell-Horn-Carroll (Carroll, 1993; Cattell, 1941; Horn, 1965) model measuring crystallized ability (*Gc*), visual processing (*Gv*), fluid reasoning (*Gf*), short-term memory (*Gsm*), and processing speed (*Gs*), rather than the four-factor model described by Wechsler (2003b).

However, an unlikely perfect loading of 1.0 was found between the general intelligence and fluid reasoning factors. The difference between comparative fit indices (CFI) between the four-factor and five-factor models was also very small, with values of .979 and .986, respectively. According to research conducted by Chen (2007) on measurement invariance and fit indices, the CFI value difference between these models did not reach a level of practical significance. Thus, a four factor model may have been more appropriate than a five-factor model.

Determining whether the factor structure of a test holds across a variety of test takers and subgroups beyond the normative sample is imperative. Without

this information, conclusions about an individual's performance and the subsequent actions and consequences based on his or her test performance may be unfounded (American Educational Research Association, American Psychological Association, & National Council on Research in Education, 1999). To this end, Watkins, Wilson, Kotz, Carbone, and Babula (2006) examined the structural validity of the WISC-IV with a sample of Pennsylvania students referred for special education. As with data from the normative sample, factor analysis supported a model consisting of four first-order factors. Similarly, an analysis of WISC-IV scores obtained from neuropsychological evaluations at a pediatric hospital in the Southeastern United States supported a higher order four-factor model with a general intelligence factor accounting for the majority of total and common variance across subtests (Bodin, Pardini, Burns, & Stevens, 2009). Finally, the same four factor model was supported in a confirmatory factor analysis conducted with 355 students referred for special education in 34 states (Watkins, 2010). These results further supported the existence of a higher order four-factor model, with a general intelligence factor accounting for the majority of common and total variance.

Several studies examining the factor structure of the Wechsler Intelligence Scale for Children-Third Edition (WISC-III; Wechsler, 1991a) with clinical and referral samples have also been conducted. A four factor model proposed by Wechsler (1991b) consisting of Verbal Comprehension, Perceptual Organization, Freedom From Distractibility, and Processing Speed factors was supported in a special education sample (Konold, Kush, & Canivez, 1997), a mixed clinical

sample (Tupa, Wright, & Fristad, 1997), and in a sample of 45 children with a clinical diagnosis of ADHD (Schwean, Saklofske, Yackulic, & Quinn, 1993). Alternatively, a five factor model consisting of the factors Verbal Comprehension, Constructional Praxis, Visual Reasoning, Freedom from Distractibility, and Processing Speed was supported in a mixed clinical sample including children with ADHD (Burton, Sepehri, Hecht, Vandenbroek, Ryan, & Drabman, 2001). The authors suggested that Wechsler had neglected to find this five factor model due to a failure to include more complex models in his analyses.

Researchers have also looked more specifically at the WISC-III performance of children and adolescents with ADHD in comparison to other groups. For example, Schwean et al. (1993) reported that a sample of children with ADHD scored significantly lower on the Processing Speed and Freedom from Distractibility factors and Verbal Intelligence Quotient and significantly higher on the Perceptual Organization Index compared to the standardization sample. On the other hand, Egeland, Sundberg, Andreassen, and Stensli (2006) found that children with ADHD did not perform worse on the Processing Speed and Freedom from Distractibility factors compared to other clinical groups on a Norwegian translation of the WISC-III and subsequently warned against its clinical utility in making diagnostic decisions.

Fewer studies have examined the factor structure of the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) in clinical samples. In a comparison of a sample of children diagnosed with ADHD with other clinical groups using a Dutch version of the WISC-R, the scores of the

subgroup with ADHD were best supported by a three factor model including the factors Perceptual Organization, Verbal Comprehension, and Freedom from Distractibility (Rispen, Swaab, van den Oord, Cohen-Kettenis, van Engeland, & van Yperen, 1997). Furthermore, the subgroup with ADHD achieved lower scores on the Performance IQ and Full Scale IQ in comparison to overall mean performance and lower on the Freedom from Distractibility factor in comparison to other diagnostic groups.

Despite research conducted on the structural validity of the WISC-III and WISC-R, these results are difficult to generalize to the WISC-IV due to considerable alterations made to both the content and structure of the test during its revision. Three WISC-III core subtests were removed in its revision and five new core subtests were added, decreasing the test's emphasis on problem solving ability and increasing its emphasis on fluid reasoning and working memory (Kaufman, Flanagan, Alfonso, & Mascolo, 2006). In addition, two core subtests in the WISC-III are now supplemental subtests in the WISC-IV. Other changes included removing the Verbal IQ (VIQ), and Performance IQ (PIQ) and renaming the Freedom from Distractibility Index (FDI) to the Working Memory Index (WMI).

Although a four-factor structure has been established with the WISC-IV standardization sample (Keith, 2005; Sattler, 2008; Watkins, 2006) samples of students referred for special education (Watkins, 2010; Watkins et al., 2006), and a clinical sample of students participating in a neuropsychological evaluation in the Southeastern U.S. (Bodin, et al., 2009), more information about the structure of

the WISC-IV among a variety of clinical samples is needed (Strauss, Sherman, & Spreen, 2006). Among the clinical samples for which the WISC-IV factor structure has yet to be investigated are children with ADHD. The high prevalence rate of ADHD among children in conjunction with the popularity of the WISC-IV in making special education eligibility decisions (Gresham & Witt, 1997) underscores the importance of utilizing a valid assessment tool with this particular group of students. Consequently, the purpose of this study is to investigate the structural validity of the WISC-IV among students with ADHD.

Chapter 2

METHOD

Participants

Following IRB and district approval, anonymous scores from WISC-IV test administrations were collected by graduate students from 3,086 psychology files in two school districts in a large city in the Southwestern region of the United States. One hundred eighty-four children (55 female and 129 male) between the ages of 6 and 16 years ($M = 10.2$, $SD = 2.6$) served as participants, with 102 children attending school district one and 82 children attending school district two at the time of WISC-IV administration.

All participants had been administered the WISC-IV as part of an evaluation for special education services and were placed in special education under the category Other Health Impairment-ADHD. All students with listed secondary diagnoses were excluded from this sample, but actual co-morbidity of participants is unknown. Test scores on norm referenced achievement measures (e.g., Wechsler Individual Achievement Test-Second Edition, 2001, Woodcock-Johnson III Tests of Achievement, 2001) were also collected when available, with an average participant Total Reading score of 95.4 ($SD = 11.7$) and an average Total Math score of 93.6 ($SD = 13.4$). The ethnic background of participants was 79.3% White, 10.3% Hispanic, 4.3% Black, .5% Asian/Pacific Islander, .5 % American Indian, and 4.9% not specified. To preserve student privacy, no other demographic information was collected on individual students.

School district demographic information was obtained from each school district's website and the Arizona Department of Education (ADE; 2011) website. School district one is located in an urban area with a current enrollment of approximately 33,500 students. It consists of 31 elementary schools, 8 middle schools, and 6 high schools. The ethnic composition for the 2009-2010 school year was 67.2% White, 23.8% Hispanic, 4.0% Black, 3.9% Asian, and 1.1% Native American. According to a March 2011 report from the ADE, 32.8% of students were eligible for free or reduced lunch. School district two is located in a suburban region and currently serves approximately 26,000 students. It consists of 16 elementary schools, 3 K-8 schools, 6 middle schools, 5 high schools, and 1 alternative school. In 2010 the ethnic composition of the population living within the boundaries of the school district was 83.1% White, 10.5% Hispanic, 2.9% Asian, 1.7% Black, .6% Native American, and 1.2% Other. According to the ADE, 26.6% of students were eligible for a free or reduced lunch in 2011.

Instrument

The Wechsler Intelligence Scale for Children-Fourth Edition (Wechsler, 2003a) is an individually administered intelligence test for children of ages 6 years, 0 months through 16 years, 11 months. It is the newest version of the Wechsler child series and was revised based on the WISC-III. The WISC-IV was standardized on 2,200 children who were selected to serve as a representative sample of children from the United States. The standardization sample closely corresponded with the composition of the 2000 United States census data on

characteristics including race, sex, level of parent education (socioeconomic status), and geographic region (Sattler, 2008).

The WISC-IV contains 10 core subtests (Block Design, Similarities, Digit Span, Matrix Reasoning, Coding, Vocabulary, Letter-Number Sequencing, Symbol Search, Comprehension, and Picture Concepts) and 5 supplementary subtests (Information, Word Reasoning, Picture Completion, Arithmetic, and Cancellation) with standard score means of 10 and standard deviations of 3. The 10 core subtests combine to form four composite index scores ($M = 100$, $SD = 15$): verbal comprehension (VCI), perceptual reasoning (PRI), working memory, and processing speed (PSI). The Full Scale IQ (FSIQ) represents general intelligence and is derived from the sum of the 10 core subtest scores.

The *WISC-IV Technical and Interpretive Manual* (2003b) reports excellent test-retest reliability and adequate to excellent internal consistency for the WISC-IV (Hunsley & Mash, 2008). For example, test-retest reliability coefficients for the four indices (with a mean test interval of 32 days) ranged from .86 to .93, with a FSIQ test-retest reliability coefficient $> .90$. The average internal reliability coefficients for the four indices ranged from .88 to .94, and the FSIQ internal reliability coefficient was .97. Internal consistency coefficients for individual subtests ranged from .79 (Cancellation and Symbol Search) to .90 (Letter Number Sequencing).

The criterion validity properties of the WISC-IV have been demonstrated by examining its convergent validity with measures of general intelligence from other Wechsler scales. The WISC-IV is highly correlated with the FSIQs of the

Wechsler Adult Intelligence Scale-Third Edition (WAIS-III; Wechsler, 1997) with a correlation of .89, the Wechsler Preschool and Primary Scale of Intelligence-Third Edition (WPPSI-III; Wechsler, 2002) with a correlation of .89, the WISC-III with a correlation of .89, and the Wechsler Abbreviated Scale of Intelligence (WASI; 1999) with a correlation of .86. The WISC-IV is also highly correlated with achievement measures such as the Wechsler Individual Achievement Test (WIAT-II; Wechsler, 2001), with a correlation of .87 between respective FSIQ and Total Achievement indices. In addition, a comparison of WISC-IV index scores has revealed its convergent and discriminant validity properties. The Verbal Comprehension index, for example, has an average correlation of .83 with other Wechsler measures of verbal intelligence. At the same time, correlations between the VCI and other indices measuring different constructs are lower (e.g., an average correlation of .61 with measures of perceptual abilities).

Analysis

The statistical treatment in this study was consistent with the replicatory factor analysis (RFA) procedure described by Ben-Porath (1990). RFA involves applying exploratory factor analytic techniques identical to those employed in the original study, including extracting the same number of factors and rotating them to replicate the original solution as closely as possible. As noted by Geisinger (2003), this is a form of cross validation. Pattern coefficients $\geq .30$ were considered salient and practically significant (Stevens, 2002). Pattern coefficients were also interpreted using a method appropriate for small samples as described

by Stevens, in which the standard error of the pattern coefficient is doubled and then used as a critical value for statistical significance.

Following these RFA procedures, a principal axis extraction method with two iterations was conducted followed by promax oblique rotation as described in the *WISC-IV Technical and Interpretive Manual* (2003b). Next, a direct comparison was made between the factorial structures found in the normative and study samples (Ben-Porath, 1990) with the coefficient of proportionality (van de Vijver & Leung, 2007) also known as Tucker's coefficient of agreement or Tucker's coefficient of congruence (Guadagnoli & Velicer, 1991; Lorenzo-Seva & ten Berge, 2006; Tucker, 1951). According to rules of thumb suggested by Lorenzo-Seva and ten Berge (2006) derived from an analysis of factorial similarity ratings of 56 judges experienced in factor analysis, coefficient values $\geq .95$ are interpreted as evidence of factorial similarity, values in the range of .85-.94 are interpreted as evidence of fair factorial similarity, and values $< .85$ are indicative of a lack of similarity between factors. The coefficient of congruence was calculated using the Coefficient of Congruence software developed by Watkins (2002).

Chapter 3

RESULTS

With the exception of the Picture Concepts subtest, the mean subtest, factor, and general intelligence scores in this sample of students with ADHD were lower than the normative sample (see Table 1). Lower subtest, factor, and general intelligence scores have also been found in other research examining the factor structure of the WISC-IV among referred students (Watkins, 2010; Watkins et al., 2006). The distribution of scores in the study sample appeared to be relatively normal, with the largest skew value at .70 and the largest kurtosis value at 1.70.

To assess the factorability of the correlation matrix, the Kaiser-Meyer-Olkin measure of sampling adequacy (KMO; Kaiser, 1974) and Bartlett's Test of Sphericity (Bartlett, 1950) were conducted. Bartlett's Test of Sphericity indicated that the correlation matrix was not random ($\chi^2 = 570.72, df = 45, p < .001$) and a KMO statistic of .85 was higher than the minimum standard value proposed by Tabachnick and Fidell (2007). Therefore, it was determined that the correlation matrix was adequate for factor analysis.

Factor intercorrelations ranging from .53 between the PR and PS factors to .67 between the VC and WM factors were indicative of a second-order factor. However, the four factor model proposed by Wechsler was consistent with the factor structure found in the sample of students with ADHD for all subtests except Picture Concepts, that failed to load saliently on any single factor (see pattern and structure coefficients in Tables 2 and 3). All salient pattern coefficients also exceeded the approximate critical value for statistical significance (.38)

recommended by Stevens (2002), indicating that they were not attributable to chance. Although Picture Concepts did not approach a level of salience or statistical significance on the PR factor (.09), it approached a level of salience on the WM and PS factors (.28 and .25, respectively). Furthermore, the Matrix Reasoning subtest loaded strongly not only on the expected PR factor (.56) but on the WM factor (.29) as well.

Based on pattern coefficients of the normative and study sample (see Table 2), the coefficient of congruence was +1.0 for the VC factor, +.91 for the PR factor, +.92 for the WM factor, and +.96 for the PS factor. Thus, the VC and PS factors in the sample with ADHD represented good to excellent factorial similarity while the PR and WM factors were fairly similar to the normative sample based on the rules of thumb suggested by Lorenzo-Seva and ten Berge (2006).

Chapter 4

DISCUSSION

An RFA of the WISC-IV scores of a sample of 184 school children and adolescents with ADHD was conducted using the same procedures used with the normative sample as reported in the *WISC-IV Technical and Interpretive Manual* (2003b). Results indicated that a four factor model was also appropriate for children and adolescents with ADHD, and that the VC and PS factors appeared to measure the same construct in the normative sample as in this sample of children and adolescents with ADHD. However, the PR and WM factors in this sample of students with ADHD were only fairly similar to the normative sample, with a failure to achieve strong factorial similarity most notably due to the Picture Concepts and Matrix Reasoning subtests. While these two subtests were expected to load strongly solely on the PR factor, the factor loadings of both subtests approached a level of salience (i.e., $\geq .30$) on the WM factor (.28 and .29, respectively).

According to Barkley (1997), ADHD is a disorder defined primarily by underlying deficits in behavior inhibition and executive functioning. These deficits result in secondary impairments in other areas including working memory, with implications including poor impulse control, difficulty using forethought and planning to solve problems, and diminished success persisting in goal-directed behavior due to internal and external disruptions within the environment. The Picture Concepts subtest requires the child to match pictures in multiple rows based on similar characteristics. The nature of the Picture Concepts

task and deficits in working memory identified by Barkley might have resulted in impulsive answer selection among the participants with ADHD in this study. Thus, this is a plausible explanation as to why Picture Concepts failed to load saliently on the Perceptual Reasoning factor and approached a level of salience on the Working Memory factor.

Like studies examining the factor structure of the WISC-IV normative sample (Keith, 2005; Watkins, 2006) samples of children and adolescents referred for special education (Watkins, 2010; Watkins et al., 2006) and a mixed clinical sample receiving a neuropsychological evaluation (Bodin et al., 2009), a factor analysis with a sample of children and adolescents with ADHD also suggested that a four-factor model consisting of Verbal Comprehension, Perceptual Reasoning, Working Memory, and Processing Speed factors is appropriate. High intercorrelations between the four factors was also consistent with previous research on the WISC-IV (Bodin et al., 2009; Keith, 2005; Watkins, 2006; Watkins, 2010; Watkins et al., 2006) and Carroll's (2003) three stratum theory, providing further evidence supporting the existence of a second-order general intelligence factor. Participants with ADHD in this study achieved lower scores than the normative sample on the full scale and four index factor scores; a consistent finding with other studies examining the WISC-IV scores among students referred for special education (Watkins, 2010; Watkins et al., 2006).

There were several limitations of this study. The psychology files from which test scores were obtained did not contain information regarding ADHD diagnostic subtype (i.e., ADHD-Inattentive, ADHD-Hyperactive/Impulsive, or

ADHD-Combined). Therefore, it is impossible to determine if there were group differences in WISC-IV test performance based on ADHD subtype. Additionally, it is unknown whether or not participants were taking medication for ADHD at the time of testing and how this might have affected their performance and subsequent test scores. However, previous research has demonstrated that WISC-III subtest and factor scores of children with ADHD taking methylphenidate (Ritalin) did not significantly differ from children with ADHD in a placebo condition (Schwean et al., 1993). Based on these findings, researchers have suggested that methylphenidate would similarly not impact test performance on the WISC-IV (Schwean & Saklofske, 2005). However, the effects of other ADHD medication other than Ritalin on test performance have not been determined. Additional research is needed to determine how characteristics such as medication and ADHD subtype affects performance on the WISC-IV. In addition, only core subtests were included in the factor analysis for this study. Thus, further research is needed in order to discern how the factor structure of the WISC-IV supplemental subtests among children with ADHD compares with the normative sample.

Although Streiner (1994) and Kline (1991) suggested that a sample size of at least 100 subjects is desirable when analyzing data using exploratory factor analysis, this study would have benefited from a larger number of participants. Additional research with a larger sample of children and adolescents with ADHD should be conducted in order to determine if the findings of this study are replicable. Finally, it should be noted that the coefficient of congruence as a

measure of factorial similarity is only appropriate in making broad, global comparisons across groups. Therefore, this statistical measure is “not accurate enough to identify anomalous items and subtle differences in the factorial composition and meaning across groups” (Van de Vijver & Leung, 1997, p. 93).

Despite these limitations, this study provides initial evidence supporting the structural validity of the WISC-IV among students with ADHD and for the use of the WISC-IV in conducting psychoeducational evaluations with this particular subgroup. Results support interpreting scores of students with ADHD based on the same four-factor model that has been proposed for use with the general population by Wechsler (2003b). An analysis of coefficients of congruence also provides preliminary evidence that specific constructs of intelligence, namely verbal comprehension and processing speed are measured with excellent similarity as in those in the general population while perceptual reasoning and working memory are fairly comparable. However, interpreting the performance of students with ADHD based on individual index scores should be done cautiously, particularly with the Working Memory and Perceptual Reasoning indices. Interpreting WISC-IV scores based on index score performance over the Full Scale IQ score is further discouraged based on previous research indicating that the majority of common and total variance in WISC-IV scores of referred and clinical samples of children is attributable to a general intelligence factor (e.g., Bodin et al., 2009; Watkins, 2010; Watkins et al., 2006).

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Table 1

*Descriptive Statistics for Sample of 184 Students with Attention Deficit
Hyperactivity Disorder on the Wechsler Intelligence Scale for Children-Fourth
Edition*

Component	<i>M</i>	<i>SD</i>	Skew	Kurtosis
Full Scale IQ	94.2	13.6	+.43	+.15
Verbal Comprehension Index	96.3	12.6	+.38	+.72
Perceptual Reasoning Index	98.3	14.0	+.35	-.18
Working Memory Index	92.3	12.7	+.22	+1.20
Processing Speed Index	92.9	14.7	+.07	+.03
Block Design	9.3	3.1	+.30	-.03
Similarities	9.5	2.9	+.17	-.28
Digit Span	8.7	2.7	+.57	+1.46
Picture Concepts	10.1	2.9	+.05	-.07
Coding	8.3	3.0	+.32	+.41
Vocabulary	9.4	2.5	+.18	-.20
Letter-Number Sequencing	8.8	2.6	-.24	+.18
Matrix Reasoning	9.7	3.0	+.70	+.95
Comprehension	9.4	2.7	-.10	+1.70
Symbol Search	9.1	3.0	-.20	+.46

Table 2

Pattern Coefficients and Coefficients of Congruence (rc) for the Wechsler Intelligence Scale for Children-Fourth Edition Normative Sample and Sample of 184 students with Attention Deficit Hyperactivity Disorder (ADHD)

Subtest	VC		PR		WM		PS	
	NS	ADHD	NS	ADHD	NS	ADHD	NS	ADHD
SI	.74	.71	.19	.24	-.03	-.06	-.06	-.12
VO	.84	.74	.02	.07	.03	-.03	-.02	.09
CO	.78	.69	-.11	-.24	.03	.16	.08	.03
BD	.01	.01	.66	.73	-.02	-.05	.08	-.03
PCn	.13	.09	.45	.09	.03	.29	.03	.25
MR	.00	-.08	.69	.56	.06	.29	.01	-.02
DS	.00	.05	.07	.05	.62	.63	-.06	-.07
LN	.09	.07	-.02	.01	.62	.58	.06	.03
CD	.02	-.01	-.01	-.14	-.04	-.01	.68	.77
SS	-.01	.01	.09	.23	.04	-.04	.65	.63
<i>rc</i>	+1.0		+.92		+.91		+.96	

Note. NS = Normative Sample; VC = Verbal Comprehension factor; PR = Perceptual Reasoning factor; WM = Working Memory factor; PS = Processing Speed factor; SI = Similarities; VO = Vocabulary; CO = Comprehension; BD = Block Design; PCn = Picture Concepts; MR = Matrix Reasoning; DS = Digit Span; LN = Letter-Number Sequencing; CD = Coding; SS = Symbol Search. Salient loadings $\geq .30$ in bold.

Table 3

Structure Coefficients on the Wechsler Intelligence Scale for Children-Fourth Edition for Sample of 184 Students with Attention Deficit Hyperactivity Disorder

Subtest	Factor			
	VC	PR	WM	PS
Similarities	.75	.56	.50	.37
Vocabulary	.80	.53	.55	.51
Comprehension	.67	.29	.48	.38
Block Design	.39	.68	.41	.33
Picture Concepts	.47	.46	.56	.52
Matrix Reasoning	.43	.69	.59	.40
Digit Span	.46	.45	.65	.37
Letter-Number Sequencing	.48	.44	.65	.43
Coding	.32	.25	.36	.68
Symbol Search	.47	.54	.50	.73

Note. VC = Verbal Comprehension factor; PR = Perceptual Reasoning factor; WM = Working Memory factor; PS = Processing Speed factor.

