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A Comparison of the WJ-III Test of Cognitive Abilities and the WAIS-III

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Abstract

Since the birth of the intelligence test in the early 20th century, these instruments have gone through tremendous alterations. The revision of such instruments creates an obligation of those who utilize these tests to provide empirical evidence that supports concurrent validity with additional cognitive measures. The purpose of this study is to evaluate the relationship between the Woodcock-Johnson Test of Cognitive Abilities, Third Edition and the Wechsler Adult Intelligence Test, Third Edition. Both instruments were administered to 30 college students attending a Midwest university. The previously collected data was analyzed using a Pearson Product Moment Correlation as well as a t-test, which was used to determine the mean performance for both instruments. The results indicated a high correlation between both the verbal scales and the full scale score of both tests; however, these instruments may yield significantly different scores when administered to the same student.

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A Comparison of the WJ-III Test of Cognitive Abilities and the WAIS-III.

Since the revision of the WAIS-R in 1997, little research has been done to compare the newer WAIS-III with additional cognitive measures. The most significant alterations noted are the renewed norms and the addition of three subtests. Additional changes affect the areas of administration, scoring, and raw and composite scores (Wechsler, 1997).

The revision of such an instrument creates an obligation of those who utilize the test to provide empirical evidence that supports concurrent validity with additional cognitive measures. The information provided by these comparisons is essential in the determination of instrument selection and utilization. The criteria for educational services, is largely influenced by the results of these instruments, which requires a complete and accurate understanding of each instrument's diagnostic capacity.

Since the birth of modern intelligence testing in the early 20th century, numerous cognitive measures have been developed. These measures are a continuing attempt to define the I.Q. phenomenon. Binet and Simon set the standard with the Binet-Simon scale in 1905, which was developed to determine the need for special forms of instruction among primary grade children (Boake, 2002). Since that time the use of intelligence tests has expanded to include areas from school placement, career screening, disability determination, and medical diagnosis. Due to the multiple uses of these tests, manufacturers provide revisions in order to maintain the validity of the instrument; furthermore, researchers are creating new cognitive measures in hopes of attaining a nonbiased, true representation of intellectual ability. With multiple instruments available, determining the most appropriate and reliable measure has become a quandary for examiners. However, in an attempt to ease this problem, tests are often compared on test construction and performance to determine levels of reliability and validity. Most often, newer instruments are compared to more dependable and well-known instruments, such as the Wechsler Intelligence Scales.

The Wechsler Adult Intelligence Scale set the standard in 1939 with the Wechsler-Bellevue Intelligence Scale (Wechsler, 1997) and has remained a popular measure of adult intelligence. Over the last 65 years, the Wechsler-Bellevue has undergone three revisions

resulting in the current Wechsler Adult Intelligence Scale-III. Though more than 68% of the major features of the WAIS-R remain on the WAIS-III, a substantial number of items were added (Wechsler, 1997).

The most significant change noted is the addition of the three subtests; Matrix Reasoning, Symbol Search, and Letter-Number Sequencing. Matrix Reasoning is a core subtest and a component of the Performance I.Q. The Symbol Search subtest is a supplementary subtest that can replace the Digit-Symbol-Coding subtest in administration. In addition, the Letter-Number Sequencing subtest is also a supplementary subtest than serves as an alternate to Digit Span if spoiled. Subtests that sustained the revision are: Picture Completion, Vocabulary, Digit-Symbol-Coding, Similarities, Block Design, Arithmetic, Digit Span, Information, Picture Arrangement, Comprehension, and Object Assembly. As in the WAIS-R, the subtests must be administered in a specific sequence to maintain standardization practices. Moreover, the WAIS-III provides two sets of summary scores known as the Verbal IQ and the Performance IQ. However, the WAIS-III provides another grouping of the subtests. These index scales are Verbal Comprehension, Perceptional Organization, Working Memory, and Processing Speed (Wechsler, 1997).

Dr. Richard Woodcock, in 1963, designed an instrument to accurately measure learning ability. His first test measured Visual-Auditory Learning, which was published in 1977, almost 15 years after the initial construction began (Mathers, 2001). Since that time the WJ has undergone two revisions, the Woodcock-Johnson Psycho-Educational Battery-Revised (1989) WJ-R, and the most current edition, the Woodcock-Johnson Psycho-Educational Battery-Third Edition published in 2001.These revised instruments consist of two co-normed tests. These tests include the WJ III Tests of Achievement, which measures academic achievement, and the WJ III Tests of Cognitive Abilities, deisgned to measure specific cognitive abilities. The WJ Test of Cogntive Abiliites was introduced in 1989 with the publication of the WJ-R. Studies have compared the WJTCA with numerous other cognitive measures, including the Wechsler Intelligence Scales (Gregg & Hoy, 1985).

The Woodcock-Johnson Test of Cognitive Ability is an individually administered battery of tests designed to measure specific cognitive abilities based on Cattell and Horn's Gf-Gc

theory. As in the achievement measure, the cognitive instrument contains both a standard battery and an extended battery. The standard battery is the most common and consists of subtests 1 through 10. The first ten subtests that comprise the standard battery are: Verbal Comprehension, Visual-Auditory Learning, Spatial Relations, Sound Blending, Concept Formation, Visual Matching, Numbers Reversed, Incomplete Words, Auditory Working Memory, and Visual-Auditory Learning-Delayed (Woodcock et al., 2001). The subtests are grouped into three broad cognitive areas: Verbal Ability, which is comparable the Verbal IQ of the WAIS III, Thinking Ability, which is comparable to the Performance IQ of the WAIS III, and Cognitive Efficiency. The General Intellectual Ability (GIA) score, which is an overall measure of intellectual functioning, can be derived from the standard battery or the extended battery (Woodcock et al., 2001).

The purpose of this study is to evaluate the relationship between the Woodcock-Johnson Test of Cognitive Abilities, Third Edition and the Wechsler Adult Intelligence Test, Third Edition. Although previous editions of these tests have been compared, because both instruments have been revised and updated, additional studies are needed. Gregg and Hoy (1985) compared the earlier editions of these instruments by administering both to fifty learning disabled undergraduates. The study found a correlation coefficient of .69 when comparing the WAIS-R Full Scale and the WJTCA Broad Cognitive Scale. In addition, similar findings were found by Ysseldyke, Shinn, and Epps (1981) who compared 4th graders on the WISC-R and the Tests of Cognitive Abilities from the Woodcock-Johnson Psycho-Educational Battery. They found that children with learning disabilities performed better on the WISC-R than on the WJTCA. A study by Reeve, Hall, and Zakreski (1979) found that the correlation between Full Scale scores on the Wechsler Intelligence Scale for Children, Revised and the WJTC was strong when administered to 51 learning disabled children.

However, research that compares the latest revisions of these two measures of cognitive ability has not been completed. The findings from the current study would provide valuable information in determining test selection and capacity when measuring the cognitive potential of adults.

Statistical analysis that will be used to compare each index (Broad Cognitive Area) is a Pearson Product Moment Correlation. A t-test will be used to determine the mean of each group

and determine if the performance differences between the WAIS III and the WJ IIII Test of Cognitive Ability are significant.

Method

Subjects

This study utilized data that was previously collected. The WAIS-III was administered by a school psychologist. The WJ-III Cognitive Ability Tests were administered by a learning disability specialist. The individuals in this study were college students attending a university in the Midwest. These students were being evaluated to determine if they had a specific learning disability and if they qualified for academic accommodations. Informed consent for testing was obtained per university procedures. A total of 29 students were administered these tests. The WJ-III Cognitive Ability Tests were administered first and the WAIS-III was administered 1 to 2 weeks later. The average age of these college students was 31 years, 8 months (SD = 12 years, 4 months; range = 18 years, 0 months to 51 years, 0 months).The individual's age, grade, gender, and test scores were entered into an Excel spreadsheet by a university employee who was not involved in the data collection. An ID number replaced the students' names on these spreadsheets. The researchers for this project did not have access to the original test protocols or the individuals' names.

Procedures

Pearson Product correlations and t-tests were computed to compare the WAIS III and WJ-III Test of Cognitive Ability for the overall cognitive ability and verbal ability subtests for the 29 subjects.

Hypothesis and Results

The results of the comparisons of interest are listed in Table 1, with the average (mean) score obtained on the both the WAIS III and the Woodcock-Johnson III Test of Cognitive Ability.

1. **What is the correlation between the WJ III Test of Cognitive Ability, General Intellectual Ability and the WAIS III Full Scale I.Q.?**

Results from this study yielded a Pearson-Product correlation of .82 ($p < .05$) between the WAIS-III Full Scale IQ and the WJ-III COG GIA.

2. **What is the correlation between the WJ III Test of Cognitive Ability, Verbal Ability and the WAIS III Verbal IQ?**

   Results from this study yielded a Pearson-Product correlation of .81 ($p < .05$) between the WAIS-III Verbal IQ and the WJ-III COG Verbal Ability.

Table 1. *Means, Standard Deviations, and Correlations Between the WAIS III and the Woodcock-Johnson III Test of Cognitive Ability.*

Measure	Mean	Standard Deviation	Difference between SD	Range	Correlation
WAIS III Verbal IQ	96.4	14.3	4.7	69 - 131	.81
WJ III Cog. Verbal Ability	95.9	9.6		70 - 119	
WAIS Full Scale IQ	98.2	14.7	4.6	70 - 145	.82
WJ III GIA	93.7	10.1		66 - 118	

3. **Is there a significant difference between the WJ III Test of Cognitive Ability, General Intellectual Ability and WAIS III FSIQ?**

   A t-test resulted in significant values, t (df = 28), = 2.3, $p < .05$, in means scores on the WAIS III Full Scale IQ and the WJ-III COG General Intellectual Ability (GIA).

4. **Is there a significant difference between the WJ III Test of Cognitive Ability, Verbal Ability and WAIS III Verbal IQ?**

   The -test resulted in non significant values, t (df = 28), =.30, $p < .05$, in means scores on the WAIS III Verbal IQ and the WJ-III COG Verbal Ability.

Discussion

Professionals who utilize these assessment instruments, such as school psychologists need to be aware of the diagnostic characteristics of each test. Certain assessment characteristics are viewed as beneficial in some situations, where as in other situations may not provide the specific data needed. The WAIS III is the most widely used measure of cognitive ability among adults, and is often viewed as the standard to which all other cognitive measures are compared.

Both verbal scales were highly correlated (.81), which indicates the verbal component of each test is measuring the same type of verbal ability. However, this correlation also indicates that verbal scales may yield significantly different scores when given to the same individual. A similar correlation was found between the WAIS III Full Scale IQ and the WJ III Cognitive Ability General Intellectual Ability (r = 28). Although these tests measure a similar general ability, these instruments may yield significantly different scores when administered to the same student. The average WAIS-III Full Scale IQ was significantly higher than the average GIA (df = 28), = 2.3, $p < .05$). However, the average difference, although statistically significant, was only 4.5 point. This study supports the concurrent validity of these tests meaning they predict verbal ability and general cognitive ability, but may not yield similar scores when given to the same individual.

Similar studies should be conducted with a larger sample size and more diverse sample. Additional studies should include minority and non-referred participants, as well as younger and older subjects.

References

Boake, C. (2002). From the Binet-Simon to the Wechsler-Bellevue: Tracing the History of Intelligence Testing. Journal of Clinical and Experimental Neuropsychology, 24(3), 383-405.

Gregg, N. & Hoy, C. (1985). A comparison of the WAIS-R and the Woodcock-Johnson Tests of Cognitive Ability with learning-disabled college students.

Mather, N., & Woodcock, R.W. (2001). Examiner's Manual. Woodcock-Johnson III Test of Achievement Itasca, IL: Riverside Publishing.

Reeve, R., Hall, R., & Zakreski, R. (1979). The Woodcock-Johnson Tests of Cognitive Ability: Concurrent validity with the WISC-R. *Learning Disability Quarterly, 2(2),* 63-69.

Wechsler, D. (1997). *Wechsler Adult Intelligence Scale-Third Edition.* Administration and scoring manual. San Antonio: Psychological Corporation.

Woodcock, R., McGrew, K., & Mather, N. (2001). Woodcock-Johnson III Test Review. Itasca, IL: Riverside Publishing Company.

Ysseldyke, J., Shinn, M., & Epps, S. (1981). Comparisons of the WISC-R and the Woodcock-Johnson Test of Cognitive Ability. *Psychology in the Schools, 18(1),* 15-19.