

1-1-2006

Correlations Between the WISC-IV, SB: V, and the WJ-III Tests of Achievement : Which has a better relationship with reading achievement?

Krystal Campbell

Follow this and additional works at: <http://mds.marshall.edu/etd>



Part of the [Educational Assessment, Evaluation, and Research Commons](#), and the [School Psychology Commons](#)

Recommended Citation

Campbell, Krystal, "Correlations Between the WISC-IV, SB: V, and the WJ-III Tests of Achievement : Which has a better relationship with reading achievement?" (2006). *Theses, Dissertations and Capstones*. Paper 522.

Correlations Between the WISC-IV, SB: V, and the WJ-III Tests of Achievement:
Which has a better relationship with reading achievement?

Thesis submitted to
the Graduate College of
Marshall University

In partial fulfillment of
the requirements for the degree of
Educational Specialist
in School Psychology

by

Krystal Campbell

Fred Jay Krieg, Ph.D., Committee Chairperson
Pete Prewett, Ph.D.
Stephen L. O'Keefe, Ph.D.

Marshall University

May 2006

ABSTRACT

Correlations between the WISC-IV, SB: V, and the WJ-III Tests of Achievement:
Which has a better relationship with reading achievement?

By Krystal Campbell

The relationship between the WISC-IV and the SB: V to three reading subtests on the WJ-III Tests of Achievement was used to determine which intelligence test correlates better with achievement using 22 students. Results yielded insignificant values when assessing significant relationships, comparing two correlated correlations, and significance between means. This study concludes that both intelligence tests measure reading similarly and does not result in whether or not one should be preferred over the other. Future implications to further validate these results would include a larger and more generalized population.

ACKNOWLEDGMENTS

I would first like to thank God for directing me to a profession that I truly love and believe in. Without His love and guidance, I would have been a lost soul trying to find my place, purpose, and profession in this world. He has made my educational experience as uncomplicated as possible as I let him do the guiding while being an obedient listener and follower. I know that I could not have obtained education success without Him. Along the way, He has blessed me with friends during my graduate career who will always have a special place in my heart and in my prayers.

Thanks to Dr. Pete Prewett for providing me the opportunity to work with his data and to make this thesis experience enjoyable and as less stressful as possible. He unselfishly gave up his time, direction, and knowledge to help me and other graduate students to use this thesis writing requirement as a learning experience for future use when the thought of writing for publication comes to mind. Thank you for always being available, insightful and prompt when responding to students' concerns when deadlines approach.

I am also grateful for my other committee members who have also served as my professors and mentors in the School Psychology program. Your advocacy for children and students of all ages and educational levels will forever be a quality that I embrace. You both have devoted a lot of time and hard work to prepare students for the future workplace in the school psychology profession. God blessed me to be able to enter into a program where I had the opportunity to receive instruction from two knowledgeable and caring individuals who I truly admire and respect.

TABLE OF CONTENTS

Abstract.....	ii
Acknowledgements	iii
List of Tables	v
History and Overview of the WISC	2
History and Overview of the Stanford Binet (SB)	3
History and Overview of the Woodcock-Johnson (WJ).....	4
Current and Past Research.....	5
Subjects.....	7
Procedures.....	8
Hypotheses and Results	8
Discussion and Future Implications	10
References.....	12

LIST OF TABLES

Table 1	8
Table 2	10

Correlations between the WISC-IV, SB: V, and the WJ-III Tests of Achievement:
Which has a better relationship with reading achievement?

A school psychologist often needs to choose an intelligence test that best reflects a child's intellectual abilities. This decision is important because this instrument is used to help make placement decisions that will impact the child throughout his/her academic experience. This decision is made relatively complicated because test companies have published a variety of intelligence tests that the companies believe accurately measure a child's cognitive abilities. In order for school psychologists to make an informed decision as to which intelligence test to administer, research that examines the validity and reliability of various tests is needed. For instance, knowing how well the various intelligence tests correlate with academic achievement would be important.

Two widely used intelligence tests have been the Wechsler Intelligence Scale for Children (Wechsler, 2003) and the Stanford Binet (Roid, 2003) series of intelligence test. These two tests were recently revised as the Wechsler Intelligence Scale for Children-IV and Stanford Binet:V because of the necessity to update the norms and theoretical foundations of the tests. As is typically the case with recently revised intelligence tests, research is needed to support the tests continued validity and reliability. The purpose of this study is to identify the relationship between the Full Scale Intelligence Quotient (FSIQ'S) on the Wechsler Intelligence Scale for Children-IV (WISC-IV; Wechsler,2003), Stanford Binet:V (SB:V; Roid, 2003), and academic reading subtests on the Woodcock-Johnson III Tests of Achievement (WJ-III ACH; Woodcock & Mather, 2001). Knowing the relationship between these intelligence tests and academic

achievement will help school psychologists make more informed decisions when choosing an intelligence test.

History and Overview of the WISC

During World War I, the Army Alpha was developed as a screening tool to measure whether an army recruit was intellectually capable for service. Because of a large number of illiterate recruits, the Army Beta was developed in an attempt to measure intelligence using nonverbal features. David Wechsler recognized the need to assess both verbal and nonverbal abilities because of the modifications made in the army's screening tool and soon developed the Wechsler-Bellevue Intelligence Scale in 1939 (Wechsler, 2003). According to Sattler and Dumont (2004), Wechsler developed the Wechsler Intelligence Scale for Children (WISC) as a downward extension of the adult intelligence test, called the Wechsler-Bellevue Intelligence Scale. The first edition of the WISC was published in 1949, and a revision was followed in 1974 (WISC-R). In 1991, the WISC-R was updated to the WISC-III. Although David Wechsler died in 1982, he is still cited as the author of the WISC-IV, and the Psychological Corporation has been responsible for the last two revisions. According to Wechsler (2003), the five primary revision goals of the WISC-IV was to update the instrument's theoretical foundations, enhance clinical utility, increase developmental appropriateness, improve psychometric properties, and increase user-friendliness.

To accomplish these goals, modifications have been made to the WISC-IV. Three subtests from the WISC-III were removed: Picture Arrangement, Object Assembly, and Mazes. The deletion of subtests made room for the addition of others. The WISC-IV contains five new subtests: Picture Concepts, Letter-Number Sequencing, Matrix

Reasoning, and Word Reasoning along with the Cancellation as a supplemental Processing Speed subtest. There were 10 subtests from the WISC-III that were preserved: Block Design, Similarities, Digit Span, Coding, Vocabulary, Comprehension, Symbol Search, Picture Completion, Information, and Arithmetic.

History and Overview of the Stanford Binet (SB)

The Stanford-Binet intelligence test began its journey in France when Alfred Binet and Victor Henri decided to create a project that would measure individual mental differences. The Binet-Simon Scale emerged in 1905 as the first published intelligence test (Roid, 2003). This scale was revised in 1908 and then in 1911. Lewis Terman, a follower of Binet's work, from Stanford University recognized ways to redesign and improve the Binet-Simon Scale. In 1916, these improvements were published as the *Stanford-Revision and Extension of the Binet-Simon Intelligence Scale* (Roid, 2003). This test was soon referred to as the Stanford-Binet and went under revisions in 1937, 1960, and 1972. In 1986, the publication of the Stanford-Binet Intelligence Scale: Fourth Edition (SB: IV) was developed by Thorndike, Hagen and Sattler (1986). Gale Roid published the most recent revision of the Stanford-Binet, the Stanford-Binet Intelligence Scale: Fifth Edition (SB: V), in 2003. The SB:V has maintained some of the features of previous editions as well as adding new ones.

The SB:V now has five factors as compared to four factors in the SB:IV. The five factors include Fluid Reasoning, Knowledge, Quantitative Reasoning, Visual-Spatial Processing, and Working Memory. Responding to many user requests, the SB: V brings back many of the toys and colorful manipulatives that are engaging for small children and helpful for early-childhood assessment (Roid, 2003). Also, the SB: V now incorporates

an enhanced nonverbal assessment in half of the subtests to measure all five major cognitive factors. A wider range of assessment has been created to measure very low functioning and very high giftedness in the SB:V using new items.

History and Overview of the Woodcock-Johnson (WJ)

The Woodcock-Johnson Psycho- Educational Battery has been revised twice since its development in the late 1970's. The Woodcock-Johnson Psycho-Educational Battery (WJ-PEB) was the first test published in 1977, and the Woodcock-Johnson Psycho-Educational Battery-Revised (WJ-R) was published in 1989. The Woodcock-Johnson III Tests of Achievement (WJ-III ACH) is a revised and expanded version of the WJ-R (Woodcock & Johnson, 1989a.).

There are some notable differences between the WJ-III ACH and the WJ-R. According to Mather and Woodcock (2001), extensive renorming and the addition of several new tests, clusters, and interpretive procedures, improve and increase the diagnostic power of this instrument while retaining many of the features of the WJ-R ACH. The WJ-III ACH has seven new tests: a Reading Fluency test, a Math Fluency test, three oral language tests, a Spelling test, and a Phonological Awareness test. Also, the WJ-III ACH has replaced the old method of hand scoring and profiling with computer generated scoring and profiling. According to Mather and Woodcock (2001), each broad achievement cluster now contains three tests measuring basic skills, fluency, and application. The WJ-III ACH has eight new clusters: Oral Language-Standard, Oral Language-Extended, Listening Comprehension, Oral Expression, Phoneme/Grapheme Knowledge, Academic Fluency, Academic Applications, and Total Achievement. Once called the relative mastery index (RMI) in the WJ-R, it is now known as the relative

proficiency index (RPI). Also, the Oral Language-Extended cluster can be used to compare with academic performance in determining an ability/achievement discrepancy. WJ-III ACH reading tests now have included more items to measure early reading performance, and the Reading Vocabulary test includes analogy items. The Academic Knowledge test is now one test that includes Science, Social Studies, and Humanities. Another difference between the WJ-III ACH and the WJ-R is that the WJ-III ACH includes in its manual a Writing Evaluation Scale to help examiners score extensive written passages. The Woodcock-Johnson III Tests of Achievement (WJ-III ACH) is one of the two assessment instruments that comprise the Woodcock-Johnson III. The other assessment is the Woodcock-Johnson Tests of Cognitive Abilities (WJ-III COG). However, this study only focuses on the WJ-III ACH.

Current and Past Research

The previous tests are regularly used in the school system as tools in making placement decisions. Current research provides information that supports the relationship between achievement and intelligence tests. Some of these studies can be found within the test manuals. Although the WISC-IV manual does not contain information regarding its relationship to the WJ-III ACH, the manual does provide information regarding its relationship to the Wechsler Individual Achievement Test (WIAT-II; Wechsler, 2003) with a .87 correlation for the FSIQ and Total Achievement. However, the SB: V manual provides information concerning the relationship between the SB:V and the WJ-III ACH. In this study, 472 students between the ages of 6 to 19 were administered the SB: V and the WJ-III ACH. The results found correlations in the range of .50 to .84 using the SB: V factor index and IQ and WJ-III ACH scores (Roid, 2003). The Verbal or Full Scale IQ

along with Reading Comprehension ($r=.84$), Math Reasoning($r=.80$), and Academic Applications ($r=.84$) in the WJ-III ACH yielded the highest correlations. Basic Reading Skills ($r=.66$) and Written Expressions ($r=.70$) produced the weakest correlations.

In 1988, a study was carried out by Beck, Spurlock, and Lindsey to identify relationships between scores on the Woodcock-Johnson Tests of Achievement (WJ-ACH) with those on the Wechsler Intelligence Scale for Children- Revised (WISC-R). Results from their study confirmed that the Verbal Scale score is the best predictor of each WJ cluster with R^2 's ranging from .32 to .78. Another study was conducted by Schultz (1997) to identify the relationship between the WISC-R and the WISC-III and then use these scores to analyze the relationship between WISC-III and the WJ-R Tests of Achievement scores. Results from this study concluded that, although scores decreased from the WISC-R to the WISC-III, this was a slight decrease and that it can be safely said that these two tests are measuring the same constructs. Also, there was a significant correlation between the WISC-III and the WJ-R scores ranging from .65 for reading, .70 for math, and .71 for written language but not as statistically significant higher than those produced by the WISC-R and the WJ-R. Prewett and Giannuli (1991) conducted a study to determine correlations of the WISC-R, SB: IV, and reading subtests of three achievement tests (WJ-R, Kaufman Test of Educational Achievement- Comprehensive Form, and the Peabody Individual Achievement Test- Revised). Results from that study concluded that there was a moderate relationship between the WISC-R FSIQ, SB: IV Composite score, and the reading subtests from the three achievement tests. The FSIQ of the WISC-R correlated between .60 and .63 with the subtests on the WJ-R, .54 to .61 with the Kaufman Test of Educational Achievement subtests, and .60 to .62 with the

Peabody Individual Achievement Test-R subtests. The SB:IV correlated between .47 and .55 with the WJ-R subtests, .45-.55 on the Kaufman Tests of Educational Achievement subtests, and .44 to .46 on the Peabody Individual Achievement Test-R subtests.

Because of the limited research between these three tests, more research is needed to study the issue as to which intelligence test has a better relationship with reading achievement. Results from this type of research would provide important information in helping to make decisions as to which tests to use in the school system to produce more accurate placement decisions. As stated before, then, the purpose of this study is to evaluate the relationship between two intelligence tests, the WISC-IV and SB:V and academic achievement as measured by the WJ-III.

Method

Subjects

This study used archival data. The WISC-IV, SB: V, and WJ-III Achievement subtests were administered by one of two certified school psychologists employed within public school systems during the 2003-2004 school year. Students that were administered these tests had been referred for a psychoeducational evaluation to help determine if students qualified for special education services. Informed consent for testing was obtained per state of Ohio Special Education Procedures. The WISC-IV and SB: V were administered in counterbalanced order, and the WJ-III was always administered last. A total of 22 students were administered these tests, and the sample consisted of 12 males and 10 females (See Table 1).

Table 1

Ages and Gender of Students				
Gender	<u>n</u>	Mean Age*	Standard Deviation (SD)	Range*
Males	12	109.08	20.23	82-138
Females	10	108.40	15.85	92-144
Total	22	108.77	17.95	82-144

*age in months

Procedures

To assess the relationship between intelligence and reading achievement between the WISC-IV, SB: V, and the WJ-III Tests of achievement, three statistical analyses were applied. Pearson Product correlations, Fischer's z, and a Paired Sample T-Test were computed to compare the WISC-IV, SB: V, and WJ-III ACH Reading subtests for the 22 subjects.

Hypotheses and Results

The results of the comparisons of interest are listed in Table 2.

A Pearson-Product correlation was used to indicate whether or not there was a significant relationship between the WISC-IV FSIQ, SB: V FSIQ and three reading achievement subtests from the WJ-III ACH. Results from this study yielded a Pearson-Product correlation of .55 ($p < .05$) between the WISC-IV Full Scale IQ and the WJ-III ACH Letter-Word Identification subtest; a correlation of .65 ($p < .05$) between the WISC-IV Full Scale IQ and the WJ-III ACH Passage Comprehension subtest; a correlation of

.54 ($p < .05$) between the WISC-IV Full Scale IQ and the WJ-III ACH Reading Fluency subtest, a correlation of .40 ($p < .05$) between the SB:V Full Scale IQ and the WJ-III ACH Letter-Word Identification subtest; a correlation of .56 ($p < .05$) between the SB: V Full Scale IQ and the WJ-III ACH Passage Comprehension subtest; and a correlation of .40 ($p < .05$) between the SB: V Full Scale IQ and the WJ-III ACH Reading Fluency subtest.

The Fisher's z score for comparing two correlated correlations yielded non significant values, $F(df = 20) = 0.08$, $p < .05$, between the correlations from the WISC-IV Full Scale IQ and the WJ-III ACH Letter-Word Identification subtest as compared to the SB:V Full Scale IQ and the WJ-III ACH Letter-Word Identification subtest; a non significant value $F(df = 20) = .18$, $p < .05$, between the correlations from the WISC-IV Full Scale IQ and the WJ-III ACH Passage Comprehension subtest as compared to the SB:V Full Scale IQ and the WJ-III ACH Passage Comprehension subtest; and a non significant value, $F(df = 20) = .10$, $p < .05$, between the correlations from the WISC-IV Full Scale IQ and the WJ-III ACH Reading Fluency subtest as compared to the SB:V Full Scale IQ and the WJ-III ACH Reading Fluency subtest.

A t -test when comparing these two tests resulted in non significant values, $t(df = 21)$, $= .732$, $p < .05$, in means scores on the WISC-IV and the WJ-III ACH Letter- Word Identification subtest; non significant values, $t(df = 21)$, $= .115$, $p < .05$, in means scores on the WISC-IV and the WJ-III ACH Passage Comprehension subtest; and non significant values, $t(df = 21)$, $= .744$, $p < .05$, in means scores on the WISC-IV and the WJ-III ACH Reading Fluency subtest.

A t -test when comparing these two tests resulted in non significant values, $t(df = 21)$, $= .063$, $p < .05$, in means scores on the SB: V and the WJ-III ACH Letter-Word

Identification subtest; non significant values, t ($df = 21$), $=.003$, $p < .05$, in means scores on the SB: V and the WJ-III ACH Passage Comprehension subtest; and non significant values, t ($df = 21$), $=.157$, $p < .05$, in means scores on the SB: V and the WJ-III ACH Reading Fluency subtest.

Table 2

Means, Standard Deviations, and Ranges for the WISC-IV, SB:V, and the WJ-III ACH Reading subtests			
Test	M	SD	Range
WISC-IV*	82.36	12.56	62-110
SB: V*	87.23	10.13	67-102
WJ-III ACH Letter-Word Identification*	81.41	12.43	39-107
WJ-III ACH Passage Comprehension*	78.14	15.57	36-99
WJ-III ACH Reading Fluency*	83.23	12.90	58-104

*WISC-IV= Wechsler Intelligence Scale for Children-Fourth Edition

*WJ-III ACH Letter-Word Identification= Woodcock Johnson Tests of Achievement Letter-Word Identification

*WJ-III ACH Passage Comprehension = Woodcock-Johnson Test of Achievement-Third Edition Passage Comprehension.

*WJ-III ACH Reading Fluency= Woodcock-Johnson Test of Achievement-Third Edition Reading Fluency

Discussion and Future Implications

Professionals who use assessments such as school psychologists are often confronted with the decision as to which testing instrument will better measure a student's intellectual and achievement ability. The WISC-IV and the SB: V are the two most widely used intelligence tests and are usually used along with the WJ-III Tests of Achievement to help make placement decisions within the school system. This study examined whether or not the WISC-IV or the SB: V would better predict reading

achievement on the WJ-III Tests of Achievement. Results from this study indicated that both IQ scores obtained from the WISC-IV and the SB: V correlated with reading significantly but not too highly. Both intelligence tests correlate with reading similarly so there would not be any reason to choose one test over the other when making decisions as to which test to administer. This study supports the criterion related validity of these tests meaning they predict reading but cannot be construed as achievement tests because the correlations are only moderate.

In order to further validate these results, this study or similar studies need to be replicated with a larger sample size to indicate a more significant difference. In addition, a more representative study is needed that would include more diverse subjects to generalize the population.

References

- Beck, F., Spurlock, D., & Lindsey, J. (1988). The WISC-R and the Woodcock-Johnson tests of achievement: correlations for exceptional children. *Perceptual and Motor Skills*, 67, 587-590.
- McGrew, K.S. & Woodcock, R.W. (2001). Technical Manual. *Woodcock-Johnson III*. Itasca, IL: Riverside Publishing.
- Prewett, P. & Giannuli, M. (1991), Correlations of the WISC-R, Stanford-Binet intelligence scale: fourth edition, and the reading subtests of three popular achievement tests. *Psychological Reports*, 69, 1232-1234.
- Roid, G.H. (2003). *Stanford-Binet intelligence scales, fifth edition, technical manual*. Itasca, IL: Riverside Publishing.
- Sattler, J.M. & Dumont, R. (2004). *Assessment of children: WISC-IV and WPPSI-II supplement*. La Mesa, CA: Jerome M. Sattler, Publisher, Inc.
- Schultz, M. (1997). WISC-III and WJ-R tests of achievement: concurrent validity and learning disability identification. *The Journal of Special Education*, 31, 377-386.
- Wechsler, D. (2003). *Wechsler intelligence scale for children- fourth edition, technical and interpretive manual*. San Antonio, TX: The Psychological Corporation.
- Woodcock, R.W., McGrew, K.S., & Mather, N. (2001). *Woodcock-Johnson Tests of Achievement*. Itasca, IL: Riverside Publishing.