

1-1-2007

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Comparative Study of the Working Memory Scales of the WISC-IV and SB5 in
Referred Students

Thesis submitted to
the Marshall University
Graduate College

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

by

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July 31, 2007

ABSTRACT

Comparative Study of the Working Memory Scales of the WISC-IV and the SB5 in Referred Students

Erica N. Abbott

The present study compared the working memory scales of the WISC-IV and the SB5 as both tests are used, in part, to develop academic interventions for students. There is a moderate correlation (.6) between the two tests with 33 percent of shared variance and a SEest of 9.1 [plus or minus]. The findings indicate that the two tests do not measure a similar ability and scores obtained on them should not be interpreted in the same manner. More research is needed to investigate the specific constructs measured and which test is most appropriate to assess working memory problems.

ACKNOWLEDGMENTS

The author would like to acknowledge and thank Dr. Peter N. Prewett for his support of this important study.

TABLE OF CONTENTS

Abstract.....	ii
Acknowledgement.....	iii
List of Tables/Graphs.....	v
Chapter One: Introduction.....	1
Chapter Two: Literature Review.....	3
Chapter Three: Method.....	13
Chapter Four: Results.....	14
Chapter Five: Discussion.....	16
References.....	20
Resume.....	24

LIST OF TABLES AND GRAPHS

Table 1.....	14
Table 2.....	14
Graph 1.....	15

CHAPTER ONE: INTRODUCTION

As research suggests, an efficient working memory system is crucial to the ongoing development of good academic skills that support success within the school environment. Among other factors, working memory is a component contributing to learning to read, reading comprehension, writing, problem solving, computing higher-level mathematics, controlling attention and concentration for new tasks and between multi-tasks, and for driving and monitoring goal-directed behavior (Baddeley, 1987; Barkley, 1998; Swanson & Siegal, 2001). Working memory contributes to a students' ability to process current and important information while simultaneously eliminating irrelevant or distracting stimuli, in addition to, retrieving stored knowledge from long-term memory to combine and then transform all active information to form a new thought or to complete a new task (Baddeley, 1987; Cornoldi et. al., 2006; Swanson & Siegal, 2001).

In simple terms, working memory abilities are essential in the classroom and without them, a student may have severe difficulties in activities such as abstract thinking, listening to a speaker and later completing an assignment, controlling and monitoring attention, learning from mistakes, following multi-step directions, independent work with new concepts, adhering to new rules and routines, and making the connections between present and past instruction necessary to achieve on level in the academic curriculum (Barkley, 1998; Cornold et al., 2001; Hambrick, Wilhelm, and Engle, 2001; Leffard et al., 2006; Swanson & Siegal, 2001). In addition, students with impaired working memory often experience problems in their attempts to engage in other

strategies utilized by more academically competent peers such as rehearsal, chunking, subvocalization, recovering from interruptions, and ignoring common types of extraneous noise in the school environment. (Baddeley, 1987; Barkley, 1998; Leffard et al., 2006; Swanson & Siegal, 2001).

CHAPTER TWO: LITERATURE REVIEW

Many investigators have alluded to causal links between working memory problems and low or deficient academic skills. The literature reviewed for the present study reported working memory deficits in two prominent student populations; students with Attention Deficit Hyperactivity Disorder (ADHD) and those with learning disabilities. Students with impaired working memory such as these must often revisit and attempt to relearn information and instruction already mastered by their peers. As a result, students with ADHD and learning disabilities suffer persistent frustration, failure, and achieve well below their classmates (Gathercole and Pickering, 2000). Due to the constant academic struggle faced by these students; social, emotional, and behavioral difficulties often arise and are commonly seen. It is evident then, that working memory delays and the resulting consequences reach many areas of a student's life. Consequently, research supports that difficulties persist throughout the lives of individuals with working memory deficits as their choices in adulthood such as continued education and employment may be limited (Swanson & Siegal, 2001).

A multitude of experimental researchers have founded theories regarding working memory. Perhaps the most frequently cited and prominent theory of working memory was originally developed by Baddeley and Hitch in 1974 (In Leffard et. al., 2006). Several revisions and/or extensions of their theory have occurred since that time (Baddeley, 1987; Baddeley and Logie, 1999; Baddeley, 2002; and 2003). For a more extensive review, the reader is encouraged to refer to Baddeley's original works listed above.

The term working memory is used to describe the system and its' mechanisms necessary for processing, manipulating, and transforming stored knowledge from long-term memory with new information present in active thought involving attention, concentration, and higher-level cognitive abilities (Barkley, 1998; Cornoldi et. al., 2006; Hambrick et. al., 2001; Leffard et. al., 2006; Swanson & Siegal, 2001). More specifically, working memory is described in the book *Working Memory* (Baddeley, 1987) as a three-unit system comprised of the central executive, the phonological loop, and the visuo-spatial sketchpad. As discussed by Leffard et. al. (2006), Baddeley revised his theory to include the episodic buffer as the fourth unit of working memory. The units of working memory and their functions are detailed below.

According to Baddeley (1987), the central executive serves as the domain general supervisory system that governs processing mechanisms therefore allowing for the performance of most cognitive tasks in addition to overseeing the two domain specific slave systems; the phonological loop and the visuo-spatial sketchpad. The primary function of the speech-based phonological loop is to process auditory/verbal information that encompasses such tasks as subvocalization and rehearsal strategies. The visuo-spatial sketchpad is essential to processing nonverbal information by forming visually and spatially correct representations of said information such as location, color, order, etc. (Leffard et al., 2006).

As discussed by Leffard et al. (2006), the episodic buffer was originally assumed to be part of the central executive (Baddeley & Logie, 1999). However, the episodic buffer is now regarded as a separate unit that performs as a two-way bridge between all

other units of the working memory system and the long-term memory (Baddeley, 2003 and Leffard et. al.). The episodic buffer is said to retrieve and activate previously learned information [housed in long-term memory], into present or conscious thought and disperse the information to the phonological loop and visuo-spatial sketchpad as overseen by the central executive (Leffard et al., 2006 and Alloway, Gathercole, and Pickering, 2006). Although the episodic buffer is thought to have a limited capacity to maintain and direct retrieved information, it is responsible for allowing the joining and transforming of stored and recently processed information to formulate a new idea or “representation of material” (Leffard et al.).

Now; with an even more complex, four-unit system of working memory considered to be an essential factor in developing and supporting sound academic skills in students, accurately assessing working memory abilities is important in the evaluation of students that are experiencing academic difficulty. The importance of working memory assessment is recognized by test companies that have incorporated a measure of working memory into their intelligence tests, such as the Wechsler Intelligence Scale for Children- Fourth Edition (WISC-IV) and the Stanford-Binet Intelligence Scales- Fifth Edition (SB5), in addition to the school psychologists who utilize these tests in their psycho-educational evaluations. By accurately determining cognitive strengths and weaknesses exhibited in students who struggle academically, appropriate interventions and/or modifications can be designed and implemented to assist and support students in achieving greater levels of success in school (Swanson & Siegal, 2001). This assertion may be most true for children with certain handicapping conditions such as ADHD and

learning disabilities who often have distinctively poor working memory abilities and skills (Barkley, 1998; Cornoldi et al., 2001; Hambrick et al., 2001; Klingberg, Forssber, and Westerberg, 2002; and Swanson & Siegal, 2001). These particular students may also experience the negative social, emotional, and behavioral setbacks often associated with academic frustration and failure.

As reported by Barkley (1998), children with ADHD show problematic malfunctions in four areas of executive functioning that result in their inattentive, hyperactive, and impulsive behaviors; thus impeding their academic success. Barkley (1998) described the first impaired executive function of working memory as “the delayed to nonexistent ability for timeliness, goal-directed behavior, the use of hindsight and forethought, preparation for and imitation of complex activities, and to understand novel behavior of others.” Self-directed and later internalized speech is deficient in children with ADHD; making self-coaching to solve problems through steps and monitor behavior extremely challenging. Those children with ADHD often lack in their ability to drive and control motivation, emotions, and arousal states (Barkley, 1998). Lastly, Barkley (1998) described the process of reconstitution, “breaking down observed behaviors and combining the parts into new actions not previously learned from exposure with flexibility, creativity, and fluency to support oneself to complete a goal” as deficient in children with ADHD.

Cornoldi et al. (2001), described working memory abilities essential in daily life functioning to update an individuals’ repertoire of information, often lacking in those with ADHD. Brown (2007) reported that students with ADHD become “demoralized”

by their repeated experience of failure in the classroom due to difficulties in regulating attention and ignoring distractions, shifting focus to organize and begin classroom tasks, and sustaining concentration and speed of understanding and performance at a level consistent with their same-aged peers. Yet further, more evidence supporting working memory deficits in students with ADHD was recently reported by Bental and Tirosh (2007), who found supported links between disastrous spelling skills and poor working memory abilities in their sample population of students with ADHD.

Students with learning disabilities may often demonstrate poor academic achievement similar to that experienced by students with ADHD due to similar working memory deficits. Co-morbid groups involving students with both ADHD and specific learning disabilities in reading have been shown to share the same core deficits in working memory as pure groups diagnosed with only one or the other of these two disorders (Bental and Tirosh, 2007). Gathercole and Pickering (2000) concluded that students with learning disabilities may have impaired functioning of the central executive due to problems in the ability to process complex information and submit and oversee the transfer of material to the slave systems of the phonological loop and the visuo-spatial sketchpad. An example of this may be decoding new text “while holding the meaning of the previously decoded text in mind, writing while formulating the next part of a paper, and problem solving” (Just and Carpenter, 1992; in Gathercole and Pickering, 2001). In addition, students with learning disabilities may have limited ability to process auditory/verbal information such as “learning sound patterns of new words” (Gathercole and Pickering, 2000).

A student could exhibit difficulties in both the central executive and phonological loop.

Swanson & Siegal (2001) concluded that students with learning disabilities experience impaired functioning to control attention to process information when in situations that require quick and efficient understanding while under strain, stress, or in the mist of competing stimuli that was seen across tasks measuring the phonological loop and the visuo-spatial sketchpad independently. The authors further supported the assumption that working memory abilities are strongly related to low achievement in the broad areas of reading, mathematics, and writing. Swanson & Siegal suggested a strong link between academic performance of younger students and visual-spatial working memory abilities. Gathercole and Pickering (2001) also concluded that students with learning disabilities pervasive enough to warrant exceptional education services showed very delayed abilities in working memory.

Given that the assessment of working memory difficulties is crucial to appropriate identification of students with ADHD and those with learning disabilities who experience poor achievement, it is important to know if the recently revised intelligence tests containing measures of working memory provide similar information about working memory when administered to the same students. It would be appropriate to examine the working memory scales of these newly revised tests of cognition to determine their correlations and ability to yield similar scores when administered to the same students. The WISC-IV and the SB5 are widely used intelligence tests and both instruments contain measures of working memory. Since both tests purport to measure working memory, it would be useful to know if the working memory assessed by these tests is

similar. One study was located (Leffard et al., 2006), that discussed the speculated substantive validity of measures of working memory among several cognitive batteries including the WISC-IV and the SB5. However; to date, no studies that have specifically addressed the statistical relationship regarding the validity of working memory measures of the WISC-IV and the SB5 in comparison to one another have been published.

Examining the concurrent validity and shared variance among intelligence scales can help answer whether or not the working memory scales are measuring the same construct. In a review of related research; “tests designed to measure similar constructs do not always yield similar scores when administered to the same individual” (Bracken, 1988; Prewett & Matavich, 1994). As reported by Bracken and Reckase (1996), tests may produce dissimilar results due to factors such as weak ceilings and floors, steep item gradients, differences in norm tables, reliability and validity differences, skill and content differences measured across tests, inadequate representations of populations, and lastly, differences in publication dates. The WISC-IV Technical and Interpretative Manual did not report any comparison to the Stanford-Binet scales (Wechsler, 2003). The SB5 was reported in the SB5 Technical Manual (Roid, 2003) to correlate .84 respectively with the WISC-III among Full Scale IQ scores.

Previous studies with earlier versions of both tests have found similar correlations. Yet, the working memory scales of WISC-IV and SB5 batteries have not been exclusively compared with one another. In Full Scale IQ comparisons, Prewett and Matavich (1994) found a correlation of .81 between the WISC-III and the SB-IV. However, the average IQ difference was 9.4 points and significant enough to conclude

that differences in diagnosis could result depending on which IQ tests was administered to make the diagnosis. The researchers noted that nearly one standard deviation mean difference (13.1 points) was found between the WISC-III and SB-IV verbal scales, indicating that classification of a students' verbal abilities would differ depending on the test given. Thus, Prewett and Matavich concluded that one test cannot reliably predict ability performance measured on another test. Prewett and Giannuli (1991) also found like results among achievement scales involving the K-TEA and the WJ-R in that similar standard scores were not derived from both tests when administered to the same student.

Rust and Linstrom (1996) found no significant mean score difference among their volunteer, non-exceptional group with a correlation of .81 among the Full Scale IQ scores on the WISC-III and the Test Composite Scores of the SB-IV. Rust and Linstrom did however, urge caution in expecting similar diagnostic impressions among the two tests due to the variability among individual scores between the two tests. In a study assessing giftedness, Simpson et al., (2002) found a low correlation of .65 between the SB-IV and the WISC-III and the resulting difference was enough to place at least fifty percent of those students in the study in different classifications. Simpson et al. concluded their results to be consistent with Prewett and Matavich (1994) in that WISC-III IQ scores were found to be lower than SB-IV scores when the SB-IV was administered first.

These studies lend support to Bracken's (1988) contention that tests that purport to measure similar constructs can yield dissimilar results. Although it is reasonable to assume that different tests that measure working memory should give the same diagnostic impressions when administered to the same students; the studies discussed above indicate

that this assumption might not be accurate. The WISC-IV (Wechsler, 2003) standard battery contributes two measures of working memory, Digit Span and Letter-Number Sequencing, which comprise the Working Memory Index and contribute to one-fourth of the Full Scale IQ. The SB5 is structured somewhat differently in that working memory is administered throughout the battery until an examinee reaches the discontinuation point, yielding a Verbal IQ, Nonverbal IQ, and Working Memory Composite that all contribute to the Full Scale IQ score (Roid, 2003). Verbal Working Memory is assessed in order by the subtests Memory for Sentences and Last Word. Nonverbal Working Memory is measured consecutively by the subtests Delayed Response and Block Span. The Working Memory Composite is comprised of all working memory subtests administered, that theoretically, could incorporate up to six levels of verbal and nonverbal working memory tasks. Therefore, working memory on the SB5 is administered in accordance with the students' ability level as opposed to the administration of the two working memory subtests on the WISC-IV administered to all examinees. Both tests were recently criticized by Leffard et. al., (2006) in their methodology of measuring working memory constructs and score interpretations involved in assessing and accurately diagnosing cognitive abilities in children.

The purpose of this study, then, is to see if the working memory scales of the WISC-IV and the SB5 provide similar information about the level of functioning in working memory when administered to the same students. Questions that will be addressed in this study are detailed below and will be answered using the statistical

analyses Pearson's Product Moment Correlation, correlation of determination, t-tests, and the SEest formula.

Research Questions

- 1.) What is the correlation between the working memory scales of the WISC-IV and SB5?
- 2.) What is the amount of shared variance between the working memory scales of the WISC-IV and the SB5?
- 3.) Overall, is there a similarity in the working memory constructs measured by the WISC-IV and the SB5?
- 4.) What is the Standard Error of Estimate (SEest) when predicting SB5 working memory scales scores from the WISC-IV working memory scales?

CHAPTER THREE: METHOD

Participants

Twenty-nine public school students ($n = 29$) between the ages of 7 years, 3 months and 15 years were administered the WISC-IV and SB5 as part of their psycho-educational evaluations for special education services in Licking County, Ohio. The participants ranged in enrollment from kindergarten to the eighth grade. The participant sample consisted of 16 males and 13 females who were of White decent.

Procedure

The Working Memory Index scores of both the WISC-IV and the SB5 for each student were derived as part of their previous psycho-educational evaluation. That information, in standard scores, was then analyzed with the Pearson-R correlation technique, the coefficient of determination, two t-tests, and the standard SEest to help answer the posed research questions for the present study.

CHAPTER FOUR: RESULTS

Table 1. Mean Scores of the WISC-IV and SB5 Working Memory Indexes

	Scores	N	M	SD	Std. Error M
Test					
WISC-IV	1.0	29	85.0	9.7	1.8
SB5	2.0	29	86.0	13.9	2.6

A pair-samples (dependent) t-test found no significant difference in the working memory scores of the WISC-IV ($\underline{M} = 85.0$, $\underline{SD} = 9.7$) to the SB5 ($\underline{M} = 86.0$, $\underline{SD} = 13.9$, $t(28) = .4$, $p > .05$). In addition, an independent-samples t-test was conducted for which no significant difference in scores between the WISC-IV ($\underline{M} = 85.0$, $\underline{SD} = 9.7$) and SB5 [$\underline{M} = 86.0$, $\underline{SD} = 13.9$, $t(56) = .3$, $p = .8$] was observed.

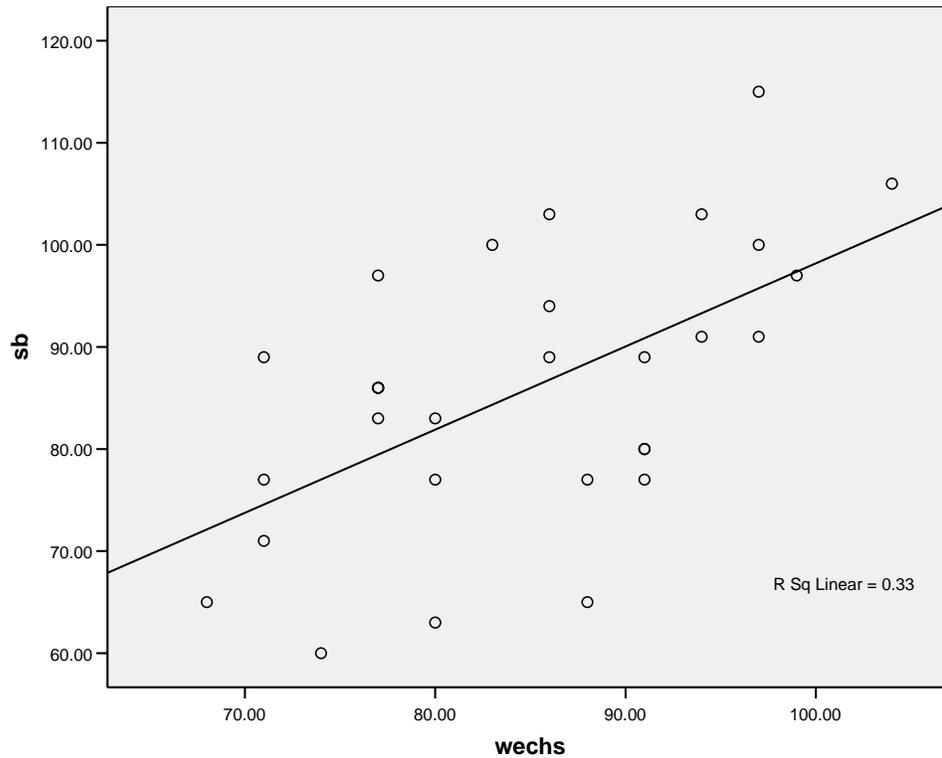
Table 2. Pearson Correlations Between the WISC-IV and SB5 Working Memory Indexes

	Score	N	Pearson Correlation Sig. (2-tailed)
Test			
WISC-IV	.6**	29	.001
SB5	.6**	29	.001

** . Correlation is significant at the .001 level

The relationship between the working memory scales of the WISC-IV and the SB5 was investigated using the Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of the assumptions of normality, linearity and homoscedasticity. A significant moderate correlation between the two variables [$r = .6$, $n = 29$, $p < .001$] was found (See Table 2).

Graph 1. Distribution of Working Memory Index Scores of the WISC-IV and SB5



The amount of shared variance between the between the working memory scales of the WISC-IV and the SB5 was examined using a correlation of determination [R Square = 0.3, $n = 29$, $p < .001$]. The finding that approximately 33% or roughly 1/3 of the total shared variance contributes to the overall variability of both the WISC-IV and the SB5 is significant (See Graph 1). However, 67% of variance between the WISC-IV and SB5 is not accounted for.

The standard error of estimate [SEest] was calculated to assist in determining if performance on one test could reliably predict performance on the following test. A SEest of 9.1 was derived.

CHAPTER FIVE: DISCUSSION

The results above help to answer the research questions for the present study. A significant moderate correlation was observed between the working memory scales of the WISC-IV and SB5. Although the correlation was significant, it also indicated that the two measures share only 33% in common variance. While it is tempting to say that the overlapping variance of the two measures was due to the extent both subtests measure working memory, this would be a tentative hypothesis because the correlation between the two could be due to other factors, such as the extent both measures are related to general intelligence. Additional research is needed to clarify this finding. Regardless, the current finding is of interest because it shows that although both tests purport to measure working memory, the two measures do not assess the same type of ability. That is, the two tests do not measure a similar ability and therefore scores obtained on them should not be interpreted in the same manner. Further research is needed to investigate the specific constructs measured by these two tests.

To answer the question if an overall similarity in the working memory constructs measured by the WISC-IV and the SB5 exist, two separate t-tests (independent and dependent) were conducted. Neither t-test reached significance. Thus, the WISC-IV and SB5 were moderately correlated, shared *some* like characteristics, and did not differ significantly in mean scores when administered to a referred group of students. Still, practitioners should remain cautious in expecting that the WISC-IV and SB5 will provide similar clinical impressions of working memory abilities in students referred for special education testing because of the large SEest.

The SEest calculation produced a large confidence interval (95%) of 18 points. The SEest of 9.1 [+ or -], indicates that individual scores on the two tests will often be dissimilar and this could lead to different diagnostic impressions and classifications. Of course, as noted before, given that the two tests appear to measure different types of ability, one would not expect the two tests to provide similar scores or diagnostic impressions.

Because with ADHD and/or specific learning disabilities often exhibit deficits in working memory, accurately assessing their abilities in this area is important in order to develop appropriate interventions. However the current results are troubling in that whether or not a student is determined to have a delay in working memory might depend on which measure of working memory is administered. How then, does one decide which test to administer? Once again, additional research is needed to clarify this issue.

There is a difference in the theoretical framework for which the WISC-IV and the SB5 are based upon. The SB5 was constructed to align with the Carroll-Horn-Cattell [CHC] model of intelligence (Roid, 2003). Although the WISC-IV was constructed to be more consistent with the CHC model than in previous editions, it still lacks an “explicit theoretical framework” (Keith, Fine, Taub, Reynolds, and Kranzler, 2006). When Leffard et. al., (2006) compared the substantive validity of both the WISC-IV and the SB5 with Baddeley’s theory of working memory, they speculated that the abilities measured on subtests that contribute to an index or global score of working memory were significantly different and did not readily compare with one another.

The WISC-IV subtest Digit Span can really be thought of as two mini subtests

collapsed together to derive a score. However; the first part of the subtest, Digit Span Forwards, may really be a measure of short-term auditory/verbal memory (Keith et. al., 2006 and Leffard et. al., 2006). Performance on that test is then combined with performance on Digit Span Backwards, [which incorporates higher processing abilities involving the transformation of stimuli] into one score (Leffard et. al.). The second standard working memory subtest of the WISC-IV, Letter-Number- Sequencing, was reported to be a good measure of working memory due to the demand for processing and transforming information (Leffard et. al.). Letter-Number-Sequencing is also a measure of verbal working memory performed in the auditory loop as supervised by the central executive. The WISC-IV does not incorporate a measure of visual-spatial working memory. In addition, Keith et. al. and Leffard et. al., argue that combining the scores of these subtests to derive an index score representative of working memory ability is not an entirely accurate process; as not all capabilities measured are true mechanisms of working memory and thus load on other factors of intelligence.

The SB5 reports that test construction was based upon the CHC model and Baddeley's theory of working memory (Leffard et al., 2006). Yet the SB5 has received criticism as well. In measuring the phonological loop mechanisms, the SB5 employs the subtests Memory for Sentences and Last Word. As characterized by Leffard et al., Memory for Sentences appears to only measure the rehearsal ability of the phonological loop. Last Word is believed to measure rehearsal and manipulation processes in the face of competing information (Leffard et. al.). Delayed Response and Block Tapping are the subtests used to measure the visual-spatial sketchpad of working memory.

Delayed Response is purported to measure aspects of visual-spatial memory. However, Leffard et. al. described this subtest as measuring the concept of “object permanence, visual tracking, and the understanding of one-to-one relationships”. Block Tapping was reported to measure the ability to retain the sequence of the tapped blocks by the examiner in accordance to placement of the blocks in color coded areas and then transform the sequence in a different order as instructed. These mechanisms are all important aspects in accurately measuring visual-spatial working memory. Leffard et. al. also criticized the SB5 for their score derivatives in combining other measured abilities in conjunction with working memory that is distributed across the Working Memory Composite, the Verbal IQ, the Nonverbal IQ, and the Full Scale IQ.

Future researchers may seek to statistically study what the 67% of unaccounted variance between the WISC-IV and SB5 is, (which is what makes these two tests distinctly different from one another) as represented in this population. In addition, investigating the findings of Leffard et. al. in a statistical form regarding substantive validity may help to answer specifically and in detail what the WISC-IV and SB5 share in common and what they differ in on their working memory measures.

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Master of Arts in Elementary Education.

2000-2003 West Virginia State College, Institute, WV
Bachelor of Arts in Psychology and
Associate in Science-General Education

1998-1999 West Virginia University of Technology, Morgantown, WV

EXPERIENCE:

2006-2007 Putnam County Schools, WV
Internship in School Psychology

This internship consisted of a full-time, year long experience consistent with the demands of a position as a school psychologist to fulfill final requirements to graduate with an Ed.S. degree in school psychology. Responsibilities included psycho-educational evaluations in accordance with Policy 2419 for a variety of learning, behavioral, and emotional difficulties; participation in 504, eligibility, and IEP meetings for students; direct and indirect crisis response; individual therapy; group therapy; curriculum based measures implementation (CBM's); consultation with personnel and parents; direct training with teachers; and internal progress monitoring of the Exceptional Education Services methodology and delivery.

2005-2006 Dr. Fred Jay Krieg and Associates Vienna, WV
School Psychometrist

This position allowed me, as a graduate student, to administer cognitive and achievement batteries to students and to formulate evaluation reports to assist in determining special education qualification under the supervision of Dr. Fred Jay Krieg, Janet Varney, and Lottie Pack in Mingo and Logan counties.

2005-2006 Problem Gamblers Anonymous Charleston, WV
Clinical Coordinator

In this position, I was responsible for providing Tier-I counseling services via telephone contact in conjunction with linking clients with long-term psychological treatment over the crisis hotline.

- 2006 ABA Specialist Charleston, WV
In-Home Service Provider
 I provided in-home therapy services that included applied behavioral analysis, play therapy and training, academic tutoring, social skills training, and functional life skill training for a 5-year-old child with autism.
- 2004-2006 Marshall University Graduate College S. Charleston, WV
Graduate Assistant
 As a graduate assistant, I was responsible for the release and retrieval of psychological materials and program data-base entry for the School Psychology Program for tuition reimbursement.
- 2003-2004 Valley Comprehensive Community Mental Health Charleston, WV
Outreach Worker
 In conjunction with the WV Department of Health and Human Resources and FEMA, I provided in-home therapy and community resource referral for individuals who experienced trauma and hardship as a result of flooding in Kanawha, Putnam, and Boone counties.
- 2003 Goodwill Industries of Kanawha County Charleston, WV
Vocational Coach
 I provided vocational counseling and on-site training for adults with developmental delays and was responsible for daily documentation and team meetings regarding the client/s.
- 2002-2003 West Virginia State College Institute, WV
Research Assistant
 Assisted with research investigation the motivation factors between Stress and nicotine abuse in rural adolescents under the supervision of Dr. Paula McCoy. I compiled an extensive literature review, obtained Information regarding testing instruments, and assisted in writing for grant proposals.
- 2002 Kanawha County Juvenile Probation Department Charleston, WV
Field Experience
 I observed preliminary, detainment, and adjudication hearings and conducted and recorded probation office visits.
- 2001 Thomas Memorial Hospital S. Charleston, WV
Field Experience
 I obtained psycho/social histories from clients, updated progress notes, formulated Master Treatment Plans, provided psychoeducational and group therapy under the supervision of Amy Britten and Sheila Morgan at the Behavioral Health Center.
- 1999 Mount Olive Correctional Complex Mt. Olive, WV
Secretary
 I typed by dictation psychological evaluations, prepared finger print Cards for inmate classification, and organized and filed confidential records.

**PROFESSIONAL
MEMBERSHIPS:**

2004-Present National Association of School Psychologists
2003-Present West Virginia Association of School Psychologists
2007 Treasurer

**STUDENT
MEMBERSHIPS:**

Psi Chi, the National Honor Society in Psychology, inducted in 2002
Alpha Mu Gamma, the National Collegiate Foreign Language Honor Society, inducted in 2001

REFERENCES:

Available upon request.