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The Construct Validity of the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II) and the Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2)

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Chapter 1: Introduction

A Brief History of Intelligence and Testing

When assessing the general intelligence of an individual, it is essential that we first have an understanding of its meaning and importance. According to Breit et. al. (2020, p. 364), intelligence can be defined as a “general mental ability that typically involves the ability to reason, plan, problem solve, think abstractly, comprehend complex ideas, learn quickly, and learn from experience.” As a result, intelligence should be considered as an important psychological construct in an individual’s everyday life. Further, it is essential for professionals to understand the complex developmental dynamics of intelligence in order to have a better understanding of cognitive development, as well as applied cognitive assessment across an individual’s life span (Breit et al., 2020). Understanding these dynamics requires valid models that can be used to capture the structure of intelligence.

There have been theoretical models of intelligence created in association with several perspectives, which include biological, cognitive, differential, and developmental approaches (Breit et. al., 2020). Moreover, a psychometric model of intelligence is based on the theory that individual differences observed within intelligence testing can accurately reflect individual differences in intelligence. These individual differences can then be referred to in terms of factors that represent broader cognitive abilities (Breit et. al., 2020). Charles Spearman created the first model of intelligence with the observation and belief that a considerable amount of variance within cognitive ability measures could be accounted for by one factor, general intelligence or *g,* while the rest of the variance is accounted for by specific factors, *s,* reflecting a more specific cognitive ability. Although there are competing theories today regarding intelligence, it is commonly accepted that a hierarchical model is necessary to represent the relationships between different cognitive abilities (Breit et. al., 2020). However, a bifactor structure seems to be as good or better in understanding intelligence test structure (Canivez, 2016).

In 1905, a tool was introduced by Binet and Simon which intended to differentiate individuals who were “mentally retarded” and those who had the potential to learn (Thorndike, 1990). At that time, this was considered the ultimate operational definition of intelligence. Over the years, there were several adaptions of this test by various researchers and later, Terman’s adaption and standardization that resulted in the Stanford-Binet intelligence test, which produced scores that were transformed and adapted into a mental level (Thorndike, 1990). Although the Stanford-Binet was a popular assessment in the past, according to a national survey (Benson et al., 2019), the Wechsler Scales are the most commonly used tests to assess intelligence. Further, over the past 40 years, the Wechsler Intelligence Scales have consistently been one of the most commonly used tools among school psychologists and are considered to be the “gold standard” when it comes to measuring intelligence (Benson et al., 2019). Moreover, Wechsler believed that the Binet scales were too focused on verbal abilities for use with adults. This resulted in the development of an instrument with subtests that intend to measure both verbal and nonverbal abilities (Thorndike, 1997).

Wechsler’s first test was the Wechsler-Bellevue Intelligence Scale (Wechsler, 1939), which was found to be fairly successful. Subsequently, there have been many revisions with different versions that specifically focus on different age groups (Thorndike, 1997). Current versions include: the Wechsler Preschool and Primary Scale of Intelligence-Fourth Edition (WPPSI-IV; Wechsler, 2012), the Wechsler Intelligence Scale for Children-Fifth Edition (WISC-V; Wechsler, 2014), and the Wechsler Adult Intelligence Scale-Fourth Edition (WAIS-IV; Wechsler, 2008). Each of these scales still show similarities with the original Wechsler-Bellevue scale from 1939 (Thorndike, 1997). Further, these scales are similar to the intelligence tests that were once used by the U.S. Army (i.e., Alpha and Beta). The Alpha test was designed for individuals who had no difficulty reading or writing and measured their "ability to comprehend, remember and follow instructions, discriminate between relevant and irrelevant answers to common sense questions, combine related ideas into a logical whole, discover by logical reasoning the plan present in a group of abstract terms, to keep the mind directed toward a goal without yielding to suggestion, and to grasp and retain miscellaneous items of information" (Terman, 1918, p. 179-180). The Beta test was designed to be given to "foreigners and illiterates" (Terman, 1918, p. 180). This test was administered to men who were unable to understand or read English well enough to take the Alpha test (Terman, 1918). Moreover, both Alpha and Beta tests intended to measure general intelligence. However, the Alpha test was more written language, while the Beta test was done through the use of more physical materials (Terman, 1918).

One characteristic that drew criticisms toward intelligence testing was the lack of sound theoretical base for the tests (Thorndike, 1990). The original Binet and Simon scale and the original Wechsler-Bellevue scale were not considered to be based on theory and were simply divided into groups of verbally and nonverbally oriented tasks. Moreover, tests that have been developed more recently, such as the WISC-V and The Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman 1990), were more driven by theory or based on a preexisting theory of intelligence (Ittenbach et. al., 1997). The first commonly referred to theory is Spearman's (1904) two-factor theory of intelligence, which is highly dependent on general intelligence, or *g*. Further, Spearman's theory comprises two factors, which include "*g"* (general intelligence) and "*s"* (specific). The "*g"* factor can be measured by almost any mental test (Breit et. al., 2020). Unique variance in each test score can also be associated with a specific (*s*) factor, representing specific cognitive abilities that may be due to individuals' differences in test scores over and above *g* (Breit et. al., 2020). Overall, based on this theory, performance on a test is due to the combination of *g* and the specific factor of that test (Thorndike, 1990).

In contrast to Spearman's theory, Thurstone's theory of the primary mental abilities and group factor theory emphasized that there are a number of groups of different mental abilities which have their own primary factor. These primary factors included: the verbal factor, the number factor, the space factor, the perception factor, the memory factor, the word fluency factor, the induction factor, and the deduction factor (Guilford, 1972). As a result of these primary factors, Thurstone created an intelligence test called the Test of Primary Mental Abilities (PMA) (Thurstone, 1941). Vernon's hierarchical "theory" was a compromise which was meant to bridge the divide between Spearman and Thurstone's theories, through allowing the existence of Spearman's "*g*" factor and Thurstone's group factors (Breit et. al., 2020). This theory describes abilities based on level; the highest level is "*g*," or general intelligence, the next level includes major factors, the next level includes minor factors, and the bottom level are the "*s*" factors, which typically are considered observed variables (indicators). Moreover, based on this theory, different specific cognitive abilities are represented by corresponding factors, while the correlations between the broadest factors can be explained by a higher order factor which reflects *g* (Breit et. al., 2020).

Contemporary developments within intelligence include the “so-called” Cattell-Horn-Carroll (CHC) model (McGrew, 2005; Schneider & McGrew, 2012) and the Three Stratum Theory (Carroll, 1993; Bain & Matthews, 2008). The CHC theory places an emphasis on fluid and crystalized intelligence, while de-emphasizing general intelligence (Geisinger, 2019). Although there have been many revisions and adaptations to intelligence testing, the basic idea of measuring a child’s abilities continues to be similar to what it originally was during the time of Simon and Binet (Ittenbach et. al., 1997).

A “so-called” comprehensive intelligence test can typically take approximately 2 hours or more of assessment, analysis, and interpretation time. Due to this, short forms of major intelligence scales were developed for use when clinicians were faced with limited testing time (Kaufman & Kaufman, 2001). For example, Terman and Merrill (1937) recognized four tasks from each level of the Stanford-Binet that could be administered, when time was a limitation, as a short form compared to the complete battery, while still obtaining a reliable IQ score. Moreover, during this development, it was important “to be as representative of the entire scale as possible with respect to variety, difficulty, interest to subject, sex differences, and validity as measured by correlation with total sample” (Terman & Merrill, 1937, pp. 31-32; Kaufman & Kaufman, 2001). However, the length of short forms were still seen as a concern, as the goal was to shorten the administration time. According to Kaufman and Kaufman (2001), most of the research data that had been used to validate short forms were used from subtest score taken from a complete battery. Through this, all of the estimates would be based on scores from an administration of the complete battery rather than the short, abbreviated version. Due to this, the use of brief tests, when faced with a time limitation, was suggested over the use of short forms. Moreover, the use of brief tests such as the Wechsler Abbreviated Scale of Intelligence (WASI;

The Psychological Corporation, 1999), Wide Range Intelligence Test (WRIT; Glutting et. al., 2000), or K-BIT is recommended (Kaufman & Kaufman, 2001).

Rationale for Using Brief Intelligence Tests

Comprehensive IQ testing can be very useful; however, it can also be time consuming. It is important to note that a so-called “comprehensive” test may not always be needed. According to Kaufman and Kaufman (2001), brief tests, such as the K-BIT, WASI, or WRIT, can be administered in a short amount of time and were reported to have excellent norms, reliability, and validity. Moreover, these brief tests were believed to create a cohesive unit from both theoretical and clinical perspectives (Kaufman & Kaufman, 2001).

In 1917, Doll recommended a brief Binet-Simon scale. Additionally, the Wechsler scales also played a key role in the proposal of short forms, when Wechsler (1939) published the Wechsler-Bellevue Intelligence Scale (W–B) (Silverstein, 1990). However, regarding the validity of using short forms, Weschler (1958) suggested that an examiner can use the results, in a combination of three or even two subtests, to obtain an IQ for screening purposes. Moreover, Wechsler noted that they should not be used for anything beyond screening (Silverstein, 1990). Wechsler also later stated that “reduction in the number of subtests as a time-saving device is unjustifiable and not to be encouraged” (Wechsler, 1967, p. 37) and advised that those who “do not have enough time” should “find the time” (Wechsler, 1967, p. 37) (Silverstein, 1990). Moreover, Levy (1968) suggested that the problem with the use of short forms was related to time being saved and validity lost. Watkins (1986) also suggested that a short form should only be used to provide global intellectual estimates or screening for cognitive disorders, rather than used to obtain a precise IQ score or for education decisions or placement (Silverstein, 1990).

Problems with "Short Forms"

Due to how time consuming a comprehensive test can be, short forms of these comprehensive intelligence tests were designed in an attempt to obtain these results within a short amount of time (Kaufman & Kaufman, 2001). As noted by Thompson (1987), the standardization and technical characteristics of the short form is based on the administration of the entire test, rather than a single subtest or select subtests. Further, due to this, the reliability, validity, and norms of short forms are undetermined. One study administered the full WAIS-R to one group, while another group was first administered the Vocabulary and Block Design subtests. Results of this study showed that participants performed significantly better when administered the two subtests first (Thompson, 1987). These results suggest that norms and scores for short forms may not be valid when they are obtained from norms from the complete battery. Additionally, Silverstein agreed with this suggestion (Kaufman & Kaufman, 2001). Moreover, Silverstein (1971) argued that coefficients of correlation from a part of a test and a whole-test, from the same administration, would violate computation of the coefficients (Kaufman & Kaufman, 2001).

In response to the problems and criticisms of short forms, several brief tests were developed, normed, and validated for the use in abbreviated administration and obtaining an IQ score. These tests included the Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman, 1990) and the Wechsler Abbreviated Scale of Intelligence (WASI; The Psychological Corporation, 1999). Additionally, these two brief tests showed excellent psychometric properties. Due to the publication of these brief intelligence tests, there is no longer a need for the use of short forms with the intention of saving time in the evaluation process (Kaufman & Kaufman, 2001). Overall, avoiding short forms and using one of the previously mentioned brief intelligence tests would be recommended due to each having their own separate standardization and norms. Further, this allows the examiner to avoid concerns related to relying on the norms derived from a complete battery (Kaufman & Kaufman, 2001). Moreover, when used appropriately, a few brief test can be used as a screening tool to determine an estimate of global intelligence (Kaufman & Kaufman, 2001).

Newer Brief Measures of Intelligence

Prior to the development of the Kaufman Brief Intelligence Test (K-BIT; Kaufman & Kaufman 1990), practitioners did not have an adequate brief intelligence test available as an option, besides the Slosson Intelligence Test (SIT; Slosson, 1963) and the Shipley Institute of Living Scale (SILS; Shipley, 1940) (Kaufman & Kaufman, 2001). The K-BIT was the first intelligence test specifically developed and normed for brief administration and the only tool available for brief administration for about a decade, until the publication of the Wechsler Abbreviated Scale of Intelligence (WASI; The Psychological Corporation, 1999). The K-BIT is composed of two subtests, Vocabulary and Matrices, that took about 15 to 30 minutes to administer (Kaufman & Kaufman, 2001). Through these subtests, the K-BIT intended to measure the individual's crystallized (verbal) and fluid (nonverbal) intelligence. Moreover, the K-BIT showed acceptable reliability and validity (Kaufman & Kaufman, 2001).

Following publication of the K-BIT, the WASI, Wide Range Intelligence Test (WRIT; Glutting et. al., 2000), and the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; Wechsler, 2011) were also developed, normed, and validated for brief assessment (Kaufman & Kaufman, 2001). The Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003) and the Reynolds Intellectual Assessment Scales, Section Edition (RIAS-2; Reynolds & Kamphaus, 2015) were also developed for time efficient administration with the intention of assessing general intelligence, or *g*, along with crystallized (verbal) and fluid (nonverbal) intelligence (Reynolds & Kamphaus, 2003; Reynolds & Kamphaus, 2015) The RIAS-2 also measures an individual's memory and processing speed (Reynolds & Kamphaus, 2015). Overall, these tests discussed above can be used for brief administration, when time is limited. However, it is important to note that the WASI and WASI-II were promoted as screeners, while the WRIT, RIAS, and RAIS-2 were not, as they were developed to be reliable and valid measures of general intelligence and its verbal and nonverbal components. A screener intends to give an examiner quick results in a short period of time, which indicates the need for further assessment.

Overall, the WASI-II and RIAS-2 composite scores appear to be similar and purport to measure the same constructs with brief administration time. These constructs include an overall estimate of general intelligence (*g*) along with the individual's verbal and nonverbal estimates. As a result, this present thesis compared the WASI-II and RIAS-2 and examined their relationship. This present thesis examined the construct validity of both the WASI-II and RIAS-2 through convergent and discriminant validity methods.

Chapter 2: Literature Review

Wechsler Abbreviated Scale of Intelligence (WASI)

In 1999, after the introduction of the K-BIT, the first edition of the Wechsler Abbreviated Scale of Intelligence (WASI; The Psychological Corporation, 1999) was designed and published for brief administration. The WASI was an individually administered intelligence test specified by the publisher as a screening instrument and used with individuals ages 6 to 89 (Wechsler, 1999). Further, it is important to note that the WASI was designed to accurately and quickly estimate an individual's intellectual functioning and for the purpose of screening (Wechsler, 1999). The publisher also noted in the WASI Manual (1999), that the WASI was not meant to be a substitute for more comprehensive measures of intelligence or be used in isolation for classification or diagnosis. According to the WASI manual (1999), the WASI is appropriate for the use of:

> "(1) screening to determine if an evaluation using a comprehensive measure is needed, (2) when time is limited, retesting individuals who have already received a comprehensive measure using a Wechsler scale, (3) obtaining an estimate of an individual's IQ when a full battery may not be possible due to limited time, (4) obtaining estimates of current cognitive functioning, (5) obtaining estimates of IQ scores for a variety of purposes" (Wechsler, 1999, p. 5-6).

The WASI contained four subtests that intended to assess various aspects of intelligence, which included fluid (nonverbal reasoning) and crystallized (verbal knowledge) intelligence (Wechsler, 1999). The subtests included Vocabulary, Block Design, Similarities, and Matrix Reasoning; which were chosen due to the strong links with *g*. Further, these results were also chosen due to their use in the WISC-III and WAIS-III (Wechsler, 1999).

After about 30 minutes of administration, the four subtests produced the Full Scale IQ (FSIQ-4). The WASI also produced a Verbal IQ (VIQ) and Performance IQ (PIQ) (Wechsler, 1999). The VIQ was composed of the Vocabulary and Similarities subtests, while the PIQ was composed of the Block Design and Matrix Reasoning subtests (Wechsler, 1999). However, if time is more limited, the Vocabulary and Matrix Reasoning subtests could be administered in 15 minutes to obtain an estimate of a person's general cognitive functioning, resulting in a Full Scale IQ (FSIQ-2) (Wechsler, 1999). The standardization sample of the WASI included 2,245 children and adults ranging between the ages of 6-89 and the standardization sample closely matched data from the 1997 U.S. census (U.S. Bureau of the Census), while being stratified according to gender, race/ethnicity, education level, and geographic region (Wechsler, 1999).

WASI Reliability

Internal Consistency. In order to assess the reliability of the WASI, the split-half (internal consistency) and test-retest (stability) methods were used with each subtest and IQ scale (Wechsler, 1999). Results showed that the average internal consistency reliability coefficients for the four subtests with children between the ages of 6 and 16 ranged between .87 and .92. Moreover, average internal consistency reliability coefficients regarding the VIQ, PIQ, and FSIQ-4 were .93, .94, and .96, respectively; while the FSIQ-2 average reliability coefficient was .93. (Wechsler, 1999). For the adult sample (ages 17 to 89), the average internal consistency reliability coefficients for the four subtests ranged between .92 and .94. Further, average VIQ, PIQ, and FSIQ-4 reliability coefficients were .96, .96, and .98, respectively; while the FSIQ-2 average reliability coefficient was .96 (Wechsler, 1999). Overall, the internal consistency reliability coefficients for the IQ scales for both children and adult samples, were found to be higher than the individual subtests as true score theory would predict.

Stability. The test-retest method was used to assess the stability of the WASI scores (Wechsler, 1999). Participants were assessed twice with a 2 to 12-week retest interval (mean retest interval of 31 days). The average subtest stability coefficients for the child sample ranged between .77 and .86, while the average stability coefficients for the IQ scales ranged between .88 and .93 (Wechsler, 1999). For the adult sample, the average subtest stability coefficients ranged between .79 and .90, while average stability coefficients regarding the IQ scales ranged between .87 and .92. Moreover, the FSIQ-2 stability coefficients for the child and adult samples were .85 and .88, respectively (Wechsler, 1999)

WASI Validity

Three studies were presented in the WASI Manual (Psychological Corporation, 1999) to examine convergent and discriminant validity for the WASI and to investigate its relationships with the Wechsler Intelligence Scale for Children, Third Edition (WISC-III), Wechsler Adult Intelligence Scale, Third Edition (WAIS-III), and Wechsler Individual Achievement Test (WIAT; The Psychological Corporation ,1992) (Wechsler, 1999). Results showed that the WASI correlated moderately with the WISC-III, WAIS-III, and WIAT and are reviewed below.

The WASI and the WISC-III were administered to a sample of 176 children and adolescents, between the ages 6 – 16, in counterbalanced order (Wechsler, 1999). The interval between the two test administrations ranged between 2 to 12 weeks (M = 23 days) and the sample was composed of participants who were 50% female, 50% male, 72.2% White, 6.8% African American, 14.8% Hispanic, and 6.3% of other racial/ethnic origin (Wechsler, 1999). The correlation coefficient for the WASI FSIQ-4 and the WISC-III FSIQ was .87 and was .81 for the WASI FSIQ-2 and WISC-III FSIQ. Further, the correlation coefficients for the WASI and WISC-III in relation to the respective VIQs and PIQs were .82 and .76 (Wechsler, 1999).

The WASI and the WAIS-III were administered in counterbalanced order to a sample of 248 adults with ages ranging 16 to 89 (Wechsler, 1999). The interval between the two test administrations was between 2 to 12 weeks (M = 28 days). The sample was composed of participants who were 58.9% female, 41.1% male, 83.1% White, 11.3% African American, and 5.6% Hispanic (Wechsler, 1999). The correlation coefficient for the WASI FSIQ-4 and the WAIS-III FSIQ was .92 and was .87 for the WASI FSIQ-2 and WAIS-III FSIQ. Moreover, the correlation coefficients for the WASI and WAIS-III in relation to the respective VIQs and PIQs were .88 and .84.

Lastly, the WASI and the WIAT were administered to a sample of 210 participants between the ages of 6 and 19 (Wechsler, 1999). The sample was composed of participants who were 51% female, 49% male, 70.5% White, 9.5% African American, 18.1% Hispanic, and 1.9% of other racial/ethnic origin (Wechsler, 1999). The correlation coefficients for the WASI IQs and the WIAT composite scores were moderate to high and ranged from .53 to .72 (Wechsler, 1999). Moreover, the Manual (Wechsler, 1999) noted that these results were similar to those between the WIAT and WISC-III and the WIAT and WAIS-III.

Independent Studies of the WASI. Axelrod (2002) examined the validity of the WASI in estimating the Verbal IQ (VIQ), Performance IQ (PIQ), and Full Scale IQ (FSIQ) scores of the WAIS-III. The participants included a clinical sample of 72 males who were previously seen for neuropsychological evaluation at a large veteran medical center. All participants were administered the WASI and WAIS-III (Axelrod, 2002). Results showed that while the correlations in the standardization sample comparing the WASI to WAIS-III scores ranged between .84 to 92, the clinical sample in this study had correlations ranging from only .71 to .82 (Axelrod, 2002). The correlation coefficient, when comparing the WAIS-III VIQ to the WASI VIQ, was $r = .75$. Results also showed that the correlation coefficient, when comparing the WAIS-III PIQ to the WASI PIQ, was $r = .74$ (Axelrod, 2002). Lastly, the correlation coefficient when comparing the WAIS-III FSIQ to the WASI FSIQ was $r = .82$. The correlations of WAIS-III scores and other short forms were consistently higher than correlations between the WASI and WAIS-III (Axelrod, 2002). Axelrod (2002) also noted that the WASI PIQ and FSIQ-4 overestimated the comparable WAIS-III scores, while the WASI VIQ score underestimated the WAIS-III VIQ. Further, only about 30% of the cases of the WASI scores fell within one standard error of measurement to the WASI-III scores.

Another study was conducted using exploratory factor analyses with the WASI adult standardization sample (*N* = 1,145) and a diagnostically diverse clinical adult sample (*N* = 201) ranging from 17 – 89 years of age (Ryan et al., 2003). The clinical sample consisted of 173 European Americans, 25 African Americans, 2 Native Americans, and 1 Asian American. Factors I and II accounted for approximately 38.3% and 33.8% of the total variance in the standardization sample, respectively. According to the order of extraction and the minimum-loading criterion, Verbal Comprehension (Factor I) was composed of the Vocabulary and Similarities subtests. Perceptual Organization (Factor II) was composed of the Block Design and Matrix Reasoning subtests (Ryan et al., 2003). As a result of the varimax-rotated solutions, the coefficients of congruence for the clinical and standardization samples were 0.98 for Factor I and 0.99 for Factor II (Ryan et al, 2003). However, orthogonal rotation (varimax) is inappropriate due to Verbal Comprehension and Perceptual Organization factors being substantially correlated.

One study examined convergent validity coefficients and latent factor structures that were consistent with the theoretical models that the WASI and WRIT were constructed to reflect, with a sample of children and adolescents (ages 6-17 years; *N* = 136) and adults (ages 18 years or older; *N* = 16) (Canivez et. al., 2009). Moreover, these tests were intended to be brief measures of general intelligence, along with crystallized (verbal) abilities and fluid- visual (nonverbal) abilities. The WASI and WRIT were administered to the participants, in counterbalanced order, during a single test session. Results showed that there were statistically significant correlations found for the WASI and WRIT subtests (Canivez et al., 2009). Further, higher correlations were observed between similar or identical subtests, which suggested convergent validity for the WASI and WRIT subtests. The correlations between similar global scale IQs were statistically significant: WASI FSIQ–WRIT GIQ (*r* = .86), WASI VIQ–WRIT VIQ (*r* = .84), and WASI PIQ–WRIT VisIQ (*r* = .79) (Canivez et al., 2009). Exploratory Factor Analyses (EFA) provided evidence for strong construct validity between the WRIT Vocabulary and Verbal Analogies subtests and the WASI Vocabulary and Similarities subtests, showing support for their verbal–crystallized factor. Strong evidence was also found between the WRIT Diamonds and Matrices subtests and WASI Block Design and Matrix Reasoning subtests, showing support for their non-verbal–fluid factor (Canivez et al., 2009). The EFA extraction of verbal–crystallized and non-verbal–fluid factors resulted in a correlation of .75. Further, the Confirmatory Factor Analyses (CFA) resulted in a verbal–crystallized and nonverbal–fluid factors correlation of .80 (Canivez et al., 2009). These findings were very similar or almost identical to the factor correlations that were obtained for the WRIT standardization sample and WASI adult standardization subsample (Canivez et al., 2009).

Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II)

The WASI was revised and renormed, resulting in the Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II; Wechsler, 2011) The WASI-II is an individually administered intelligence test that was developed for individuals between 6 to 90 years of age. The revision of the WASI had three main goals (Wechsler, 2011). The first goal was to maintain and enhance its link with the Wechsler Intelligence Scale for Children, Fourth Edition (WISC-IV; Wechsler, 2003) and the Wechsler Adult Intelligence Scale, Fourth Edition (WAIS-IV; Wechsler, 2008) due to their revisions of the WISC-III and WAIS-III following publication of the original WASI (Wechsler, 2011). This was done through comparing the items and scoring standards on the WISC-IV and WAIS-IV to the WASI, which resulted in items being dropped, modified, or retained. The second goal was to increase its applicability across administrators and user-friendliness through the modification of the administration rules, such as the reversal and discontinue rules (Wechsler, 2011). Lastly, the third goal was to improve the psychometric properties of the WASI-II. This was done through updating norms and evidence of reliability and validity and extending floors and ceilings (Wechsler, 2011).

The main focus of the WASI-II was to develop a tool that could accurately and quickly estimate an individual’s intellectual functioning and for screening purposes (Wechsler, 2011). Moreover, the information obtained through screening could be used to determine if there was a need for more comprehensive testing. Similar to the original WASI, the WASI-II contains four subtests that can be used as an alternate form for the WISC-IV and WAIS-IV subtests (Wechsler, 2011; Irby & Floyd, 2013). These subtests include Block Design, Vocabulary, Matrix Reasoning, and Similarities (Wechsler, 2011). Block Design is designed to measure an individual's ability to analyze and synthesize abstract stimuli. Moreover, this subtest requires the examinee to use red and white blocks to recreate a picture of a design that is presented, in a specific amount of time (Wechsler, 2011). Vocabulary measures an individual's word knowledge and verbal concept formation, requiring the examinee to define words that are presented visually or orally (Wechsler, 2011). Matrix Reasoning intends to measure broad visual intelligence, spatial ability, and perceptual organization. This subtest requires individuals to view an incomplete matrix or series and select the response that completes it (Wechsler, 2011). Lastly, Similarities is designed to measure verbal concept formation and reasoning, requiring the examinee to describe similarities between two words that represent common objects or concepts (Wechsler, 2011). Administering all four subtests takes approximately 30 minutes and results in two Full Scale IQs (FSIQs), the FSIQ-4 is derived from all four subtests, and the FSIQ-2 results from the Vocabulary and Matrix Reasoning subtests (Wechsler, 2011). According to the WASI-II Manual

(Wechsler, 2011), all four subtests can be quickly administered to estimate an individual's verbal, nonverbal, and general cognitive functioning. In the case of a time constraint, the FSIQ-2 can be obtained in approximately 15 minutes as an estimate of an individual's general cognitive functioning. The Vocabulary and Similarities scores produce a Verbal Comprehension Index (VCI) and the Block Design and Matrix Reasoning scores produce a Perceptual Reasoning Index (PRI) (Wechsler, 2011).

The WASI-II standardization and norming were based on a sample of 2,300 individuals between the ages 6 and 90 (Wechsler, 2011). All participants were screened prior to the study using exclusionary criteria. This sample was considered to be consistent with and representative of the population of children attending school based on age, sex, race/ethnicity, education level, special education classifications and geographic region through the use of the 2008 U.S. Census data (Wechsler, 2011).

WASI-II Reliability

Internal Consistency. WASI-II internal consistency was estimated using the Spearman-Brown Corrected Split-Half method. The average WASI-II subtest score internal consistency estimates for the child sample (ages 6-16) ranged between .87 and .91. The average internal consistency for the VCI, PRI, FSIQ-4, and FSIQ-2 composites were also reported. Spearman-Brown corrected split-half coefficients were .94 for VCI, .92 for PRI, .96 for FSIQ-4, and .93 for FSIQ-2 (Wechsler, 2011). Likewise, the average internal consistency coefficients for the adult sample (ages 17 to 90) ranged between .90 and .92 for the subtest scores. The average internal consistency coefficients for VCI, PRI, FSIQ-4, and FSIQ-2 composites were also reported for the adult sample and were .95 for VCI, .94 for PRI, .97 for FSIQ-4, and .94 for FSIQ-2 (Wechsler, 2011).

Stability. Test-retest reliability (stability) of the WASI-II was obtained by administering the test twice with a retest interval ranging 12 to 88 days (mean interval of 10 days) with 215 participants within four age bands (ages 6-11 [*N* = 58], 12-16 [*N* = 45], 17-54 [*N* = 53], and 55-90 [*N* = 59]) (Wechsler, 2011). Results with the child sample (6-11 and 12-16 age bands) showed that subtest stability coefficients ranged between .79 to .90, while stability coefficients for the composites ranged between .87 and .95 (Wechsler, 2011). For the adult sample (17-54 and 55-90 age bands) results showed that subtest stability coefficients ranged between .83 to .94, while stability coefficients for the composites ranged between .90 and .96 (Wechsler, 2011).

Interrater Agreement. Interrater reliability analysis assessed interscorer agreement and was done through two different scorers independently scoring responses from the standardization sample. Due to the highly objective and simple scoring criteria, Matrix Reasoning and Block Design produced interrater agreement coefficients between .98 and .99, which indicated very high interrater agreement. Further, due to Vocabulary and Similarities subtests requiring more examiner judgment, 60 cases were randomly chosen from the standardization sample and independently scored by four different scorers. Results showed excellent interrater agreement in scoring the Vocabulary and Similarities subtests with coefficients ranging between .94 and .95 (Wechsler, 2011). Further, these results suggested that although these subtests require more judgment during scoring, they can be scored reliably and by individuals who had no prior experience with the WASI-II scoring criteria (Wechsler, 2011).

WASI-II Validity

In order to obtain evidence for the validity of the WASI-II, test content, internal structure, correlations with other tests, and special group studies were assessed and presented in the WASI-II Manual (2011). Further, this evidence is important to support the use of the WASI-II as a measurement of intellectual ability (Wechsler, 2011). Test content validity was based on how well the items adequately relate to the characteristic or function that is intended to be measured (Wechsler, 2011). It is also related to the format and wording of the items, including the administration and scoring procedures (Wechsler, 2011). According to the WASI-II Manual (2011), the subtests had high *g* loadings, as well as tapping into an individual's cognitive functioning that is important for obtaining a reliable estimate such as verbal and nonverbal abilities. Further, it was claimed that the subtests allow for estimating verbal (crystallized) versus nonverbal (fluid) abilities (Wechsler, 2011).

According to the WASI-II Manual (2011), a scale's internal structure can inform us on the degree to which the test items and elements correspond to the construct that score interpretations are based on. Further, a test's internal structure can be supported by the intercorrelations of the subtests and composites and through factor analyses. An intercorrelation study of the WASI-II was conducted for 23 different age groups. The correlations presented in the WASI-II Manual (2011) illustrated each subtests correlation with other subtests, along with the composite score correlations of *T* scores for the composite score. Moreover, in order to control for inflated correlations, the correlation of a scale was corrected through the removal of that subtest's *T* score from the sum of the *T* scores, for example, Block Design and PRI. Lastly, composite score intercorrelations were presented, along with a correlation matrix for the overall sample (combining all 23 age groups) (Wechsler, 2011).

Results showed that, for the child (ages 6-16) and adult (ages 17-90) samples, all of the subtests correlated with each other at least at a moderate level, with correlations ranging between the .40s and the .70s (Wechsler, 2011). These results also indicated that all subtest correlations were statistically significant ($p < .01$), and provided evidence for convergent and discriminant validity. Moreover, these intercorrelations were similar to those found with the original WASI, WISC-IV, and WAIS-IV and support the observations that *g* is a part of many different types of abilities (Wechsler, 2011). For all age groups, the Vocabulary subtest correlated the highest with the Similarities subtest, with correlations ranging between .64 and .82. Further, for 20 of the 23 age groups, the Block Design subtest correlated the highest with the Matrix Reasoning subtest, with correlations ranging between .44 and .66. For the other three age groups (Age 14, Ages 45-54, and Ages 85-90), Block Design was found to be similarly correlated with the Vocabulary and Similarities subtests and the Matrix Reasoning subtest.

Factor analytic studies, such as exploratory and confirmatory factor analyses, were conducted to assess whether the WASI-II subtests measured the constructs of abilities related to verbal comprehension and perceptual reasoning (Wechsler, 2011). It is important to note that factor analysis should typically include at least three indicator variables in order to adequately define each potential factor (Wechsler, 2011). Further, the data resulting from the WASI-II standardization sample may not be sufficient and may result in an underestimation of how many factors compose the scale due to it only containing two verbal comprehension and two perceptual reasoning subtests.

Exploratory Factor Analyses. It is also important to note that the WASI-II Manual (2011) indicated that all subtests showed high *g* loadings. Further, the Manual also indicated that conducting an exploratory factor analysis that is related to only the Vocabulary, Similarities, Block Design, and Matrix Reasoning subtests can have the potential to increase the risk of underestimating the number of factors in the WASI-II. Due to this, an exploratory factor analysis was conducted based on the combined WASI-II/WISC-IV (N =201) and WASI-II/WAIS-IV (N =182) correlation studies data (Wechsler, 2011). Results supported a factor pattern that separated the verbal comprehension and the perceptual reasoning subtests (Wechsler, 2011). Moreover, the WASI-II Manual (2011) indicated that results provided evidence to support the construct validity of the WASI-II with general support for a four-factor solution for the full Wechsler batteries.

Confirmatory Factor Analyses. A confirmatory factor analysis was conducted using the data from the WASI-II standardization sample for each of the nine groups: the total sample, all children (ages 6-16), all adults (ages 17-90), and six age bands (6-9, 10-13, 14-16, 17-34, and 70-90) (Wechsler, 2011). For each of the confirmatory factor analyses, a one-factor model was compared to a two-factor model. The WASI-II Manual (2011) presented the models: Model 1 (One Factor) — all four subtests on one factor; Model 2 (Two Factors) — two verbal comprehension subtests and two perceptual reasoning subtests. The goodness-of-fit measures that were used to evaluate the factor models were based on the chi-square statistic, along with root mean square error of approximation (RMSEA) and various model-fit statistics (Wechsler, 2011). Overall, the WASI-II Manual (2011) presented results from confirmatory factor analyses supporting the two-factor model best fit the data for the total sample, child sample, adult sample, and all of the age bands. Moreover, the Manual also suggested that the results from the intersubtest correlations, as well as the exploratory and confirmatory factor analyses supported the WASI-II test structure.

Relationship with External Variables. According to the WASI-II Manual (2011), evaluating the relationship between the WASI-II test scores and related external variables may provide additional evidence to support its validity. Further, this can be done through evaluating the relationship of the WASI-II to another instrument that is designed to measure similar constructs. The WASI-II and the WASI were both administered to 142 individuals between the ages of 6-89 years (Wechsler, 2011). The WASI-II Manual (2011) showed that the demographic characteristics for the WASI-II and WASI correlations sample consisted of participants who were 61.3% Female, 38.7% Male, 49.3% White, 12% African American, 26.8% Hispanic, 7% Asian, and 4.9% other. Due to these being two different versions of the same instrument, it was expected that they would have high correlations. These tests were administered in counterbalanced order, with a testing interval of 13 to 117 days (mean internal of 22 days) (Wechsler, 2011). Results showed that the corrected correlation coefficients for the subtest and composite scores from the two tests were all statistically significant and ranged from .71 (Matrix Reasoning) to .91 (FSIQ-4) (Wechsler, 2011).

The WASI-II and the WISC-IV were administered to 201 individuals between the ages of 6-16 (Wechsler, 2011). The WASI-II Manual (2011), reported the demographic characteristics for the WASI-II and WISC-IV correlations sample consisted of participants who were 49.8% Female, 50.2% Male, 53.2% White, 15.9% African American, 21.4% Hispanic, 3% Asian, and 6.5% other. The WASI-II and WISC-IV were administered in counterbalanced order with a testing interval between 12-88 days (mean interval of 21 days). Results showed that the corrected correlation coefficients for the subtest and composite scores between the two tests were statistically significant and the coefficients ranged from .73 (Matrix Reasoning) to .91 (FSIQ-4) (Wechsler, 2011). Moreover, the WASI-II Manual (2011) indicated that these results were expected and suggested the WASI-II subtest and composite scales measure similar constructs to the WISC-IV.

The WASI-II and WAIS-IV were administered to 182 individuals between the ages of 16-90 (Wechsler, 2011). The WASI-II Manual (2011) showed that the demographic characteristics for the WASI-II and WAIS-IV correlations sample consisted of participants who were 65.9% Female, 34.1% Male, 62.1% White, 13.7% African American, 18.1% Hispanic, 1.1% Asian, and 4.9% other. The WASI-II and WAIS-IV were administered in counterbalanced order with a testing interval between 13–91 days (mean interval of 23 days). Results showed that the corrected correlation coefficients for the subtest and composite scores between the two tests were all statistically significant and ranged from .70 (Matrix Reasoning) to .92 (FSIQ-4 – FSIQ), suggesting that the WASI-II and WAIS-IV measured similar constructs (Wechsler, 2011).

The WASI-II and KBIT-2 were also administered to 81 individuals between the ages of 16-88 years (Wechsler, 2011). The WASI-II Manual (2011) illustrated that the demographic characteristics for the WASI-II and KBIT-2 sample consisted of participants who were 59.3% Female, 40.7% Male, 44.4% White, 22.2% African American, 29.6% Hispanic, 1.2% Asian, and 2.5% other. The WASI-II and KBIT-2 were administered in counterbalanced order with a testing interval between 9-75 days (mean interval of 23 days) (Wechsler, 2011). Results showed that the correlations between the WASI-II and KBIT-2 IQ scores were high. The correlation between the WASI-II FSIQ-4 and the KBIT-2 IQ Composite was .91, while the correlation between the WASI-II FSIQ-2 and the KBIT-2 IQ Composite was .87 (Wechsler, 2011). Further, the correlation between the WASI-II VCI and the KBIT-2 Verbal IQ was .88, while the correlation between the WASI-II PRI and the K-BIT-2 Nonverbal IQ was .83 (Wechsler, 2011). Overall, the WASI-II Manual (2011) indicated that due to these results, the WASI-II and KBIT-2 measured similar constructs. There were no published validity studies, to this researcher's knowledge, of the WASI-II compared to other brief measures of intelligence or independent peer review studies in literature.

Overall, based on the evidence reported in the WASI and WASI-II Manuals (Wechsler, 1999; Wechsler, 2011) and the independent studies provided, evidence for the reliability and validity for the WASI and WASI-II has been supported. However, there are no published independent validity studies of the WASI-II compared to other brief measures of intelligence at present. Due to this, additional independent research on the WASI-II is needed.

Reynolds Intellectual Assessment Scales (RIAS)

The Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 2003) is an individually administered general intelligence test that can be administered to individuals between 3 to 94 years of age. The main focus of the development of the RIAS, provided in the professional manual (Reynolds & Kamphaus, 2003), was to provide valid and reliable measurement of *g*, along with estimates of its two largest components, verbal and nonverbal intelligence. This development also placed an emphasis on fluid and crystallized abilities as alternative concepts to nonverbal and verbal abilities, respectively.

The RIAS contained four intelligence subtests, two verbal (crystallized) and two nonverbal (fluid), which combined produce the Composite Intelligence Index (CIX), an estimate of *g*. RIAS subtests included Guess What (verbal), Odd-Item Out (nonverbal), Verbal Reasoning (verbal), and What's Missing (nonverbal) (Reynolds & Kamphaus, 2003). Guess What measures verbal reasoning, along with vocabulary and language development. This subtest requires the examinee to provide an answer based on a set of two to four clues about an object or concept (Reynolds & Kamphaus, 2003). Odd-Item Out is designed to measure nonverbal reasoning skills, along with spatial ability and visual imagery. This subtest requires individuals to choose a picture that does not belong or go with the others, when presented with a picture of five to seven pictures or drawings (Reynolds & Kamphaus, 2003). Verbal Reasoning measures verbal-analytical reasoning ability, with fewer vocabulary and general knowledge demands compared to Guess What. For this subtest the examinee is presented with a verbal analogy and responds with one or two words that complete the idea (Reynolds & Kamphaus, 2003). What's Missing is designed to measure nonverbal reasoning through conceptualizing a picture and analyzing its essential elements, requiring the examinee to point out the missing essential element in the picture presented (Reynolds & Kamphaus, 2003). These four subtests produce the three intelligence indexes: Verbal Intelligence Index (VIX), Nonverbal Intelligence Index (NIX), and Composite Intelligence Index (CIX) (Reynolds & Kamphaus, 2003). The CIX is composed of the VIX and NIX. The Guess What and Verbal Reasoning subtests make up the VIX, while the Odd-Item Out and What's Missing subtests make up the NIX (Reynolds & Kamphaus, 2003). The RIAS also provided two memory subtests that could be used and produced the Composite Memory Index (CMX). It took about 20 to 25 minutes to administer all four intelligence subtests and an additional 10 to 15 minutes when including the memory subtests (Reynolds & Kamphaus, 2003). Moreover, the Guess What and Odd-Item Out subtests could also be administered as a general intelligence screener, and specified as the Reynolds Intellectual Screening Test (RIST; Reynolds & Kamphaus, 2003), which takes about 10 minutes to administer (Reynolds & Kamphaus, 2003).

The RIAS was standardized on a sample of 2,438 individuals that was considered to be representative of the population and provided a variety of standardized scores. The scores resulting from each subtest were scaled as *T* scores with a mean of 50 and a standard deviation of 10 (Reynolds & Kamphaus, 2003). The indexes were scaled based on a mean of 100 and standard deviation of 15, typically associated with intelligence tests. The RIAS also provided users with percentile ranks, *T* scores, *z* scores, normal curve equivalents (NCEs), and stanines (Reynolds & Kamphaus, 2003).

RIAS Reliability

Internal Consistency. As presented in the RIAS Manual (Reynolds & Kamphaus, 2003), the internal consistency of the RIAS items was examined through the use of Cronbach's (1951) coefficient alpha, while estimates of internal consistency for the RIAS indexes were obtained through a simplification of Guilford's (1954) formula. Other methods to evaluate RIAS reliability included content sampling, time sampling, and interscorer differences. Results showed that for all RIAS subtest scores the alpha coefficients across all age groups were .84 or higher (Reynolds & Kamphaus, 2003). Further, median alpha reliability coefficients were ≥ .90 for all subtests. Reliability estimates for the RIAS indexes resulted in median reliability coefficients across all age groups that were ≥ .94 (Reynolds & Kamphaus, 2003).

Stability. RIAS test score stability was assessed using the test-retest method. Participants ($N = 86$) between 3 and 82 years of age were tested twice with a 9 to 39-day retest interval (median retest interval of 21 days) (Reynolds & Kamphaus, 2003). The sample was composed of participants who were 54.7% female, 45.3% male, 83.7% White, 4.7% African American, 1.2% Hispanic, and 10.5% of other racial/ethnic origin. Uncorrected stability coefficients for the RIAS subtests and indexes for the total test-retest sample all exceeded .70, while corrected values, except two, ranged from .83 to .91 (Reynolds & Kamphaus, 2003).

Interrater Agreement. Lastly, interscorer reliability was assessed through two employees of the publisher's staff independently scoring 35 randomly selected protocols from the normative sample. Results suggested very high interscorer reliability of the RIAS with correlations of .99 for Guess What, 1.00 for Verbal Reasoning, 1.00 for Odd-Item Out, 1.00 for What's Missing, .95 for Verbal Memory, and 1.00 for Nonverbal Memory (Reynolds & Kamphaus, 2003). Overall, the results of the various reliability methods suggested very strong estimates and supported the reliability and accuracy of the RIAS. Results also suggested the reliability of use across age, gender, and ethnicity (Reynolds & Kamphaus, 2003).

RIAS Validity

The validity of the RIAS was assessed through analyses of the internal structure of the RIAS and its correlations with external variables. The internal structure of the RIAS was analyzed through internal consistency, which was previously discussed within the reliability section, and factor analyses of the intercorrelations of the subtests (Reynolds & Kamphaus, 2003). Exploratory and confirmatory factor analyses were conducted by the test authors to assess the validity of the RIAS.

Exploratory Factor Analyses. Exploratory factor analyses were conducted using the principal factors (PF) method. According to the RIAS manual (2003), scree plots from the exploratory analyses, for both four and six subtest analyses, suggested that two and three factor solutions might be viable. The sample was divided in to five age groups to reflect common developmental stages including ages 3-5 (early childhood), 6-11 (childhood), 12-18 (adolescence), 19-54 (adulthood), and 55-94 (senior adulthood). Exploratory factor analyses results showed that, within all age groups, the *g* factor was found to be very strong and verbal and nonverbal subtests were clearly two separate factors that corresponded with their corresponding indexes (VIX and NIX) (Reynolds & Kamphaus, 2003). Moreover, results showed that all but one of the loadings on the first unrotated factors, labeled *g* loadings, were $\geq$ .60 across all ages, while 13 out of the 20 loading were $\geq$ .70. These results also showed that the verbal subtests (Guess What and Verbal Reasoning) were the strongest measures of *g*, while the nonverbal subtests (Odd-Item Out and What's Missing) were the weakest measures of *g*

(Reynolds & Kamphaus, 2003). Reynolds and Kamphaus concluded that the RIAS intelligence subtests were good measures of *g* and the strongest interpretative support was given to the CIX.

Confirmatory Factor Analyses. In regard to confirmatory factor analyses, three theoretical models were assessed based on the theoretical views of the structure of the RIAS (Reynolds & Kamphaus, 2003). The models presented in the RIAS Manual (2003) included Model 1 which proposed that the RIAS was a measure of general intellectual abilities; Model 2 which proposed that the RIAS was a measure of verbal and nonverbal abilities; and Model 3 which proposed that the RIAS was a measure of verbal, nonverbal, and memory abilities. In order the test the relative fit of the three models, the LISREL-VI program (Joreskog & Sorbom, 1987) was used to compare the resulting chi square (x^2), residuals, root mean square error of approximation (*RMSEA*), and other model-fit statistics (Reynolds & Kamphaus, 2003). Results showed that for Model 1, general intelligence clearly fit better with the four subtests compared to the six subtests, x^2 = 8.17 to 20.57 and *RMSEA* ranging from .10 to .14. These results suggested that, similar to exploratory factor analyses, the RIAS was dominated by a large first factor (Reynolds & Kamphaus, 2003).

Model 2 was also found to have a good fit. Similar to Model 1, Model 2 was found to fit better with four subtests compared to six. Moreover, chi-square values were between .22 and 1.49 and RMSEAs were less than .01 for ages 3 to 54 years and .04 for ages 55 and older (Reynolds & Kamphaus, 2003). The RIAS Manual (2003) indicated that these findings suggested that the fit of a three-factor model was not good. Model 3 was not found to fit as well as Model 2, x^2 = 14.14 to 37.48 and RMSEA ranging from .01 to .09. Due to these results, it was suggested in the RIAS Manual (2003) that although the four subtest two factor model was recommended, six subtests for assessing verbal and nonverbal intelligence might be justifiable. Overall, RIAS confirmatory factor analyses suggested that the CIX, VIX, and NIX had evidence of factorial validity (Reynolds & Kamphaus, 2003). However, it was recommended that further research be conducted regarding the CMX with a variety of clinical and nonclinical samples. It was also recommended that it was best not to use all six subtests to measure general intelligence (Reynolds & Kamphaus, 2003).

Relationships with External Variables. Another important aspect of the validity process was the evaluation of the relationship of the RIAS with external variables. A variety of external variables were chosen to be investigated with the RIAS which included: developmental variables, demographic variables, relations with other tests, and clinical status (Reynolds & Kamphaus, 2003). The correlations between age and raw scores for the four subtests, across all individuals ages 3 -18 years, ranged between .79 and .87, while the correlation for Verbal Memory was .53 and Nonverbal Memory was .83 (Reynolds & Kamphaus, 2003). The correlations between gender and raw scores for the four subtests, across females and males, ranged between .78 and .87, while the correlation for Verbal Memory was .53 for both genders and Nonverbal Memory was .85 for males and .82 for females (Reynolds & Kamphaus, 2003). The correlations between ethnicity and raw scores for the four subtests, across White, African American, and Hispanic American, ranged between .76 and .91, while the correlation for Verbal Memory ranged between .49 and .52 and Nonverbal Memory was ranged between .81 and .89 (Reynolds & Kamphaus, 2003). Overall, the RIAS Manual (2003) suggested that these results supported the developmental nature of the constructs latent to the RIAS subtest, along with their generalizability across ethnic groups and gender.

According to the RIAS Manual (Reynolds & Kamphaus, 2003), it was important for the RIAS, a measure of general intelligence, to correlate well with another test intended to measure *g* and related constructs. The relationship between the RIAS and the Wechsler Intelligence Scale for Children, Third Edition (WISC-III; Wechsler, 1991) was examined. The RIAS Manual (Reynolds & Kamphaus, 2003) illustrated that demographic characteristics for the RIAS and WISC-III sample (*N* = 54) included participants who were 48.1% Female, 51.9% Male, 72.2% White, 13% African American, 14.8% Hispanic, and 0% other. The results indicated that the RIAS indexes were highly correlated with the WISC-III Full Scale IQ (FSIQ) (Reynolds & Kamphaus, 2003). Further, these correlations ranged from .60 (NIX to FSIQ) to .78 (VIX to FSIQ). Reynolds and Kamphaus (2003) suggested that the low correlation with NIX from the RIAS might be due to the increased emphasis on motor and language skills on the WISC-III Performance IQ (PIQ). The RIAS indexes correlated the lowest with the WISC-III PIQ, with correlations ranging from .33 (NIX to PIQ) to .44 (VIX to PIQ) (Reynolds & Kamphaus, 2003). Additionally, the RIAS indexes correlated the highest with the WISC-III VIQ, with correlations ranging from .60 (NIX to VIQ) to a high of .86 (VIX to VIQ), which was also the highest correlation with the RIAS indexes and WISC-III IQs. Most of the RIAS subtests showed significant correlations with the WISC-III subtests, except for Coding, Symbol Search, and Object Assembly, which require motor speed for good performance (Reynolds & Kamphaus, 2003).

The relationship between the RIAS and the Wechsler Adult Intelligence Scale, Third Edition (WAIS-III; Wechsler, 1997a) was also assessed and presented in the RIAS Manual (2003). The demographic characteristics for the RIAS and WAIS-III sample (*N* = 31) included participants who were 38.7% Female, 61.3% Male, 58.1% White, 25.8% African American, 9.7% Hispanic, and 6.5% other. All but two of the correlations between the RIAS indexes and WAIS-III IQs exceeded .70 (*r* = .67 between the NIX and VIQ and *r* = .61 between the VIX and

PIQ) (Reynolds & Kamphaus, 2003). Regarding the RIAS indexes and WISC-III FSIQ, the correlations ranged from .70 (VIX to FSIQ) to .79 (CMX to FSIQ). Further, the relationship of the RIAS subtests and the WAIS-III subtests were similar to the results previously discussed with the WISC-III. The RIAS subtests had lowest correlations with the WAIS-III Digit Symbol – Coding and Symbol Search subtests, indicating that the RIAS scores are not related to motor speed and coordination (Reynolds & Kamphaus, 2003).

The relationship of the RIAS and the Wechsler Individual Achievement Test (WIAT; The Psychological Corporation, 1992) was also assessed and presented in the RIAS Manual (Reynolds & Kamphaus, 2003). The demographic characteristics for the RIAS and WIAT sample ($N = 78$) included participants who were 52.6% Female, 47.4% Male, 74.5% White, 10.3% African American, 11.5% Hispanic, and 3.8% other. Results showed that the RIAS indexes correlated well with the WIAT composite scores. The highest correlations were found with the VIX and CIX with the WIAT composite scores, with correlations ranging between .60 (RIAS CIX-WIAT Writing Composite) and .70 (RIAS VIX-WIAT Language Composite) (Reynolds & Kamphaus, 2003). It was reported in the RIAS Manual (2003) that results indicated that the RIAS had strong predictive value for educational achievement.

Independent Studies of the RIAS. One study investigated the factor structure of the RIAS with an independent sample ($N = 1{,}163$) of referred students between the ages 6-18 years (Nelson, et. al., 2007). Factor extraction using Horn's parallel analysis (HPA; Horn, 1965), a rationale and test for the number of factors in factor analysis, and Minimum Average Partial (MAP) analysis (Velicer, 1976) to determine the number of components from the matrix of partial correlations were investigated. Moreover, exploratory factor analyses were conducted with both orthogonal and oblique rotations and higher-order factor analyses using the Schmid and Leiman procedure (Schmid & Leiman, 1957) (Nelson et al., 2007). According to Nelson et al. (2007), extraction of only one factor was supported by all factor extraction criteria. Additionally, the oblique rotations showed different results compared to the orthogonal rotations. The higher-order factor analysis also indicated that the general intelligence factor accounted for the largest amount of variance, while also failing to support the proposed three-factor solution (Nelson et al., 2007).

Another study (Dombrowski et. al., 2009) investigated the factor structure of the RIAS using the same factor extraction and exploratory factor analyses procedures as Nelson et al. (2007). The sample included the 2,438 individuals, ages 3 to 94 years, that were used in the standardization sample. Results indicated that the RIAS was a single factor test. Moreover, the Schmid-Leiman method suggested that all of the RIAS subtests were consistent with their theoretical constructs (Dombrowski et. al., 2009). The results also showed that the largest amount of variance was accounted for by the *g* factor.

Another study examined the convergent relationship between the RIAS and the WISC-IV with a sample of 48 elementary school aged students who were referred for psychological testing (Edwards & Paulin, 2007). These participants were referred for academic difficulties and high academic achievement. All participants were administered both the RIAS and WISC-IV, in counterbalanced order (Edwards & Paulin, 2007). Results showed that there were significant positive correlations between conceptually similar and conceptually dissimilar subtests on the RIAS and WISC-IV. Further, these results showed that the correlation coefficient between the RIAS VIX and the WISC-IV VCI was .90, while the correlation coefficient between the RIAS NIX and the WISC-IV PRI was .72 (Edwards & Paulin, 2007). The correlation coefficient between the RIAS CIX and the WISC-IV FSIQ was .90. Moreover, the overall mean scores were significantly higher for the RIAS compared to the WISC-IV scores (Edwards & Paulin, 2007). The results supported the hypothesis that there would be a relationship between the composite scores of the RIAS and the composite scores of the WISC-IV that were intended to measure similar constructs. Further, the significant, strong correlations and substantial shared variance are believed to support the convergent validity of these composite scores (Edwards & Paulin, 2007).

One study examined the relationship of the RIAS and the WAIS-III through the comparison of scores from both, with a sample ($N = 81$) of college students who had been diagnosed with a Learning Disability, Attention-Deficit Hyperactivity Disorder, or a combination (Smith et. al., 2009). Each participant received administrations of both RIAS and WAIS-III, with the WAIS-III being administered first. Results showed that the RIAS and WIAS-III were significantly correlated on all scales, with correlations ranging from a high of .80 (RIAS VIX–WAIS-III VIQ) to .22 (RIAS VIX–WAIS-III PSI) (Smith et al., 2009). This correlation clearly illustrates discriminant/divergent validity as verbal and processing speed are very different constructs.

Krach et. al. (2009) evaluated the scores of the RIAS in comparison with the scores of the Woodcock-Johnson Tests of Cognitive Abilities-Third Edition (WJ-III; Woodcock et. al., 2001) with a sample of 107 undergraduate student volunteers. Results showed that there were moderate to high correlations between the RIAS scores compared to the corresponding scores on the WJ-III. Moreover, substantially lower correlations were found between the RIAS NIX and the WJ-III fluid ability scores (Krach et al., 2009). The corrected correlation coefficient between the RIAS CIX and the WJ-III General Intellectual Ability (GIA) Composite was .75 (Krach et al., 2009). Further, the corrected correlation coefficient between the RIAS VIX and the WJ-III Comprehension-Knowledge (*Gc*) Composite was .88, while the corrected correlation coefficient between the RIAS NIX and the WJ-III Fluid Reasoning (*Gf*) Composite was .54. Scores from the RIAS were also found to be higher than scores from the WJ-III.

One study examined the factor structure of the RIAS across three samples of school-aged children. These samples included: the RIAS norming sample, the data reported by Nelson, et. al., and a new and independent sample of students who were referred for special education services (Beaujean et. al., 2009). Based on the confirmatory factor analyses methods used, a two-factor model (verbal and nonverbal factors) fit the three data sets better than the one-factor model. The two-factor model also showed partial measurement invariance across the three data sets (Beaujean et. al., 2009). Moreover, the verbal factor was found to show stronger invariance, construct reliability, and overall interpretability compared to the nonverbal factor.

Nelson and Canivez (2012) examined the structural, convergent, and incremental validity of the RIAS with a large clinical sample ($N = 521$) of adolescents and adults who were seeking psychological evaluation at a university-based clinic. The exploratory factor analysis indicated one factor, while the confirmatory factor analysis indicated that a one-factor model was a good fit but the two-factor model was a better fit to data. Moreover, the correlations with other measures that intend to measure the same constructs supported the convergent validity of the RIAS VIX but not the NIX (Nelson & Canivez, 2012). Incremental validity analyses also suggest that the CIX accounted for a medium to large amount of academic achievement variance, while the NIX and VIX account for a small amounts of unique variance.

Beaujean and McGlaughlin (2014) examined the invariance of the RIAS's measurement of general cognitive ability, or *g*, for Black and White students that were referred for special education. Results showed that the subtests showed strict invariance, while *g*'s variance was not the same across the two groups. Moreover, the group of White students had a higher mean ($d =$

0.60) and almost twice the variance in *g* when compared to the group of Black students (Beaujean & McGlaughlin, 2014). Beaujean and McGlaughlin noted that although there were between-group mean differences in the subtest scores and the CIX due to the between-group differences in *g*, the Black group of students used a more narrow range of *g* when answering the RIAS items compared to the White group of students (Beaujean & McGlaughlin, 2014).

Table 1 ***Nine primary goals for the development of the Reynolds Intellectual Assessment Scale, 2nd Edition (RIAS-2)***
Goal 1: Provide a reliable and valid measurement of *g* and its two primary components, verbal and nonverbal intelligence, with close correspondence to crystallized and fluid intelligence
Goal 2: Provide a practical measurement device in terms of efficiency of time, direct costs, and information needed from a measure of general intelligence
Goal 3: Allow continuity of measurement across all developmental levels for ages 3 – 94 years for both clinical and research purposes
Goal 4: Substantially reduce or eliminate dependence on motor coordination and visual-motor speed in the measurement of general intelligence
Goal 5: Eliminate dependence on reading in the measurement of intelligence
Goal 6: Provide accurate prediction of basic academic achievement at levels at least comparable to that of intelligence tests twice its length
Goal 7: Apply familiar, common concepts that were clear and easy to interpret, and to couple these with simple administration and scoring
Goal 8: Eliminate items that showed differential item functioning associated with gender or ethnicity
Goal 9: Provide for the verbal and nonverbal assessment of memory

Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2)

A revision of the original RIAS resulted in the development of the Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2; Reynolds & Kamphaus, 2015). The RIAS-2 is an individually administered test of general intelligence for individuals 3 – 94 years. The Manual stated nine primary goals for the development of the RIAS-2 (Reynolds & Kamphaus, 2015). The nine goals are presented in Table 1.

During this revision, two subtests were added that were intended to target a so-called "processing speed" factor, resulting in a total of 8 subtests. Moreover, similar to the original version of the RIAS, the RIAS-2 allows the user to administer two subtests as a screener, the Reynolds Intellectual Screening Test, Second Edition (RIST-2), in about 12 minutes (Reynolds & Kamphaus, 2015). The four RIAS-2 general intelligence subtests can be administered in about 20 to 25 minutes. The revision also resulted in the addition of one and two more items on the verbal and nonverbal subtest discontinue rules, respectively, which can take slightly more administration time. The two memory and two processing speed subtests typically take about 10 minutes each to administer. (McNicholas & Floyd, 2016; Reynolds & Kamphaus, 2015). Similar to the original RIAS, the Verbal Intelligence Index (VIX) and Nonverbal Intelligence Index (NIX) are composed of two subtests each. Moreover, the sum of the *T* scores provided by the four VIX and NIX subtests produces the Composite Intelligence Index (CIX).

The RIAS-2 standardization and norming sample included 2,154 individuals between the ages of 3 to 94 matched to the 2012 U.S. Census population data and were representative of the U.S. population (Reynolds & Kamphaus, 2015). The standardization sample included participants who were 50.2% Female, 49.8% Male, 58.4% White, 12.9% African American, 20.2% Hispanic, and 8.5% other. Similar to the original RIAS, the scores resulting from each subtest are reported as *T* scores scaled with a mean of 50 and a standard deviation of 10 and the indexes are scaled based with a mean of 100 and standard deviation of 15, typical of intelligence tests (Reynolds & Kamphaus, 2015). The RIAS-2 also provides users with percentile ranks, *T* scores, *z* scores, normal curve equivalents (NCEs), and stanines (Reynolds & Kamphaus, 2015).

RIAS-2 Reliability

Internal Consistency. To assess the reliability of the RIAS-2, three sources of error variance were assessed including content sampling, time sampling, and interscorer differences. As with the original RIAS, the internal consistency of the RIAS-2 test scores were estimated using Cronbach's (1951) coefficient alpha. RIAS-2 subtest score reliability across all age groups was assessed and resulted in internal consistency coefficients that ranged between .80 and .99 (Reynolds & Kamphaus, 2015). These findings were also similar among gender and race/ethnicity. RIAS-2 indexes also showed high internal consistency coefficients ranging between .86 and .99 (Reynolds & Kamphaus, 2015). CIX alpha coefficients ranged between .91 and .97 across all age groups (*Mdn* = .93) (Reynolds & Kamphaus, 2015).

***Stability*.** Assessment of the RIAS-2 test score stability was examined using the test-retest method with a retest interval of 7 to 43 days (*Mdn* = 18 days) (Reynolds & Kamphaus, 2015). The RIAS-2 was twice administered to a sample of 97 individuals between the ages of 3–72 and the total test-retest sample consisted of participants who were 50.5% Female, 49.5% Male, 51.5% White, 8.2% African American, 28.9% Hispanic, and 11.3% other (Reynolds & Kamphaus, 2015). Stability coefficients exceeded .83 in all cases but four (Odd-Item Out, Verbal Memory, Nonverbal Memory and Speeded Picture Search) across the total sample. Corrected test-retest stability coefficients for the RIAS-2 indexes for the total sample exceeded .79 (Reynolds & Kamphaus, 2015).

Interrater Agreement. Interscorer reliability of the RIAS-2 was conducted with two of the publisher's employees independently scoring 35 randomly selected protocols and resulted in perfect or almost perfect correlations: Guess What, r = 1.00; Odd-Item Out, r = .99; Verbal Reasoning, r = 1.00; What's Missing, r = 1.00; Verbal Memory, r = .99; Nonverbal Memory, *r* = .99; Speeded Name Task, *r* = 1.00; Speeded Picture Search, *r* = 1.00 (Reynolds & Kamphaus, 2015).

RIAS-2 Validity

The validity of the RIAS-2 was assessed and reported in the Manual through analyses of the internal structure of the RIAS-2 and its correlations with external variables. The internal structure of the RIAS-2 was analyzed through internal consistency, which was previously discussed within the reliability section above, and factor analyses of the subtest intercorrelations (Reynolds & Kamphaus, 2015). Exploratory and confirmatory factor analyses were conducted to assess the structural validity of the RIAS-2 and reported in the Manual.

Exploratory Factor Analyses. Exploratory factor analyses were conducted using the principal factors (PF) method. According to the RIAS-2 Manual (2015), scree plots and eigenvalues were assessed to determine the appropriate number of factors to extract based on an eight-subtest analyses. This analysis suggested that two and three factor solutions might be viable. Further, it was reported in the RIAS-2 Manual (2015) that the wide age range, when using the total sample, may mask any developmental shifts that could emerge. Due to this, the sample was divided into four age groups to reflect common developmental stages and included ages 3-5, 6-17, 18-30, and 31-94. Results showed that the *g* factor was found to be strong for the RIAS-2 (Reynolds & Kamphaus, 2015). Moreover, all but two of the first unrotated factor loadings (*g* loadings) were .43 or higher across all ages, while 23 of the 32 *g* loadings were .43 or higher across gender (Reynolds & Kamphaus, 2015). According to the factor loadings, the four intelligence subtests were found to be good measures of *g*. However, the verbal subtests were the highest (Reynolds & Kamphaus, 2015). Overall, due to these results, the RIAS-2 Manual (2015) specifies that the RIAS-2 subtests are good measures of *g* and the strongest interpretative support is given to the CIX. Moreover, the results showed that the factor structure of the RIAS-2 was found to be similar across gender and ethnic groups, which supported the interpretation of the RIAS-2 indexes across these groups (Reynolds & Kamphaus, 2015).

Confirmatory Factor Analyses. Following the exploratory factor analyses, confirmatory factor analyses were conducted to examine the fit of models suggested by exploratory analyses (Reynolds & Kamphaus, 2015). During the confirmatory factor analyses, four groups of theoretical models were tested. The groups specified in the RIAS-2 Manual (2015) included Models 1-4: The one-factor models hypothesized that the RIAS-2 was a measure of general intellectual abilities; Models 5-8: The two-factor models hypothesized that the RIAS-2 was a measure of verbal and nonverbal abilities; Models 9-13: The three-factor models hypothesize that the RIAS-2 is a measure of verbal and nonverbal abilities with either processing speed or memory abilities as the third factor; and Model 14: The four-factor model hypothesized that the RIAS-2 was a measure of verbal, nonverbal, memory abilities, and processing speed abilities. In order to test the relative fit of the models, the AMOS 22.0 program (Arbuckle, 2006, 2013) was used to compare the resulting chi square (x^2), residuals, root mean square error of approximation (*RMSEA*), and other model-fit statistics (Reynolds & Kamphaus, 2015). Results showed that the best fitting model of the one-factor models (general intelligence), was Model 3 (Reynolds & Kamphaus, 2015). Model 3 included the four core IQ subtests with the two processing speed subtests, while completely excluding the memory subtests. The RIAS-2 Manual (Reynolds & Kamphaus, 2015) stated that although these results were strong for a one-factor model, similar to the results of the exploratory factor analyses, the RMSEAs are still high enough to advocate for the exploration of the two- and three-factor models.

Results showed that the best fitting model of the two-factor models, was Model 7 (Reynolds & Kamphaus, 2015). Further, Model 7 included the four core IQ subtests with the two processing speed subtests, while excluding the memory subtests. Results showed that the best fitting model, regarding the three-factor models, was Model 10 (Reynolds & Kamphaus, 2015). Model 10 included the four core IQ subtest with the two processing speed subtests, while also excluding the memory subtests. According the RIAS-2 Manual (Reynolds & Kamphaus, 2015), Model 10 was the single best fitting model that was tested, specifically due to the three factors representing Verbal IQ (GWH, VRZ), nonverbal IQ (OIO, WHM), and processing speed (SNT, SPS). Results also showed that the four-factor model did not fit these data well, which was expected based on the exploratory factor analyses (Reynolds & Kamphaus, 2015). Overall, due to the confirmatory factor analyses, the RIAS-2 Manual (2015) suggested that results showed evidence to support the factorial validity of the CIX, VIX, NIX, and SPI. It was further recommended that, due to these findings, it was not necessary to use all eight subtests when measuring general intelligence (Reynolds & Kamphaus, 2015).

Relationships with External Variables. Another important aspect of validity is the evaluation of the relationship of the RIAS-2 to external variables. A variety of external variables were chosen for investigation with the RIAS-2 and included developmental variables, demographic variables, relations with other tests, and clinical status (Reynolds & Kamphaus, 2015). The correlations between age and raw scores for each subtest, calculated for the primary developmental stage (ages 3-18), typically exceeded .80. Moreover, the results were similar regarding the correlations between this age range and subtest raw scores by gender and by ethnicity (Reynolds & Kamphaus, 2015). According to the RIAS-2 Manual (Reynolds & Kamphaus, 2015), these results suggested that the RIAS-2 raw scores increase with age in a moderately constant manner across the subtests. Further, lower correlations were found for Verbal Memory, however, the publisher suggested that this might be due to the method of administration associated with these subtests.

According to the RIAS Manual (Reynolds & Kamphaus, 2015), as a measure of general intelligence it was important that the RIAS-2 correlated well with other tests that measure *g* and related constructs. Moreover, it was also expected that the RIAS-2 should correlate well with the original RIAS and an individual's performance on the RIAS-2 should be similar to their performance on the RIAS. To examine the relationship of the RIAS-2 and the RIAS, a subsample of individuals ($N = 25$) from the RIAS-2 standardization sample was also administered the RIAS (Reynolds & Kamphaus, 2015). The demographic characteristics for the RIAS-2 and RIAS comparison sample included participants who were 48% Female, 52% Male, 52% White, 4% African American, 40% Hispanic, and 4% other. Results showed that the RIAS mean indexes ranged from 97.8 (VIX, CIX) to 99.9 (NIX), while the RIAS-2 mean indexes ranged from 94.2 (VIX) to 98.2 (NIX) (Reynolds & Kamphaus, 2015). Further, the subtest correlations between the two tests were all statistically significant, ranging from .71 (OIO) to .93 (GWH, VRM). The composite index score correlations were also statistically significant, ranging from .72 (NIX) to .91 (VIX, CIX) (Reynolds & Kamphaus, 2015). These data supported the consistency of the item content and performance outcomes between the RIAS and RIAS-2.

The RIAS-2 Manual illustrated examinations of the relationships of the RIAS-2 with the Wechsler Intelligence Scale for Children–Fourth Edition (WISC-IV; Wechsler, 2003), the Wechsler Adults Intelligence Scale–Fourth Edition (WAIS-IV; Wechsler, 2008), and the Wechsler Preschool and Primary Scale of Intelligence–Fourth Edition (WPPSI-IV; Wechsler, 2012). In order to examine the relationship between the RIAS-2 and the WISC-IV, the two tests were administered to a sample of 92 children and the results showed that the RIAS-2 indexes correlated highly with the WISC-IV Full Scale IQ (FSIQ). The correlation coefficient between the RIAS-2 CIX and the WISC-IV FSIQ was .77. Further, the correlation coefficient between the RIAS-2 VIX and the WISC-IV VCI was .76, while the correlation coefficient between the RIAS-2 NIX and the WISC-IV PRI was .59 (Reynolds & Kamphaus, 2015). The highest correlations were those found with those scores more associated with *g* (Reynolds & Kamphaus, 2015).

In order to examine the relationship between the RIAS-2 and the WAIS-IV, the two tests were administered to 72 adults (Reynolds & Kamphaus, 2015). Results showed that the correlations between the RIAS-2 indexes and the WAIS-IV composites ranged from .23 (RIAS-2 Speeded Processing Index (SPI) with WAIS-IV Perceptual Reasoning) to .77 (RIAS-2 VIX with WAIS-IV Verbal Comprehension) (Reynolds & Kamphaus, 2015). Further, these results provide discriminant/divergent evidence as processing speed is not related to general intelligence. Similar to the WISC-IV, the highest correlations were found to be indexes associated with *g*.

Lastly, the RIAS-2 and the WPPSI-IV were administered to 28 children and results showed that the correlations between the RIAS-2 indexes and the WPPSI-IV composites ranged from .63 to .74 (Reynolds & Kamphaus, 2015). The correlation coefficient between the RIAS CIX and the WPPSI-IV FSIQ was .69. Further, the correlation coefficient between the RIAS VIX and the WPPSI-IV VCI was .76, while the correlation coefficient between the RIAS NIX and the WPPSI-IV PRI was .45 (Reynolds & Kamphaus, 2015).

Overall, based on the evidence reported in the RIAS and RIAS-2 Manuals (Reynolds & Kamphaus, 2003; Reynolds & Kamphaus, 2015) and the independent RIAS and RIAS-2 studies reviewed, strong evidence for the reliability and validity for the RIAS and RIAS-2 has been supported. However, there are no published independent reliability or validity studies of the RIAS-2 compared to other measures of intelligence at present. Due to the availability of other brief intelligence measures, such as the WASI-II, it would be beneficial to conduct additional independent examinations. Independent studies must be conducted to replicate the findings presented in the test materials. This would allow for further evidence to be obtained regarding the reliability and validity of the RIAS-2 as a measure of an individual's general intelligence and its verbal and nonverbal estimates.

Purpose of the Study

Currently, there are no peer reviewed published independent comparisons between the WASI-II and RIAS-2. Other than the studies presented in the test manuals, there are few published validity studies that have been conducted for the WASI-II and RIAS-2. One purpose of this present study was to assess the relationship between the WASI-II and RIAS-2 through evaluating their construct validity. Both the WASI-II and RIAS-2 purport to measure *g*, verbal/crystallized, and nonverbal/fluid estimates of intelligence. Examining the construct validity of the WASI-II and RIAS-2 through convergent and discriminant validity assessed the validity of both tests. There were two main hypotheses for this study. The first of these hypotheses was that the similar IQ scales of the WASI-II and RIAS-2 would be highly correlated (convergent) since they purport to measure the same or similar constructs. Moreover, all subtests and IQ scales of the WASI-II and RIAS-2 are measuring *g* variance. However, the verbal subtests are focused on measuring crystallized intelligence, while the nonverbal subtests are focused on measuring fluid intelligence. Consequently, the second hypothesis for this study was that the correlations for dissimilar IQ scales would be moderately correlated, but not as highly correlated as similar IQ scales (discriminant). Specifically, the correlations between the WASI-II

VCI–RIAS-2 NIX and WASI-II PRI–RIAS-2 VIX were expected to be lower than the correlations between the WASI-II VCI–RIAS-2 VIX and WASI-II PRI–RIAS-2 NIX.

Method

Participants

Participants included children and adolescents referred for an initial evaluation as a result of learning and/or behavioral concerns or special education consideration, as well as students receiving triennial special education re-evaluations (*n* = 12). Participants also included adult (*n* = 33) and student volunteers (*n* = 15) with parent permission. Demographic data gathered included gender, age/grade level (for children and adolescents), and race/ethnicity. Additionally, demographic data regarding disabilities was obtained and included: No Disability, Autism Spectrum Disorder, Specific Learning Disability, Intellectual Disability, Emotional Disability, Other Health Impairment, Multiple Disabilities, or Traumatic Brain Injury. Individuals with Visual and Hearing Impairments were excluded. The sample consisted of individuals between the ages 8 and 80 (*M* = 29.85, *SD* = 18.76). Participants and demographics can be found in Table 2 below.

Instruments

Wechsler Abbreviated Scale of Intelligence, Second Edition (WASI-II). The WASI-II is an individually administered test that measures intelligence in individuals between the ages 6 to 90 years (Wechsler, 2011). Similar to the original WASI, the WASI-II is composed of four subtests that produce four composite scores (FSIQ-4 , FSIQ-2, VCI, and PRI). These composites provide estimates of an individual's verbal, nonverbal, and general cognitive functioning (Wechsler, 2011). Moreover, the WASI-II was created to quickly and accurately estimate an individual's intellectual functioning and for screening purposes. The WASI-II is also linked with the WISC-IV and WAIS-IV. The WASI-II was standardized using a large representative sample

Table 2
Sample Demographic Statistics (N = 60)

	n	%
Sex		
Female	40	66.7
Male	20	33.3
Race/Ethnicity		
White/Caucasian	41	68.3
Black/African American	3	5.0
Hispanic/Latino/Latinx	13	21.7
Asian American	2	3.3
Native American	0	0
Multiethnic	1	1.7
Grade Placement		
1	0	0
2	0	0
3	1	1.7
4	0	0
5	0	0
6	0	0
7	0	0
8	0	0
9	6	10.0
10	7	11.7
11	3	5.0
12	10	16.7
NA (Adult)	33	55.0
Disability		
Not Disabled	46	76.7
Learning Disability	3	5.0
Learning Disability & OHI	2	3.3
Intellectual Disability & Autism	1	1.7
Emotional Disability	1	1.7
Emotional Disability & OHI	1	1.7
Other Health Impairment	1	1.7
Autism	3	5.0
Traumatic Brain Injury	1	1.7
Emotional Disability & SLD	1	1.7

Note. Percentages may not sum to 100 due to rounding

(*N* = 2,300) that closely resembled the 2008 U.S. Bureau of the Census across age, sex, race/ethnicity, education level, and geographic region (Wechsler, 2011). Internal consistency reliability estimates for the four IQ composites were high for the child sample (ages 6-16), ranging from .87 to .91, and the adult sample (ages 17 to 90), ranging from .90 to .92 (Wechsler, 2011). Average test-retest stability estimates for the composites were also high, ranging between .87 and .96 (Wechsler, 2011).

Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2). The RIAS-2 is an individually administered test that measures intelligence in individuals between the ages 3 to 94 years (Reynolds & Kamphaus, 2015). The RIAS-2 has four subtests that specifically measure verbal and nonverbal estimates of intelligence and yields three composite index scores (VIX, NIX, and CIX). These indexes provide an estimate of an individual's verbal, nonverbal, and global intelligence (Reynolds & Kamphaus, 2015). The RIAS-2 also offers additional subtests to obtain a Composite Memory Index (CMX), which provides an estimate of an individual's memory skills and subtests to obtain a Speeded Processing Index (SPI) (Reynolds & Kamphaus, 2015). Moreover, the SPI measures an individual's processing speed through decision speed and reaction time. The RIAS-2 was standardized using a large sample (N = 2,154) representative of the U.S. population across gender, ethnicity, education level, and geographic region as defined by the 2012 U.S. Census Bureau (Reynolds & Kamphaus, 2015). Internal consistency reliability estimates for the RIAS-2 indexes, across all age groups, ranged between .86 and .99 (Reynolds & Kamphaus, 2015). Average test-retest stability estimates for the RIAS indexes, across the total sample, all exceeded .79 (Reynolds & Kamphaus, 2015).

Procedure

Participants were administered the WASI-II and RIAS-2 in a random counterbalanced order, during the same testing session. Data were obtained either (a) as part of a comprehensive evaluation to determine a disability in an initial special education evaluation, (b) as part of reevaluation, (c) via adult volunteers, or (d) student volunteers with parent permission. This study was submitted to and approved by the Institutional Review Board (IRB) at Eastern Illinois University to assure the protection of the rights and welfare of human subjects participating in this research.

Special Education Evaluations. Parent permission for participants who were subjects of a special education evaluation was obtained through the standard informed consent form used in the school district which allows for special education evaluation, consistent with The Individuals with Disabilities Education Act (IDEA; Public Law 105-17). Through these evaluations, anonymous data were generated to protect the identity of all participants.

Student and Adult Volunteers. To solicit student volunteers, this researcher visited multiple Advanced Placement (AP) Psychology classes in the high school setting. A letter (Appendix A) was provided to students to bring home requesting parent permission for their child's participation in the study. Adult volunteers obtained the letter through solicitation or word of mouth (Appendix B). This letter explained the study and its purpose, comparing two brief intelligence tests to assess their validity. The letter also explained that data would be stored and analyzed in an anonymous, group fashion, with no personally identifiable information.

All evaluations were conducted by this examiner, a trained school psychology graduate student and one licensed/nationally certified school psychologist in the district who assisted in data collection. Each examiner conducted both assessments for the participants they assessed. The four WASI-II subtests and composite scores, the FSIQ-4, FSIQ-2, VCI and PRI, were obtained. However, the FSIQ-2 was not examined due to focus on the IQ, verbal, and perceptual reasoning scores obtained from all four subtests. The four RIAS-2 intelligence subtests and three index scores (VIX, NIX, and CIX) were also obtained. These subtest and composite scores were then used for comparison through convergent and discriminant validity analyses to determine the construct validity of the WASI-II and RIAS-2. Participation was completely voluntary and no incentive was provided.

Data Analysis

Pearson product-moment correlation coefficients were calculated between the WASI-II composite scores and the RIAS-2 index scores using JASP 0.17.1 (Intel) (JASP Team, 2022) (see Table 3). These composite index score correlations were then used for convergent and discriminant comparisons to determine the construct validity of the WASI-II and RIAS-2. Convergent validity was examined through comparing the composite score correlations obtained from the WASI-II and RIAS-2 (WASI-II FSIQ-4 – RIAS-2 CIX; WASI-II VCI – RIAS-2 VIX; WASI-II PRI – RIAS-2 NIX), as these composite scores purport to measure similar constructs and should result in high correlations. Campbell and Fiske (1959) argued scores like these should have the highest correlations (convergent validity) given their theoretical and measurement similarities. Discriminant validity was examined by comparing correlations from dissimilar composite scores obtained from the WASI-II and RIAS-2, such as comparing the verbal to the nonverbal composites (WASI-II VCI – RIAS-2 NIX; WASI-II PRI – RIAS-2 VIX). These scores were expected to have lower correlations (discriminant validity) than convergent validity coefficients given their theoretical and measurement dissimilarities. Statistical tests for dependent correlations comparing convergent and discriminant validity coefficients were conducted using SimpleStat Tests (Watkins, 2020) (https://edpsychassociates.com). Lastly, mean differences between similar composite scores (VCI - VIX, PRI - NIX, FSIQ-4 - CIX) from the WASI-II and RIAS-2 were examined with dependent *t*-tests for differences between means and effect sizes estimated with Cohen’s *d* using JASP 0.17.1.

Results

Global Scale Comparisons

Convergent Validity.

The first research question asked if similar IQ scales of the WASI-II and RIAS-2 would be highly correlated. Due to the WASI-II and RIAS-2 purporting to measure similar constructs, it was hypothesized that similar IQ scales would be highly correlated. Table 3 presents results from data analyses and illustrates strong convergent validity support for the WASI-II FSIQ-4 and RIAS-2 CIX with a correlation coefficient of .90 (81% shared variance) and they appear to be measuring the same construct (general intelligence). Additional support for convergent validity was illustrated as the VCI and VIX were found to be highly correlated (r = .85) with 72% shared variance. Moreover, the PRI and NIX also resulted in a high correlation (r = .77) with 59% shared variance, which suggests further support for convergent validity between the WASI-II and RIAS-2.

Discriminant Validity.

The second research question asked if dissimilar composite scores of the WASI-II and RIAS-2 would be correlated to a lesser degree than convergent coefficients. The WASI-II VCI - RIAS-2 NIX and WASI-II PRI - RIAS-2 VIX provide different estimates (verbal versus nonverbal) of intelligence and were expected to result in lower correlation coefficients (discriminant validity) than convergent validity coefficients. As a result, similar constructs of both assessments (VCI-VIX, PRI-NIX, and FSIQ-CIX) were expected to have significantly higher correlation coefficients (convergent validity). Table 3 presents results and illustrates lower correlations for discriminant validity compared to convergent validity. This was illustrated through the VCI-VIX correlation (r = .85) being significantly higher than the VCI-NIX correlation ($r = .56$; $t(57) = 5.07$, $p < .0001$) but similar to the PRI-VIX correlation ($r = .83$; $t(57) = 0.44$, $p > .05$). The PRI-NIX correlation ($r = .77$) was significantly higher than the VCI-NIX correlation ($r = .56$; $t(57) = -3.02$, $p < .0038$). However, the PRI-NIX correlation ($r = .77$) was lower than the PRI-VIX correlation ($r = .83$), but was not statistically significant, $t(57) = -1.13$, $p > .05$.

Composite Score Comparisons

Dependent *t*-tests were conducted to examine the differences between WASI-II and RIAS-2 composite score means. It was expected that there would be no significant mean differences between similar IQ scales. Table 3 presents means and standard deviations for the WASI-II and RIAS-2 composite scores. Dependent *t*-tests for differences between means indicated the WASI-II FSIQ-4 was significantly higher than the RIAS-2 CIX ($t(60) = 2.25$, $p = 0.03$), but the effect size was small ($d = 0.29$). Results found that the VCI and VIX were roughly equal, not significantly different ($t(60) = -1.36$, $p = 0.18$), and the effect size was trivial ($d = -0.18$). The PRI was significantly higher than the NIX ($t(60) = 4.35$, $p < .001$) and effect size was moderate ($d = 0.56$), but may not be practically meaningful. These results suggest that the two normative samples may be similar and provide roughly equivalent estimates of general intelligence and its verbal and nonverbal estimates.

Table 3
Pearson Product-Moment Correlations and Descriptive Statistics for WASI–II and RIAS–2 Subtests and Composite Scores (N = 60)

			Reynolds Intellectual Assessment Scales-Second Edition (RIAS–2)						
			Subtests				Composites		
WASI–II	*M*	*SD*	GWH	OIO	VRZ	WHM	VIX	NIX	CIX
Subtests									
BD	48.20	9.27	.70	.60	.73	.58			
VC	52.17	9.96	.65	.33*	.75	.47			
MR	54.92	11.25	.67	.61	.78	.67			
SI	51.48	9.78	.74	.49	.71	.53			
Composites									
VCI	102.75	14.17					.85	.56	.77
PRI	102.53	16.11					.83	.77	.87
FSIQ	103.07	15.43					.92	.73	.90
M			51.90	43.78	54.40	52.03	104.63	95.97	100.60
SD			12.90	13.63	14.70	11.71	19.81	18.08	19.36

Note. WASI–II = Wechsler Abbreviated Scale of Intelligence-Second Edition, BD = Block Design, VC = Vocabulary, MR = Matrix Reasoning, SI = Similarities, VCI = Verbal Comprehension Index, PRI = Perceptual Reasoning Index, FSIQ = Full Scale IQ, GWH = Guess What, OIO = Odd Item Out, VRZ = Verbal Reasoning, WHM = What's Missing, VIX = Verbal Intelligence Index, NIX = Nonverbal Intelligence Index, CIX = Composite Intelligence Index. Subtest scores are *T* scores ($M = 50$, $SD = 10$), Composite scores are standard scores ($M = 100$, $SD = 15$). WASI–II and RIAS–2 subtest and composite scores skewness estimates ranged X to X and kurtosis estimates ranged X to X, indicating approximately normal distributions. Dark grey shading indicates hypothesized convergent validity coefficients, light grey shading indicates hypothesized discriminant validity coefficients. All correlations statistically significant ($p < .001$) except where noted with asterisk ($p < .05$).

Discussion

The purpose of this study was to assess the construct validity of the WASI-II and RIAS-2 through evaluating their convergent and discriminant relationships. There were no independent peer reviewed published comparisons between the WASI-II and RIAS-2 in the literature. The present study examined the construct validity of the WASI-II and RIAS-2 through convergent and discriminant comparisons with a sample of students referred for special education evaluations, student volunteers with parent permission and adult volunteers. Both the WASI-II and RIAS-2 purport to measure general intelligence (*g*), verbal/crystallized, and nonverbal/fluid intelligence. To assess the construct validity of both tests, convergent and discriminant validity comparisons were used. The research questions and hypotheses were listed as:

1. Will the similar IQ scales and subtests of the WASI-II and RIAS-2 be highly correlated?

-It was hypothesized that similar IQ scales and subtests of the WASI-II and RIAS-2 would be highly correlated since they purport to measure the same or similar constructs.

2. Will the dissimilar IQ scales and subtests of the WASI-II and RIAS-2 be correlated to a lesser degree?

   -It was hypothesized that dissimilar IQ scales and subtests would be moderately correlated, although not as highly correlated as similar IQ scales and subtests.

Both research questions were answered through the data analyses reported above. As predicted, similar composite scores proved to measure a similar construct as purported (verbal intelligence, nonverbal intelligence, or general intelligence). The VCI-VIX (r = .85), PRI-NIX (r = .77), and FSIQ-CIX (r = .90) provided strong correlations and large portions of shared variance (convergent validity), suggesting that they were measuring verbal intelligence, nonverbal intelligence, and general intelligence, as hypothesized. All subtests were also found to be moderately correlated due to their measurement of general intelligence. Moreover, all subtest correlations were statistically significant and positive, which is a reflection of Spearman's positive manifold. Positive correlations among cognitive tasks illustrate Spearman's positive manifold and that all subtests share variance related to general intelligence. Through his evaluation of similar tasks, Spearman (1904) found that the positive manifold implies that scores from different estimates will be positively correlated due to all factors being derived from general intelligence (*g*).

According to the WASI-II (Wechsler, 2011) and RIAS-2 (Reynolds & Kamphaus, 2015) manuals, validity of the two tests were evaluated through comparison of the WASI-II and RIAS-2 to both the WISC-IV and WAIS-IV. This present study provided similar results to the studies reported in the WASI-II and RIAS-2 manuals. Full scale estimates were typically the highest correlations found in this present study and also studies reported in the WASI-II and RIAS-2 manuals. This was expected as the full scale estimate includes more items and subtests (both verbal and nonverbal), so there is less error variance. As hypothesized, in this present study, the correlation between the WASI-II FSIQ-4 and RIAS-2 CIX was statistically significant and high with a correlation coefficient of .90 (81% shared variance), indicating the measurement of the same construct (general intelligence). The study reported in the WASI-II Manual comparing the WASI-II and WISC-IV reported a correlation of .91 (83% shared variance) for the WASI-II FSIQ-4 and WISC-IV FSIQ. Similarly, the highest correlation comparing the RIAS-2 and WISC-IV, reported in the RIAS-2 Manual, was between the RIAS-2 CIX and WISC-IV FSIQ ($r = .77$; 59% shared variance). The study presented in the WASI-II Manual comparing the WASI-II and WAIS-IV reported a correlation of .92 (85% shared variance) between the WASI-II FSIQ-4 and the WAIS-IV FSIQ. The study comparing the RIAS-2 and WAIS-IV reported in the RIAS-2 Manual presented a correlation coefficient of .65 (42% shared variance) between the RIAS-2 CIX and WAIS-IV FSIQ. This correlation was slightly lower than full scale estimates observed in this present study, although still considered highly correlated. The full scale correlation (WASI-II FSIQ - RIAS-2 CIX) of the present study was very similar to those reported in the WASI-II Manual, while significantly higher than those reported in the RIAS-2 Manual.

Verbal estimates were typically reported to have higher correlations compared to the nonverbal estimates as observed in this present study and the studies reported in the WASI-II and RIAS-2 manuals. This present study resulted in a correlation of .85 between the WASI-II VCI and RIAS-2 VIX, which was very similar to comparisons reported in the WASI-II Manual where the WASI-II VCI and WISC-IV VCI resulted in a correlation of .84 and the WASI-II VCI and WAIS-IV VCI resulted in a correlation coefficient of .88. Studies reported in the RIAS-2 Manual resulted in a RIAS-2 VIX and WISC-IV VCI correlation coefficient of .76 and RIAS-2 VIX and WAIS-IV VCI correlation of .77. The RIAS-2 VIX and WAIS-IV VCI correlation was reported to be higher than its full scale correlation, which is slightly different from this present study as its highest correlation was found between the full scale estimates.

Although they were found to be highly correlated, nonverbal intelligence estimates were reported to have the lowest correlations in this present study and also in all studies reported in the WASI-II and RIAS-2 manuals. The present study found a correlation of .77 between the WASI-II PRI and RIAS-2 NIX. While similar comparisons reported in the WASI-II Manual resulted in correlation coefficients of .82 between the WASI-II PRI and WISC-IV PRI and .87 between the WASI-II PRI and WAIS-IV PRI. Comparisons reported in the RIAS-2 Manual found the RIAS-2 NIX - WISC-IV PRI (r = .77) and RIAS-2 NIX - WAIS-IV PRI (r = .60) were highly correlated, but the lowest correlations, also observed in this present study where the lowest correlation was between the nonverbal intelligence estimates.

Although the sample size of the present study was smaller, results indicated very similar correlations with the highest correlation between the full scale estimates and nonverbal intelligence estimates highly correlated but the lowest. Overall, the WASI-II and RIAS-2 purport to measure similar constructs and present results further support the convergent validity of the WASI-II and RIAS-2.

Mixed support for discriminant validity was illustrated through the VCI-VIX (r = .85) correlation being significantly higher than the VCI-NIX correlation (r = .56) but not significantly higher than the PRI-VIX correlation (r = .83). Moreover, the PRI-NIX correlation (r = .77) was significantly higher than the VCI-NIX correlation (r = .56), as hypothesized. However, the PRI-NIX correlation (r = .77) was slightly lower (but not significant) than the PRI-VIX correlation (*r* = .83). Discriminant validity coefficients in this present study were similar to those reported in the WASI-II and RIAS-2 manuals. Lower correlations were reported between dissimilar constructs in the RIAS-2 Manual (Reynolds & Kamphaus, 2015). The RIAS-2 Manual reported correlation coefficients between the RIAS-2 and WISC-IV, as well as the RIAS-2 and WAIS-IV. According to the RIAS-2 Manual, the correlation coefficient between the RIAS-2 VIX and WISC-IV PRI was .55, while the RIAS-2 NIX and WISC-IV VCI correlation coefficient was .62. In regard to the correlations between the RIAS-2 and WAIS-IV, the RIAS-2 VIX and WAIS-IV PRI resulted in a correlation coefficient of .62, while the RIAS-2 NIX and WAIS-IV VCI correlation coefficient was .45. The discriminant validity coefficients in the present study were similar. Discriminant validity and correlations were not reported or presented in the WASI-II Manual. Mixed results in the present study may relate to the smaller sampler size and greater sampling error.

When examining differences between means in the present study, the WASI-II FSIQ-4 (*M* = 103.07) was slightly higher than the RIAS-2 CIX (*M* = 100.6) but reflected a small effect size and similar to results reported for the WASI-II and RIAS-2 compared to the WISC-IV and WAIS-IV. The WASI-II FSIQ-4 mean of 102.0 was similar to the WISC-IV FSIQ mean of 102.7, while the WASI-II FSIQ-4 mean of 99.9 was similar to the WAIS-IV FSIQ of 100.7 (Wechsler, 2011). Comparisons in the RIAS-2 Manual showed the RIAS-2 CIX mean of 95.5 was similar to the WISC-IV FSIQ mean of 101.8 and the RIAS-2 CIX mean of 104.1 was similar to the WAIS-IV FSIQ mean of 105.8 (Reynolds & Kamphaus, 2015). Thus, the present results are comparable for global intelligence estimates.

In the present study, the WASI-II VCI (*M* = 102.75) and RIAS-2 VIX (*M* = 104.63) were roughly equal with a small effect size. Similar results were reported in the respective WASI-II and RIAS-2 manuals with comparisons to the WISC-IV and WAIS-IV. The WASI-II VCI mean of 100.8 was nearly identical to the WISC-IV VCI mean of 101.0. The WASI-II VCI mean of 100.0 was also nearly identical to the WAIS-IV VCI mean of 100.4. The RIAS-2 VIX mean of 97.7 was similar to the WISC-IV VCI mean of 101.1 and the RIAS-2 VIX mean of 104.3 was similar to the WAIS-IV VCI mean of 105.9.

The present study found that the WASI-II PRI (M = 102.53) was significantly higher than the RIAS-2 NIX (M = 95.97) with a moderate effect size. This difference was larger than those reported in the respective WASI-II and RIAS-2 manuals with comparisons to the WISC-IV and WAIS-IV. The WASI-II PRI mean of 102.2 was closer to the WISC-IV PRI mean of 105.2. The WASI-II PRI mean of 99.7 was closer to the WAIS-IV PRI mean of 101.2. The larger mean difference between the WASI-II PRI and RIAS-2 NIX in the present study may be the result of sampling error so replication is recommended to ensure stable and valid results. Results of the present study suggest that the two assessments may be similar and should provide roughly similar estimates of overall intelligence, indicating that the WASI-II and RIAS-2 could be used interchangeably.

Limitations

Although the present results were generally supportive, limitations in the present study affect generalizability of the results. All cases were obtained from a small sample of adult and student volunteers and special education students from an urban area in Illinois or an urban school district in Illinois. Thus, the sample is not geographically representative of the United States. Further, generalizability is limited by the general lack of racial/ethnic, age, and disability diversity of the sample. Although Black/African American (n = 3), Hispanic/Latino/Latinx (n = 13), Asian American (n = 2), and Multiethnic (n = 1) participants were included, their proportions were much smaller than those of the population as a whole. There were no Native American participants included in the sample. Moreover, all participants were obtained from a high school setting (except one participant from an elementary school setting) or were adult volunteers. Lastly, most participants had no disability (n = 46), but there was a limited number of participants with a disability such as: Specific Learning Disability (n = 3), Emotional Disability (n = 1), Other Health Impairment (n = 1), Autism (n = 3), Traumatic Brain Injury (n = 1), Specific Learning Disability and Other Health Impairment (n = 2), Specific Learning Disability and Emotional Disability (n = 1), Emotional Disability and Other Health Impairment (n = 1), Intellectual Disability and Autism (n = 1). Because the disability groups had small sample sizes, various disability groups could not be analyzed separately for comparison. Another limitation was the overall sample size. A larger sample could have ensured greater stability in results, as well as less error. The final limitation is associated with the fact that only two examiners collected data for this current research. A variety of examiners collecting data could help avoid idiosyncrasies of only 2 individuals that could influence data and produce less potential error.

Future Research

Replication of this study is recommended with a larger sample and with broader demographic representation (race/ethnicity, age, and rural areas) to provide stability in results, less error, and greater generalizability. Moreover, replication of this study with a larger, more representative sample would help extend the validity of these tests and overcome the aforementioned limitations. Lastly, the WASI-II is intended to be a screening measure, while the RIAS-2 is not, despite their similar length. It is recommended that the WASI-II and RIAS-2 might be compared to a longer, more current intelligence test, such as the WISC-V.

Conclusions

Overall, the results of this study support the construct validity of the WASI-II and RIAS-2. Similar findings were reported in both the WASI-II and RIAS-2 manuals with comparisons to longer, so-called “comprehensive” measures (WISC-IV and WAIS-IV) which resulted in high correlations among similar composite scores. The WASI-II and RIAS-2 appear to provide similar results and might be used interchangeably for estimating general intelligence. While the WASI-II is purportedly a screener, the RIAS-2 is considered a reliable and valid measure of general intelligence. Due to resulting high correlations and suggesting that the two might be used interchangeably, the WASI-II may be more than just a screener and may also be considered a reliable and valid measure of general intelligence. In the school setting, use of such tests are both time and cost effective and allow professionals more time providing interventions, teaming, consulting, and report writing; with less time testing. Replication of this study and similar studies is recommended to provide stability and validity in results and overcome previously mentioned limitations. This examiner also found that most participants reported to prefer the RIAS-2 over the WASI-II due to the ease of subtest presentation and they felt they were more engaged. This examiner also made these observations throughout the assessments, based on body language and enthusiasm. Moreover, this examiner felt that the RIAS-2 was more user friendly and easier to administer with a wide range of individuals.

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Appendix A
Student Volunteer Form

Dear Parent or Guardian:

As part of the training of school psychologists at Eastern Illinois University, specialist candidates are required to complete a master's thesis project which is focused on answering specific research questions through data collection. We are seeking your help in this by asking if you would be willing to allow one or more of your children to be given two brief intelligence tests by a school psychologist specialist candidate or a nationally certified and licensed school psychologists for data collection. Administration of these two intelligence tests, which include both verbal and visual (nonverbal) tasks, will take approximately 1 hour. I will be working under the direct supervision of Dr. Sue Gallagher, the school psychology coordinator at La Grange Area Department of Special Education and Dr. Gary L. Canivez, professor of psychology at Eastern Illinois University, will also provide supervision during the data collection and analysis process. If you would be willing to consider helping us in allowing your child to participate, please have your child return the bottom section of this letter to their class they received it in or to McKenzie Sopoci in Room 214A. She will work with your child to provide detailed information about the process, tests, and arrange times that are convenient for them. No testing would be done without your written permission. Alternatively, if more convenient. You may call or email me at the phone number and email below to express interest in allowing your child or children to participate. Thank you very much for your consideration! Your assistance will make a very important contribution to research on tests that may help school psychologists in spending less time testing with more time to provide direct services to students in need.

Sincerely,

____

McKenzie K. Sopoci
Riverside - Brookfield High School
LaGrange Area Department of Special Education
Sopocim@rbhs208.org
(708) 442 - 9367

- -

Name of Child: ____

Name of Parent(s): ____

Address: ____

Phone Number(s)/Email: ____

Please return to McKenzie K. Sopoci in RM 214A or return to the teacher in the class it was received.

STUDENT VOLUNTEER CONSENT FORM

The purpose of this letter is to inform you that as part of your consent for a special education evaluation, you are consenting to the IQ scores of the current evaluation being used as part of a research study. Please read the following information carefully before you decide whether you would like to opt-out.

Title of Project: The Construct Validity of the Weschler Abbreviated Scale of Intelligence, Second Edition (WASI-II) and the Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2)

Purpose of research: The purpose of this research study is to asses the relationship between the WASI-II and RIAS-2 through evaluating their ability to similarly measure intellectual abilities. These two tests purport to measure overall general intelligence and verbal and nonverbal abilities. Due to this, results should provide similar scores from both tests.

Procedure to be followed: You will be asked to meet with a school psychologist for **approximately 1 hour** to complete two abbreviated IQ assessments. You will be asked to perform a variety of verbal and nonverbal tasks. You will work with pictures and blocks, as well as verbal prompts.

Discomforts/Risks: Due to anonymous data collection, participants would be at minimal risk as no personally identifiable information will be linked to test scores and data will be reported in aggregate.

Benefits: This research may provide adequate evidence for the use of these brief intelligence tests, which will allow school psychologists to obtain similar results in less time. This would give professionals more time to provide direct support and services by reducing testing time.

Statement of Confidentiality: Records will be kept confidential and will be available only to the researchers involved. All information will be securely stored on this researcher's password protected computer or locked filing cabinet. If the results of this study are published, the data will be presented in a way that individual participants will not be identified.

Voluntary Participation: Your participation is voluntary. You may choose to withdraw from the study at any time. Withdrawal or deciding not to participate at any time will result in no penalty or loss of benefit to the participant.

Questions or concerns regarding the research or your participation in this research project should be directed to:

-McKenzie K Sopoci at Sopocim@rbhs208.net or phone number (708) 442 - 9367
-Gary L. Canivez at Glcanivez@eiu.edu or phone number 217-581-6413

Appendix B
Adult Volunteer Form

To whom it may concern:

As part of the training of school psychologists at Eastern Illinois University, specialist candidates are required to complete a master's thesis project which is focused on answering specific research questions through data collection. We are seeking your help in this by asking if you would be willing to participate by completing two brief intelligence tests administered by a school psychologist specialist candidate or a nationally certified and licensed school psychologists for data collection. Administration of these two intelligence tests, which include both verbal and visual (nonverbal) tasks, will take approximately 1 hour. I will be working under the direct supervision of Dr. Sue Gallagher, the school psychology coordinator at La Grange Area Department of Special Education and Dr. Gary L. Canivez, professor of psychology at Eastern Illinois University, will also provide supervision during the data collection and analysis process. If you would be willing to consider helping us in participating, please call or email McKenzie Sopoci at the phone number and email below to express interest in participating. She will call you to provide detailed information about the process, tests, and arrange times that are convenient for you. Thank you very much for your consideration! Your assistance will make a very important contribution to research on tests that may help school psychologists in spending less time testing with more time to provide direct services to students in need.

Sincerely,

____

McKenzie K. Sopoci
Riverside - Brookfield High School
LaGrange Area Department of Special Education
Sopocim@rbhs208.org
(708) 442 - 9367

ADULT VOLUNTEER CONSENT FORM

Title of Project: The Construct Validity of the Weschler Abbreviated Scale of Intelligence, Second Edition (WASI-II) and the Reynolds Intellectual Assessment Scales, Second Edition (RIAS-2)

Your consent is being sought to participate in this research study. Please read the following information carefully before you decide whether or not you consent to participate.

Purpose of research: The purpose of this research study is to asses the relationship between the WASI-II and RIAS-2 through evaluating their ability to similarly measure intellectual abilities. These two tests purport to measure overall general intelligence and verbal and nonverbal abilities. Due to this, results should provide similar scores from both tests.

Procedure to be followed: You will be asked to meet with a school psychologist for **approximately 1 hour** to complete two abbreviated IQ assessments. You will be asked to perform a variety of verbal and nonverbal tasks. You will work with pictures and blocks, as well as verbal prompts.

Discomforts/Risks: Due to anonymous data collection, participants would be at minimal risk as no personally identifiable information will be linked to test scores and data will be reported in aggregate.

Benefits: This research may provide adequate evidence for the use of these brief intelligence tests, which will allow school psychologists to obtain similar results in less time. This would give professionals more time to provide direct support and services by reducing testing time.

Statement of Confidentiality: Records will be kept confidential and will be available only to the researchers involved. All information will be securely stored on this researcher's password protected computer or locked filing cabinet. If the results of this study are published, the data will be presented in a way that individual participants will not be identified.

Voluntary Participation: Your participation is voluntary. You may choose to withdraw from the study at any time. Withdrawal or deciding not to participate at any time will result in no penalty or loss of benefit to the participant.

Questions regarding the research or your participation in this research project should be directed to:

-McKenzie K Sopoci at Sopocim@rbhs208.net or phone number (708) 442 - 9367
-Gary L. Canivez at Glcanivez@eiu.edu or phone number 217-581-6413

I have read all the information provided on this form, am at least 18 years of age, and ***consent*** *to participate in this study.*

_______________________ _______________________
Signature *Date*

____
Please print your name here.