A Comparison of Low IQ Scores From the Reynolds Intellectual Assessment Scales and the Wechsler Adult Intelligence Scale—Third Edition

Thomas B. Umphress

Abstract

Twenty people with suspected intellectual disability took the Reynolds Intellectual Assessment Scales (RIAS; C. R. Reynolds & R. W. Kamphaus, 1998) and the Wechsler Adult Intelligence Scale—3rd Edition (WAIS-III; D. Wechsler, 1997) to see if the 2 IQ tests produced comparable results. A *t* test showed that the RIAS Composite Intelligence Index scores were significantly higher than WAIS-III Full Scale IQ scores at the alpha level of .01. There was a significant difference between the RIAS Nonverbal Intelligence and WAIS-III Performance Scale, but there was no significant difference between the RIAS Verbal Intelligence Index and the WAIS-III Verbal Scale IQ. The results raise questions concerning test selection for diagnosing intellectual disability and the use of the correlation statistic for comparing intelligence tests.

DOI: 10.1352/2008.46:229–233

The Reynolds Intellectual Assessment Scales (RIAS; Reynolds & Kamphaus, 1998) and the Wechsler Adult Intelligence Scale—3rd Edition (WAIS-III; Wechsler, 1997) are two standardized tests used in the United States to measure human intelligence. The WAIS-III, introduced in 1997, is the third and most recent revision of the 1939 Wechsler-Bellevue Intelligence Scale. It is a widely used and well-known test. The RIAS by comparison is a newer and lesser known test. The RIAS, introduced in 2003, was standardized on a population of 2,438 people selected to reflect the U.S. population. The RIAS, an individually administered test, has a verbal and a nonverbal section. Both tests have standard scores, with means of 100 and standard deviations of 15. The WAIS-III assigns IQs from 45 to 150 and the RIAS from 40 to 160. Those who are not familiar with the RIAS may want to read the reviews by Bracken (2005) and Schraw (2005). It is not known how widely the RIAS is used. It is marketed as a viable alternative to the WAIS-III, with the added benefits of being less expensive and quicker to administer. Promotional materials for the RIAS indicate that it is a reliable and valid measurement of general intelligence, serves as a stand-alone intellectual assessment, can assist in diagnosing intellectual disability, and predictably scores persons with intellectual disability. The publisher does not refer to it as a brief IQ test. At least one state (Arkansas) accepts RIAS results for the intellectual assessment component of a diagnosis of intellectual disability.

The RIAS provides index scores, whereas the WAIS-III provides intelligence quotient (IQ) scores. For simplicity, this article refers to both as IQ scores. The RIAS test manual (Reynolds & Kamphaus, 1998) contains a study of concurrent validity between the RIAS and the WAIS-III IQs. That study showed a correlation of .75 between the RIAS Composite Intelligence Index (CIX) and the WAIS-III Full Scale IQ (FSIQ). The RIAS Verbal Intelligence Index (VIX) and the WAIS-III Verbal Scale IQ (VSIQ) had a .71 correlation, as did the RIAS Nonverbal Intelligence Index (NIX) and the WAIS-III Performance Scale IQ (PSIQ). The CIX scores had a mean of 98.9 and a standard deviation of 17.84, and the FSIQ scores had a mean of 99.42 and a standard deviation of 20.48. Using a *z*-score transformation, one can estimate that approximately 3 of the 31 participants in that study had IQs at

©American Association on Intellectual and Developmental Disabilities

or below the borderline level of intelligence (i.e., IQ < 80). Three is a small number for calculating a correlation, so it would be interesting to see if this .75 correlation holds for a larger sample of people with low IQ scores.

I reviewed files from the Continuum of Services Program (CSP), an outreach program at the Conway Human Development Center in Conway, Arkansas, for a 2-year period and found 12 people who had taken both tests. None of these people took the two tests on the same day, and most had different test administrators. All of these people came to CSP for testing because of suspected intellectual disability, so the group was not reflective of the general population. One of the 12 people tested in the normal range of intelligence on both tests, and another person suffered a loss of intellectual abilities between assessments, possibly due to dementia. These 2 people were excluded from the group. An analysis of the remaining 10 people showed a correlation of .72 between the CIX and FSIQ, which approximates the .75 correlation published in the RIAS manual. However, the mean CIX was 76.60 and the mean FSIQ was 66.10. This is a difference of 10.5 points. A t test showed a statistically significant difference between the two IQ means, $t(10) = 5.00$, $p < .01$ (two-tailed). This raises the question of whether these two tests produce comparable results when the person who is tested is likely to get an IQ score at or near the level of intellectual disability. A difference of 10.5 IQ points can be large enough to affect diagnostic outcome. A regression analysis of the linear relationship between these two groups of scores predicts that a person receiving a FSIQ of 67 on the WAIS-III would receive a CIX of 77.5 on the RIAS, with the standard error of estimate being 7.06. In the *Diagnostic and Statistical Manual of Mental Disorders, Text Revision (DSM-IV-TR*; American Psychiatric Association, 2000), one of the three criteria for the diagnosis of intellectual disability is an IQ score of approximately 70 or less. Scores from 70 to 79 are classified as *borderline intelligence* by the WAIS-III and *moderately below average* by the RIAS. In this regression analysis, the WAIS-III IQ of 67 indicates *mild intellectual disability*, whereas a RAIS IQ score of 77 indicates *borderline intelligence*. In these examples, the test selected for administration was a significant factor in the diagnosis.

The purpose of this study was to use a larger sample size ($N = 20$) to see if these two tests, when given on the same day by the same tester, produce comparable results for people with IQs less than 80.

Method

Participants

All participants came to CSP for an intellectual assessment. They came by referral from juvenile court, state agencies, and community living agencies. CSP was not involved with the referral process. Participants had to be able to take both tests to be included in the study. They had to be 16 years of age or older and have functional speech, vision, hearing, and fine-motor skills. To control for possible practice effect, no one who had taken either test in the past year was included in study. Each person or his/her legal guardian had the study explained to them and written consent was required for participation. All who participated received a promise of anonymity. No one received any material compensation or special consideration for participation. Nonparticipation did not influence service delivery. The "Ethical Principles of Psychologists and Code of Conduct" (American Psychological Association, 1992) was observed in the design and conduct of this experiment. The Agency and Institutional Research Review Boards of the Arkansas State Division of Developmental Disabilities Services reviewed and approved this project. I performed the tests on all of the people in this study.

Twenty-one people agreed to participate in this study. One person scored low average on both tests and was not included the study. There were 9 women and 11 men. Eighteen were Caucasian and 2 were African American. The mean age was 26.4 years, the age standard deviation was 11.7 years, and the age range was 16 to 57 years. Everyone included in the study received an FSIQ or CIX of less than 80 on either the RIAS, WAIS-III, or both.

Materials

The RIAS and the WAIS-III were used. The WAIS-III takes from 60 to 90 min to administer and the RIAS Intelligence subtests take 20 to 25 min, on average, according to their respective manuals.

Design and Procedure

Each participant took both the RIAS and WAIS-III. To control for any order effect, half of the people took the WAIS-III first and the other half took the RIAS first. I administered and scored the tests according to the standardized administra-

 ©American Association on Intellectual and Developmental Disabilities

tion and scoring procedures outlined in the respective test manuals. I did not administer any optional subtests of the WAIS-III or any memory subtests of the RIAS because they are not included in the calculation of VSIQ, PSIQ, FSIQ, VIX, NIX, or CIX.

Results

The order of test administration did not affect IQ scores. A *t* test showed no significant difference between tests given first and tests given second, $t(20) = -0.24$, $p = .99$ (two-tailed).

The Pearson product-moment correlation coefficient (r) measured correlations between the RIAS and WAIS-III scores. There was a correlation of .94 between the CIX and FSIQ, a correlation of .89 between VIX and VIQ, and a correlation of .88 between NIX and PIQ. These correlations are actually higher than those reported in the RIAS manual.

Table 1 compares the means, standard deviations, and standard errors of measurement for the RIAS and the WAIS-III. The data were analyzed statistically using a *t* test to confirm or reject the null hypothesis, using an alpha of .05. The analysis of the data showed a significant differences between the CIX and FSIQ, $t(20) = 3.75$, $p < .01$ (two-tailed), and between the NIX and PSIQ, $t(20) = 5.60$, $p < .01$ (two-tailed). There was no difference between the VIX and VSIQ, $t(20) = 0.21$, $p < .84$ (two-tailed).

Table 1 *Means*, *Standard Deviations*, and *Standard Errors of Measurement* for the Reynolds Intellectual Assessment Scales (RIAS) Indexes and the Wechsler Adult Intelligence Scale (WAIS-III)

Subscale	*Mean*	*Standard deviation*	*Standard error of measurement*
RIAS			
VIX	66.10	14.31	3.20
NIX	76.35	14.66	3.28
CIX	67.80	13.25	2.95
WAIS-III			
VSIQ	65.75	8.87	1.98
PSIQ	66.05	8.64	1.93
FSIQ	62.90	8.40	1.88

Note. VIX = Verbal Intelligence Index; NIX = Nonverbal Intelligence Index; CIX = Composite Intelligence Index; VSIQ = Verbal Scale IQ; PSIQ = Performance Scale IQ; FSIQ = Full Scale IQ.

Fifteen of the 20 people tested had CIX scores higher than FSIQ scores, 3 had CIX scores lower than the FSIQ, and 2 had the same CIX and FSIQ. In 7 of 20 cases (35%), the RIAS indicated borderline intelligence, whereas the WAIS-III indicated mild intellectual disability.

Discussion

The RIAS and WAIS-III IQ scores in this study had correlations higher than those reported in the RIAS manual. However, it is possible to have a high correlation and yet have significantly different means and/or standard deviations. In this study, there was a statistically significant difference between RIAS and WAIS-III IQ scores less than 80. The verbal sections of the RAIS and the WAIS-III produced similar results, but the nonverbal sections did not. RIAS NIX scores tended to be higher than WAIS-III PSIQ scores. In fact, nonverbal IQ differences were large enough to make the overall IQs significantly different as well, because CIX is a calculation based on the sum of VIX and NIX scores. This study questions the use of the r statistic to compare IQ tests because the result can be misleading. Test developers should consider augmenting the r statistic with the t statistic to evaluate scores from all intellectual functioning levels.

The American Association on Intellectual and Developmental Disabilities' (AAIDD's) definition of intellectual disability has three components. AAIDD's IQ component uses an IQ of 70 but adds 5 points for the standard error of measurement (*SEM*) to include scores up to 75. *SEM* is an important aspect of the IQ score. The IQ score is a number that anchors the middle of a range of scores. Associated with that range is a probability of how likely it is that the true IQ is within that range. The 1997 technical manual for the WAIS-III reported *SEM*s of 2.3 for the FSIQ, 2.5 for the VSIQ, and 3.7 for the PSIQ. When WAIS-III FSIQ *SEM*s are calculated by age group (16 to 89 years), *SEM*s range from a low of 1.90 to a high of 2.58. The RIAS manual (1998) reported *SEM*s of 2.80 for the CIX, 3.67 for the VIX, and 3.35 for the NIX. The RIAS CIX *SEM*s for age groups from 15 to 94 ranged from 2.12 to 3.00. The typical 95% confidence interval for an IQ score is plus or minus 2 *SEM*s, or about 5 points (4.6 for the WAIS-III and 5.6 for the RIAS). Thus, a 95% confidence interval

for an IQ of 70, rounded to the nearest whole number, would be 65 to 75 on the WAIS-III and 64 to 76 on the RIAS. IQ scores between 70 and 75 can be particularly troublesome because their confidence intervals encompass scores in both the mild range of intellectual disability and the borderline range of intelligence. Often, there is a specific IQ cut-off or upper limit where scores above that are ineligible for services. That cut-off point varies depending on what guidelines or definitions are used by a particular agency. An IQ score above 75 generally disqualifies a person from the intellectual disability eligibility component for Social Security benefits (Reschly, Myers, & Hartel, 2002). A CIX of 76 on the RIAS might be too high to qualify for Social Security benefits and yet not high enough to preclude a diagnosis of intellectual disability for Medicaid waiver services eligibility.

FSIQs above 75 on the WAIS-III and CIXs above 76 on the RIAS indicate borderline intellectual functioning. This 1-point difference on the RIAS theoretically places 0.7% (7 per 1,000) more people than the WAIS-III in the mild range of intellectual disability. For those individuals who have RIAS CIX scores above 76, about 2.7% (27 per 1,000) can expect to score 75 or less on the WAIS-III FSIQ.

It is possible that some people have been denied services, based in part on RIAS results, who would have been eligible for those services had the WAIS-III been given. It is also possible that some people received services, based in part on WAIS-III results, who would not have received services had the RAIS been given. The potential exists for a person to receive differing intellectual diagnoses based on the whether the RIAS or the WAIS-III was used to measure their intelligence.

Intellectual diagnosis can have a large impact on one's life. A diagnosis of intellectual disability can determine eligibility for Supplemental Security Income, Medicaid waiver, special education, rehabilitation services, or disability insurance. The biggest impact of an intellectual disability diagnosis would involve a defendant in a death penalty case. Here, the difference between a diagnosis of intellectual disability and borderline or higher intelligence could be a matter of life or death because a diagnosis of intellectual disability can make one ineligible for the death penalty in the United States (*Atkins v. Virginia*, 2002). Unfortunately, the court in the Atkins case did not provide an exact definition of intellectual disability in their ruling. According to the Death Penalty Information Center (2007a, 2007b), prior to *Atkins v. Virginia*, states that prohibited the execution of persons with intellectual disability adapted the 1992 American Association on Mental Retardation, now AAIDD, definition of *mental retardation* or something close to it. Most of these states required an IQ of 70 or less as one essential component of the diagnosis. Arkansas required an IQ of 65 or less in its law. After *Atkins v. Virginia*, the states of California, Louisiana, Nevada, and Virginia developed definitions of intellectual disability that did not specify IQ number, whereas Delaware (<70), Idaho (<70), and Illinois (<75) did. States that have statutes dealing with intellectual disability and the death penalty have wide variations in the definition of intellectual disability and the procedures for determining it (Olley, Greenspan, & Switzky, 2006). If a uniform definition of intellectual disability is adopted by the legal system, and part of that definition includes a specific IQ score, it will be important that tests promulgated as comparable actually produce comparable results.

Federal and state agency guidelines influence what tests are used to measure intelligence. Even though the RIAS is promoted as comparable with the WAIS-III, the WAIS-III remains the gold standard of assessing intelligence in people 16 years of age and older. The RIAS is not as widely used as the WAIS-III, but there are times when it could be very useful. The RIAS is not significantly different from the WAIS-III in its measurement of verbal intelligence. When only the verbal portion of a test can be used because the person being tested has limited motor skills (e.g., cerebral palsy or paralysis) the RIAS should serve well. If the only measure of IQ prior to Age 18 years is the RIAS, it could be a way of establishing the age of onset. In the absence of specific rules, professional judgment should guide test selection.

Good professional judgment is enhanced by a well-informed examiner. Any examiner who assesses intelligence with either of these two tests should be aware of their differences because the test selected could determine diagnostic outcome. In this study, I did not try to determine which intelligence test, RIAS or WAIS-III, is more valid. That question remains for later investigation.

References

Atkins v. Virginia, 536 U.S. 304, 122 S.CT. 2242, 153 L. Ed. 2d 335 (2002).

 ©American Association on Intellectual and Developmental Disabilities

American Psychiatric Association. (2000). *Diagnostic and statistic manual, text revision* (4th ed., text rev.). Washington, DC: Author.

American Psychological Association. (1992). Ethical principles of psychologists and code of conduct. *American Psychologist, 47,* 1597–1611.

Bracken, B. A. (2005). Review of the Reynolds Intellectual Assessment Scales and the Reynolds Intellectual Screening Test. In R. A. Spies & B. S. Plake (Eds.), *The sixteenth mental measurements yearbook* (pp. 891–894). Lincoln: The University of Nebraska Press.

Death Penalty Information Center. (2007a). State statutes prohibiting the death penalty for people with mental retardation. Retrieved September, 27, 2007, from http://www.deathpenaltyinfo.org/article/php?scid=28&did=138

Death Penalty Information Center. (2007b). States that have changed their statutes to comply with Supreme Court's decision in *Atkins v. Virginia*. Retrieved September, 27, 2007, from http://www.deathpenaltyinfo.org/article/php?scid=28&did=668

Olley, J. G., Greenspan, S., & Switzky, H. (2006, Winter) Division 33 ad hoc committee on mental retardation and the death penalty. *Psychology in Mental Retardation and Developmental Disabilities, 31,* 11–13.

Reschly, D. J., Myers, T. G., & Hartel, C. R. (Eds.). (2002). *Mental retardation: Determining eligibility for Social Security benefits*. Washington, DC: National Academy Press.

Reynolds, C. R., & Kamphaus, R. W. (2003). *Manual for Reynolds Intellectual Assessment Scales and the Reynolds Intellectual Screening Test*. Lutz, FL: Psychological Assessment Resources, Inc.

Schraw, G. (2005). Review of the Reynolds Intellectual Assessment Scales and the Reynolds Intellectual Screening Test. In R. A. Spies & B. S. Plake (Eds.), *The sixteenth mental measurements yearbook* (pp. 894–895). Lincoln: The University of Nebraska Press.

The Psychological Corporation. (1997). *WAIS-III–WMS-III technical manual*. San Antonio, TX: Author.

Wechsler, D. (1997). *Manual for Wechsler Adult Intelligence Scale—Third edition*. San Antonio, TX: The Psychological Corporation.

Received 12/18/06, first decision 6/11/07, accepted 10/30/07.
Editor-in-Charge: Steven J. Taylor

I thank all the people who agreed to participate in this study, Chris Spatz for his statistical advice and editorial consultation, Carl Reddig for his encouragement and support of this project, and, last, the Arkansas Department of Health and Human Services, Developmental Disabilities Services, for its support and approval.

Author:
Tom B. Umphress, MA, Department of Psychology, Conway Human Development Center, 150 Siebenmorgen Rd., Conway, AR 72032-4000. E-mail: tomumphress@msn.com