

Comparison of the WAIS and WAIS-R: Different Results for Different IQ Groups

Jean Spruill and Brett L. Beck
University of Alabama

Using a procedure that eliminated repetition of identical items, thus avoiding order effects, we administered the Wechsler Adult Intelligence Scale (WAIS) and the WAIS-Revised to 108 subjects. All correlations between the two tests were significant and similar to those reported in the WAIS-R manual. For the group as a whole, verbal, performance, and full scale IQ scores on the WAIS-R were significantly lower than their respective WAIS scores; however, this difference was not consistent across IQ levels. Subjects of both average and borderline intelligence had WAIS IQ scores significantly above their WAIS-R scores. For the mildly retarded subjects, the performance IQs were equal for the WAIS and WAIS-R, whereas the WAIS-R verbal and full scale IQ scores were higher than the corresponding WAIS IQ scores. However, these score differences were small (1 point) and of little practical value. The differences of moderately retarded subjects, on the other hand, were large and in the reverse direction: The WAIS-R IQ scores were significantly higher than the WAIS IQ scores. Clinical implications of these findings are discussed.

When an established test is revised, evaluation of the equivalence of the two forms is necessary. Since the publication of the Wechsler Adult Intelligence Scale-Revised (WAIS-R), several comparisons of IQ scores obtained on the WAIS-R and WAIS have been published. When using subjects of average or above intelligence, the researchers generally have found lower IQ scores on the WAIS-R than on the WAIS. The exceptions to this finding are three studies, one with high-IQ subjects (Edwards & Klein, 1984) and two with mentally retarded subjects (Simon & Clopton, 1984; Spitz, 1986). The order of administration of the two forms of the Wechsler tests had an effect in some studies, but not in others. In Table 1 we provide a summary of the published literature to date on comparisons of the WAIS and the WAIS-R. Evidence that the differences between WAIS and WAIS-R scores are less at either extreme of the IQ distribution is accumulating (e.g., Mitchell, Grandy, & Lupo, 1986; Rabourn, 1983; Spitz, 1986).

Most of the researchers comparing the WAIS and the WAIS-R have used subjects of average to superior intelligence. Our purpose was to determine the equivalence of the WAIS and the WAIS-R for subjects in the lower ranges of intelligence—that is, subjects descriptively classified as average, borderline, mildly retarded, or moderately retarded.

JEAN SPRUILL is currently an associate professor and Director of the Psychology Clinic, University of Alabama. She is a member of the Executive Council of the Association of Directors of Psychology Training Clinics. Her research interests focus on psychological assessment, particularly as it relates to the mentally retarded.

BRETT L. BECK is a doctoral candidate in clinical psychology at the University of Alabama. He is currently on internship at Fairfield Hills Hospital in Newtown, Connecticut. His research interests include psychological assessment, self-defeating behaviors, and the teaching of psychology.

CORRESPONDENCE CONCERNING THIS ARTICLE should be addressed to Jean Spruill, University of Alabama, P.O. Box 6142, Tuscaloosa, Alabama 35487.

Method

Subjects

Subjects were 108 individuals referred to a local university psychology clinic for a routine psychological evaluation to assist in determining their eligibility for rehabilitation or special education services by various community agencies. The agencies were Vocational Rehabilitation Services, Mental Health and Mental Retardation Services, and the local city school system. Subjects' mean age was 25.5 years ($SD = 7.38$); 56 were female; 33 were White and 75 were Black.

Procedure

In order to minimize practice effects, both forms of the test were administered concurrently. This combined administration procedure was first used by Rabourn (1983) and is possible because many items on the two tests are identical. Subjects were administered either the WAIS initially (Order 1), with the unique items from the WAIS-R inserted at the end of the appropriate subtests, or the WAIS-R initially (Order 2), with the unique items from the WAIS inserted at the end of the appropriate subtests. The order of administration was counterbalanced. Each form was scored according to the criteria for that form. For each subject, it was possible to obtain full scale IQ scores (FSIQ), verbal IQ scores (VIQ), and performance IQ scores (PIQ) for both the WAIS and WAIS-R.

Subjects were classified, according to their WAIS IQ scores, as follows: average intelligence ($FSIQ \geq 85$; $n = 23$), borderline intelligence ($FSIQ = 70-84$; $n = 35$), mildly retarded ($FSIQ = 55-69$; $n = 25$), and moderately retarded ($FSIQ = 40-54$; $n = 25$). This classification is based on the criteria specified by the American Association of Mental Deficiency (Grossman, 1973). The full scale IQ equivalents in Table 18 of the WAIS manual (Wechsler, 1955, pp. 78-97) consist of a sum of scaled scores of not less than 11 each, thus yielding IQs of 41 or above. Therefore, for the 4 subjects whose scale score sum was less than 11, Silverstein's extrapolated WAIS full scale IQs were used. All subjects had a scaled score sum of 11 or greater on the WAIS-R; thus extrapolation was not needed for the WAIS-R.

Table 1
Summary of Comparisons of the WAIS and the WAIS-R

Author/subject group	Order effect	Score differences
Edwards & Klein (1984): MENSA subjects	Yes	WAIS = WAIS-R
Kelly, Montgomery, Felleman, & Webb (1984): neurologically impaired patients	na	WAIS > WAIS-R
Lewis & Johnson (1985): college students	na	WAIS > WAIS-R
Lippold & Claiborn (1983): VA patients, normal IQ	na	WAIS > WAIS-R
Mishra & Brown (1983): college students	No	WAIS > WAIS-R
Mitchell, Grandy, & Lupo (1986): medical students	na	WAIS > WAIS-R
Quereshi & Ostrowski (1985): college students	Yes	WAIS > WAIS-R
Rabourn (1983): college students	na	WAIS > WAIS-R
Rogers & Osborne (1984): clinical subjects, normal IQ	na	WAIS > WAIS-R
Ryan, Rosenberg, & Prifitera (1983): VA inpatients	na	WAIS > WAIS-R ^a
Simon & Clopton (1984): mentally retarded subjects	No	WAIS-R > WAIS ^b
Smith (1983): college students	Yes	WAIS > WAIS-R
Spitz (1983): mentally retarded subjects	na	WAIS = WAIS-R
Spitz (1986): mentally retarded subjects	na	WAIS = WAIS-R

Note. WAIS = Wechsler Adult Intelligence Scale (R = Revised). na = not applicable; either the same subjects were not administered both tests or a combined administration technique was used. VA = Veterans Administration.

^a Only full scale IQ scores were reported. ^b For verbal IQ and performance IQ.

Results

Correlations between WAIS and WAIS-R VIQ, PIQ, and FSIQ scores were .99, .97, and .99, respectively. The correlations for subtest scores ranged from a low of .87 for Picture Completion to a high of .99 for Object Assembly. All correlations were significant ($p < .001$). The correlations for all IQ and subtest scores were equal to or higher than the test-retest correlations reported in the manual (Wechsler, 1981).

A mixed-model analysis of variance (ANOVA) with one between-subjects variable (order) and one within-subjects variable (test form) was used to analyze verbal, performance, and full scale IQ scores. In Table 2 we present the means, standard deviations, and ANOVA results for the IQ scales. There was a significant main effect for test form for all three IQ scores, $F_s(1, 106) = 5.35, 9.81, \text{ and } 11.54, p_s < .001$, for VIQ, PIQ, and FSIQ scores, respectively. For all three scales, WAIS IQ scores were higher than WAIS-R IQ scores. Neither order nor the Test Form \times Order interaction was significant for any IQ score.

Although the differences between the verbal (2.33), performance (1.20), and full scale (1.90) IQ scores were significant, they were considerably lower than those reported in the Wechsler manual (Wechsler, 1981) and by other researchers (e.g., Lippold & Claiborn, 1983; Rogers & Osborne, 1984). When the data were examined more closely, it was apparent

Table 2
Means and Standard Deviations for Test Scores and ANOVA F Ratios

Function	Verbal IQ		Performance IQ		Full Scale IQ	
	M	SD	M	SD	M	SD
Test scores						
WAIS	73.35	18.38	71.10	15.68	70.48	17.20
WAIS-R	71.02	11.70	69.90	10.67	68.50	11.89
$F(1, 106)$	5.35*		9.81*		11.54*	
ANOVA						
Order 1	72.14	15.86	71.59	13.20	70.10	14.83
Order 2	72.22	10.67	69.52	13.54	68.96	14.78
$F(1, 106)$						
Test form	0.67		0.01		0.17	
Test \times Order	1.79		0.03		0.19	

Note. ANOVA = analysis of variance; WAIS = Wechsler Adult Intelligence Scale (R = Revised).

* $p = .001$.

that the differences between the WAIS and WAIS-R IQ scores varied as a function of intelligence classification. Accordingly, a repeated-measures ANOVA was used to analyze the IQ score differences between the two tests for each group. Order of administration was not significant; therefore, it was not considered in further analyses.

In Table 3 we present the means, standard deviations, and ANOVA results for the different intelligence classification groups. For subjects with average intelligence, the WAIS/WAIS-R

Table 3
Means and Standard Deviations for WAIS and WAIS-R IQ Scores and ANOVA F Ratio for Mean Differences for Different Intelligence Classifications

Score	WAIS		WAIS-R		F	df	p
	M	SD	M	SD			
Average intelligence (WAIS FSIQ $\geq 85, n = 23$)							
VIQ	91.00	6.02	83.08	4.79	14.57	1, 22	< .001
PIQ	94.69	6.60	85.56	6.89	112.33	1, 22	< .001
FSIQ	92.13	5.87	83.04	5.51	19.59	1, 22	< .001
Borderline intelligence (WAIS FSIQ 70-84, $n = 35$)							
VIQ	78.06	4.35	74.60	3.04	104.05	1, 34	< .001
PIQ	82.37	6.79	75.31	5.49	235.55	1, 34	< .001
FSIQ	78.66	4.03	73.91	2.64	137.63	1, 34	< .001
Mildly retarded intelligence (WAIS FSIQ 55-69, $n = 25$)							
VIQ	64.52	6.95	65.72	5.15	4.70	1, 24	< .05
PIQ	66.96	7.87	66.40	4.92	0.52	1, 24	ns
FSIQ	62.76	4.92	64.02	3.95	4.32	1, 24	< .05
Moderately retarded intelligence (WAIS FSIQ < 55, $n = 25$)							
VIQ	49.64	3.55	55.36	3.05	174.03	1, 24	< .001
PIQ	47.48	6.65	56.28	4.77	156.12	1, 24	< .001
FSIQ	45.80	3.91	51.64	4.32	205.95	1, 24	< .001

Note. WAIS = Wechsler Adult Intelligence Scale (R = Revised); ANOVA = analysis of variance; VIQ = verbal IQ; PIQ = performance IQ; FSIQ = full scale IQ; ns = nonsignificant.

r differences of 7.92, 9.13, and 9.09 between VIQ, PIQ, and FSIQ scores were significant ($p < .001$) and consistent with the differences of 6.9, 8.0, and 7.5 reported in the WAIS-R manual (Wechsler, 1981, p. 47). For the borderline classification, however, the differences, though significant, were generally smaller (3.46, 7.06, and 4.75 for VIQ, PIQ, and FSIQ, respectively) than the differences found in the average intelligence group. Most notable was the reversal in differences between the WAIS and WAIS-R scores for the mildly and moderately retarded groups of subjects. In the mildly retarded group, WAIS-R VIQ and FSIQ scores were significantly higher than WAIS scores (1.20 and 1.26, respectively). Although significant, these small differences represent little practical difference between the two tests. The mean difference of 0.50 for PIQ scores was not significant. This reversal of the usual WAIS and WAIS-R differences became even greater for the moderately retarded group. Significant mean differences of 5.72, 8.80, and 5.84 were found for VIQ, PIQ, and FSIQ scores, respectively. In each case, the WAIS-R IQ score was higher than the WAIS IQ score.

In Table 4 we detail the changes in intelligence classification when WAIS-R FSIQ scores instead of WAIS FSIQ scores are used to descriptively classify the subjects' intellectual level. No changes in classification occurred in the mildly retarded group, but substantial changes occurred in the other groups. Of the 23 subjects who were originally classified in the average range of intelligence on the WAIS, 15 (65%) were classified in the borderline range of intelligence by their WAIS-R scores. For the moderately retarded group, 8 (32%) of the 25 subjects would be reclassified as mildly retarded on the basis of their WAIS-R scores. Changes in IQ classification would result in changes in eligibility for the social service programs that referred the current subjects for evaluation. Although intelligence scores are not the only criteria for determining eligibility for services, they are the most important criteria. In Table 5 we show the number of subjects who, according to only their WAIS and WAIS-R IQ scores, would qualify for services from local referral agencies. In some instances, WAIS-R scores increased the number of potentially eligible clients; in other cases, the WAIS-R scores decreased the number of potentially eligible clients.

Table 4
Number of Individuals in Each Intelligence Classification According to WAIS and WAIS-R Scores

Classification	WAIS classification			
	Average	Border line	Mildly retarded	Moderately retarded
WAIS classification	23	35	25	25
WAIS-R reclassification				
Average	8			
Borderline	15	33		
Mildly retarded		2	25	8
Moderately retarded				17

Note. Example: Of the 23 subjects classified as average on the WAIS (Wechsler Adult Intelligence Scale), 8 were classified as average and 15 as borderline on the WAIS-R (WAIS-Revised).

Table 5
Changes in Number of Subjects Eligible for Social Service Programs as a Function of the Intelligence Test Used

Program	IQ criterion	No. eligible	
		WAIS score	WAIS-R score
Vocational rehabilitation	≤ 84	85	100
Social Security disability	≤ 59	30	25
Special education classes			
EMR	50-70	43	30
TMR	30-49	23	10

Note. WAIS = Wechsler Adult Intelligence Scale (R = Revised); EMR = educable mentally retarded; TMR = trainable mentally retarded. For purposes of this table, eligibility was based only on IQ scores. In most cases, impairment in adaptive functioning or other criteria are also required for eligibility.

Discussion

When comparing the WAIS and WAIS-R, most researchers have found WAIS scores to be higher, although a few have found WAIS-R scores to be higher. We also found the typical results (WAIS score $>$ WAIS-R score) when the entire subject group was compared. However, when subjects were divided into different groups on the basis of their intelligence classification, the differences between the WAIS and WAIS-R IQ scores varied as a function of the subject's intellectual level. This may explain the contradictory findings in the literature. Indeed, those researchers who found WAIS-R scores to be equal to or higher than WAIS scores studied mentally retarded subjects. Similarly, Light and Chambers (1958), studying mentally retarded subjects, found WAIS scores to be higher than Wechsler-Bellevue II scores, a difference in the opposite direction from other comparisons of the WAIS and Wechsler-Bellevue II.

Different scoring procedures for the WAIS and WAIS-R at the lower end of the scale may partly explain the WAIS-R scores' being higher than the WAIS scores at the lower end of the intelligence distribution. The minimum scaled score on the WAIS-R is 1; on the WAIS it is 0. For example, Comprehension subtest raw scores of 0-2 receive a scaled score of 0 on the WAIS, but they receive a scaled score of 1 on the WAIS-R. Clearly, the mentally retarded subjects are the ones who earn a higher IQ from this scaled score increase at the lower end of the distribution on the WAIS-R.

Although the standardization sample of the WAIS-R was representative with respect to the percentage of retarded in the population, it did not include any institutionalized retarded. The standardization sample of the WAIS, on the other hand, included roughly 2% of institutionalized mentally retarded subjects (Matazarro, 1972). It is reasonable to conclude that those two classified samples of retarded individuals were not equivalent. This also may explain why the traditional finding of lower scores on newly standardized tests than on the previous test (Flynn, 1984) does not occur with the retarded.

Are the differences between the two tests large enough to alter clinical decisions? On the basis of the research to date, the answer is yes. A person's eligibility for social service

programs may be affected by changes in IQ scores from one test to another. Previous research with mentally retarded subjects has shown an upward shift in IQ scores when subjects originally tested on the Wechsler Intelligence Scale for Children (WISC) or the WISC-R are retested with the WAIS and/or WAIS-R (Carvajal, Lane, & Fay, 1984; Craft & Kronenburger, 1979; Rubin, Goldman, & Rosenfield, 1985; Sattler, Polifka, & Polifka, 1984). As pointed out by Rubin et al. (1985), such "built-in shifts" (p. 392) in IQ have the potential of great impact on funding for special programs, educational placement, eligibility for disability benefits, and a whole range of supportive programs for the retarded.

For example, when retested with the WAIS-R, a person who is currently in a class for the trainable mentally retarded (TMR) may no longer qualify for this placement. Instead, he or she may now qualify for class for the educable mentally retarded (EMR). Indeed, our local school system no longer uses the WAIS-R for this very reason. On the other hand, social service programs that serve the borderline segment of the population may find an increase in the number of clients eligible when WAIS-R scores instead of WAIS scores are used.

Clinicians are cautioned that the WAIS and the WAIS-R are not interchangeable and that findings that apply to subjects of average or superior intelligence do not apply to those of lesser ability. The higher WAIS-R IQ scores in our sample of retarded subjects appear to be a function of the test itself and are a result of the standardization process and/or the methods used to calculate the scaled scores and IQs rather than any real increases in IQ.

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