

## Variations in Wechsler Interscale IQ Disparities at Different Levels of IQ

HERMAN H. SPITZ

*E. R. Johnstone Training and Research Center*

Collating results from studies in which groups were given two IQ tests, one normed many years earlier than the other, or in which the raw scores of comparable groups tested from 10 to 40 years apart were compared, Flynn (1987) reported that—in a single generation and in many nations—there had been massive IQ gains. The present survey reports results based on groups that had taken both the WAIS and the WAIS-R (normed 25 years after the WAIS) and that had mean IQs ranging from about 50 to 130. Results in the average IQ range are consistent with Flynn's hypothesis, but test differences gradually diminish above and below the average range, and in the retarded range the direction of the differences reverses. WISC-R/WAIS-R differences in the retarded range are also reversed (the newer test giving a higher score) and show increasing disparity with decreasing IQ. In general, tabled values for converting raw scores to IQs parallel the empirical data. At least on these two pairs of Wechsler scales, massive gains in IQ are conditional on level of IQ.

Among the more provocative findings involving standardized intelligence tests are the reports of massive IQ gains, ranging from 5 to 25 points in a single generation (Flynn, 1984, 1987; Parker, 1986). In brief, the raw scores of contemporary groups are higher than the raw scores of comparable groups who had taken the same test many years ago. Furthermore, recent standardization samples established higher norms than did earlier standardization samples, and consequently individuals who take both the earlier and the more recent versions of an intelligence test will tend to score higher on the earlier tests. One puzzling inconsistency, however, is that at the same time that IQ had been going up, SAT scores had been declining, a discrepancy that Flynn (1987) attempted to resolve by suggesting that "IQ tests do not measure intelligence but rather a weak causal link to intelligence" (p. 190). However, Flynn (personal communication, January 15, 1988) does not deny that IQ tests are useful in assessing individual differences in the intelligence of members of a homogeneous group; what he questions is the accuracy of the tests when comparing groups separated by time or by differences in culture.

The data showing IQ gains were gathered from many countries and included

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Correspondence and requests for reprints should be sent to Herman H. Spitz, Research Dept., E. R. Johnstone Training & Research Center, Bordentown, NJ 08505.

many different intelligence tests, including various versions of the Wechsler scales (Flynn, 1987). But use of the Wechsler scales raises a problem: on some of the scales the intertest IQ disparities are not consistent across the entire range of intelligence. Indeed, in the lower IQ range an opposite trend can occur, in which a later scale produces higher IQs than an earlier one (Flynn, 1985; Spitz, 1988).

The purpose of this paper is to examine published reports of Wechsler interscale comparisons with samples drawn not only from the average range, but also from other sections of the Gaussian curve. If a lawful relationship between interscale IQ disparities and IQ level is unearthed, its congruence with tabled values for converting raw scores to scaled scores to IQs will be examined.

## STUDY 1: EMPIRICAL DATA

### Method

From a search of the literature, 13 studies provided a total of 15 samples that received both the Wechsler Adult Intelligence Scale (WAIS; Wechsler, 1955) and its revised version (WAIS-R; Wechsler, 1981), and in which sample size was at least 20. In six samples (Edwards & Klein, 1984; Mishra & Brown, 1983; Quereshi & Ostrowski, 1985; Simon & Clopton, 1984; Smith, 1983; Wechsler, 1981) a counterbalanced design was used, and one sample was partially counterbalanced (Urbina, Golden, & Ariel, 1982). Interval between tests ranged from 1 to 6 weeks, with the exception of Urbina et al. (1982), where it ranged from 1 day to 7 months.

In an additional four studies the two scales were given concurrently, a procedure made possible because, ignoring Digit Symbol (where the same symbols were used but with three additional chances on the WAIS-R), the two scales have about 81% of their items in common or only slightly different. For three of these samples (Field & Sisley, 1986; Mitchell, Grandy, & Lupo, 1986; Rabourn, 1983) all the WAIS (or WAIS-R) items of a subtest were given first, followed by the unique items of the other scale, with order counterbalanced; whereas for the other sample (Lippold & Claiborn, 1983), subjects were alternately assigned to the WAIS or WAIS-R first, with unique items of the other scale inserted in a position corresponding to their locations in the original form.

In the remaining four samples the WAIS was given first, with either a 4-year retest interval (the three samples in Goldman, 1987) or a 2.6-year retest interval (Spitz, 1986).

For the analyses, all these procedural differences were ignored because, as will be seen, the data produced lawful curves irrespective of the procedures used. The total number of subjects was 784, the median *N* per sample being 45. For all samples, median age at first testing was 29.50 years. The percentage of males was 54%, based on 13 samples in which sex ratios were provided.

**TABLE 1**  
**Comparison of WAIS/WAIS-R IQs Across a Large Portion of the Intelligence Curve**

Study	WAIS (Y)	WAIS-R (X)	Diff. (Y - X)
Goldman (1987) <sup>a</sup>	48.77	55.05	-6.28
Simon & Clopton (1984)	59.86	62.00	-2.14
Spitz (1986)	60.02	60.75	-0.73
Goldman (1987)	63.16	63.98	-0.82
Goldman (1987)	76.90	73.43	3.47
Field & Sisley (1986) <sup>b</sup>	87.50	82.10	5.40
Lippold & Claiborn (1983) <sup>b</sup>	94.80	86.40	8.40
Wechsler (1981) <sup>a</sup>	111.30	103.80	7.50
Urbina et al. (1982) <sup>c</sup>	114.32	109.04	5.28
Rabourn (1983) <sup>b</sup>	115.90	109.20	6.70
Mishra & Brown (1983) <sup>a</sup>	120.25	115.64	4.61
Quereshi & Ostrowski (1985) <sup>a</sup>	119.40	115.70	3.70
Smith (1983) <sup>a</sup>	119.70	115.95	3.75
Mitchell et al. (1986) <sup>b</sup>	124.54	120.77	3.77
Edwards & Klein (1984) <sup>b</sup>	129.60	126.50	3.10

a = counterbalanced, b = concurrent, c = partially counterbalanced

In addition to WAIS/WAIS-R comparisons, a search was also made for studies in which the Wechsler Intelligence Scale for Children-Revised (WISC-R; Wechsler, 1974) was compared with the WAIS-R in a repeated measures design, with *N*s of at least 20 per sample. Seven studies with a total of nine samples were found. Two (Nagle, 1986; Wechsler, 1981) used a counterbalanced design with 16-year-old subjects (because at that age the two scales overlap) and intertest intervals of 1 to 6 weeks. For the remaining seven samples (two from Rubin, Goldman, & Rosenfeld, 1985; one each from Sattler, Polifka, & Polifka, 1984; Spitz, 1988; Vance, Brown, & Hankins, 1987; and two from Zimmerman, Covin, & Woo-Sam, 1986) the WISC-R was given first, with retest intervals ranging from 2.7 to 4.3 years, and a median age at first testing of 14.2 years. The total *N* of the nine samples was 322, with a median per sample of 30. For the eight samples in which sex ratios were provided, 66% of the subjects were males.

**Results**

**WAIS/WAIS-R Comparisons.** The WAIS/WAIS-R scores, along with their differences, are given in Table 1. The differences as a function of the WAIS-R IQs are shown graphically in Figure 1. The regression equation that best fits these data includes a quadratic term and produces a bow-shaped function:

$$Y' = -60.365 + 1.393X - .00716X^2. r = .9655$$

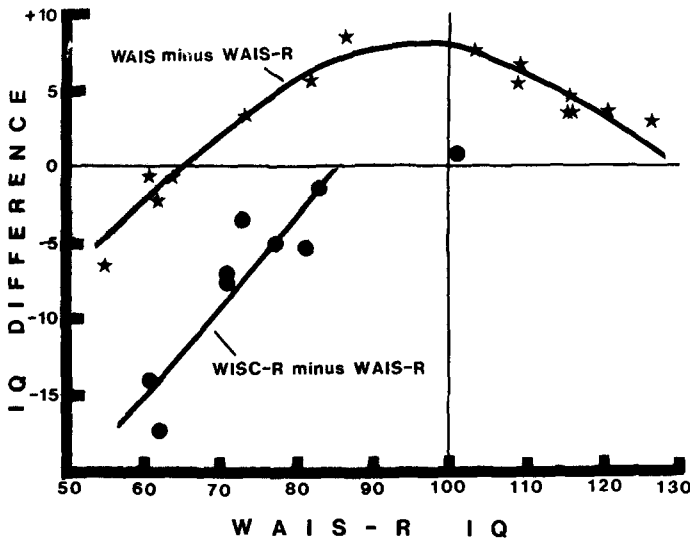


FIG. 1. Lines of best fit for the data derived from WAIS minus WAIS-R and WISC-R minus WAIS-R repeated measures comparisons.

The regression equation that best fits the WAIS and WAIS-R data (that is, WAIS as a function of WAIS-R) is of course very similar:

$$Y' = -60.365 + 2.393X - .00716X^2. r = .9993$$

Differences are greatest at a WAIS-R IQ of close to 100. In the below average range differences diminish to about zero at the WAIS-R 65 IQ level, after which the differences reverse and the WAIS-R overestimates IQ relative to the WAIS. In the above average range the WAIS-R underestimation of IQ diminishes when going from the average to the superior IQ level, where differences approach zero. Despite these disparities, the interscale correlations for each group was generally high; the median correlation for the 12 samples where this information was available was .88.

Recently published findings fit this general picture almost perfectly. Spruill and Beck (1988) gave the WAIS and WAIS-R to 108 subjects, eliminating repetition of identical items. For subjects who had IQs in the average and borderline range, the mean WAIS IQs were, respectively, 9.09 and 4.75 points higher than the mean WAIS-R IQ. On the other hand, in the mildly retarded range (WAIS IQ 55-69) there was a slight, 1.26-point difference in favor of the WAIS-R, and in the moderately retarded range (WAIS IQ < 55) the mean WAIS-R IQ was higher by 5.84 points than the mean WAIS IQ.

**WISC-R/WAIS-R Comparisons.** Because I could find no relevant WISC-R/WAIS-R comparisons with samples of above average intelligence, only the data from eight samples with below average IQs are given in Table 2. These data, plus the single data point from a sample with average intelligence (Wechsler, 1981), are plotted in Figure 1, where it is evident that with decreasing IQs there is an increasing disparity between the two scales. As you go lower in the intelligence curve, the WAIS-R progressively overestimates IQ relative to the WISC-R, until at WAIS-R IQ of about 60 the two scales differ by the tests' standard deviation (Spitz, 1988). The regression equation (not including the Wechsler samples) is given in Table 2. For the six samples on which interscale correlations were provided, the median correlation is .77.

## STUDY 2: WECHSLER CONVERSION TABLES

The major source of the empirical functions described in Figure 1 should lie in the Wechsler tables for converting raw scores to scaled scores and then to IQs. That is, if in the average IQ range, for example, the WAIS-R underestimates IQ relative to the WAIS, then the same total raw score that produces an IQ of, say, 100 on the WAIS-R should produce an IQ of about 108 on the WAIS, and the fluctuating interscale disparities across the range of IQs should result from parallel disparities in the conversion tables.

**WAIS/WAIS-R Comparisons.** In order to track the interscale conversion differences across a large section of the intelligence curve, raw scores required to obtain scaled scores and IQs at different IQ levels were obtained from tables provided in the WAIS and WAIS-R manuals (Wechsler, 1955, 1981) for age

TABLE 2  
Comparison of WISC-R/WAIS-R IQs in the  
Below Average Range of Intelligence

Study	WISC-R (Y)	WAIS-R (X)	(Y - X)
Rubin et al. (1985)	47.00	61.00	-14.00
Spitz (1988)	44.80	62.10	-17.30
Rubin et al. (1985)	64.00	71.00	-7.00
Nagle (1986) <sup>a</sup>	63.33	71.10	-7.77
Zimmerman et al. (1986)	69.60	73.00	-3.40
Vance et al. (1987)	72.40	77.50	-5.10
Zimmerman et al. (1986)	75.90	81.20	-5.30
Sattler et al. (1984)	81.13	82.70	-1.57
Regression equation: $Y = -51.175 + 1.60X$ . $r = .984$			

<sup>a</sup>Counterbalanced

group 25–34 years, because this age group includes the median age of the samples in Study 1. The results are given in Table 3.

The data in Table 3 were generated from the Wechsler manuals as follows. For the first row, the raw score required for a scaled score of 2 on each of the 11 subtests of the WAIS and WAIS-R was derived using Wechsler's Table of Scaled Score Equivalents provided on the WAIS and WAIS-R Record Forms (and also reproduced in the manuals). In instances where a subtest has a range of raw scores for a single scaled score (e.g., 2–3 for a scaled score of 2), the median raw score was used (2.5 in this example). These 11 raw scores were then totaled and placed in the first row followed by the corresponding total scaled score. The IQ was then obtained from the table for determining IQ equivalents from the sum of scaled scores for age group 25–34. For the next row, the total raw score required for a scaled score of 3 on each subtest of the WAIS and WAIS-R was calculated and the above procedures followed. These steps were taken at each subsequent level until IQs of 124 and 126 were reached.

The curves drawn from the Table 3 data are shown in Figure 2 where, for each scale, the total raw scores are plotted against the IQs they generate. For an equivalent raw score, the lower the curve relative to the other curve the higher that scale's IQ relative to the other scale. Scale disparities can be estimated by drawing a horizontal line to connect the two curves at any point, and then dropping a vertical line to the abscissa. In figure 2, examples are provided by the striped lines. At the lower end of the curves a total raw score of 55 produces a WAIS IQ of about 47 and a WAIS-R IQ of about 56. On the other hand, in the average range a total raw score of 265 produces a WAIS IQ of about 100, and a

**TABLE 3**  
**Raw Score to Scaled Score to IQ Conversions for the WAIS and WAIS-R for Age Group 25–34**

Raw Score	WAIS		Raw Score	WAIS-R	
	Scaled Score	IQ		Scaled Score	IQ
55.5	22	47	41.5	22	51
71.5	33	54	66.0	33	59
92.0	44	61	93.0	44	64
117.0	55	67	130.0	55	70
146.5	66	74	170.5	66	75
177.0	77	80	209.0	77	79
205.0	88	87	240.0	88	85
236.0	99	93	266.5	99	91
268.5	110	100	292.5	110	97
298.5	121	106	317.0	121	104
324.5	132	113	339.5	132	113
346.0	143	119	360.0	143	124
365.5	154	126			

*Note.* Data are from tabled values for converting scaled scores to IQs for age group 25–34. To convert raw scores to scaled scores, a single table is used for all ages.

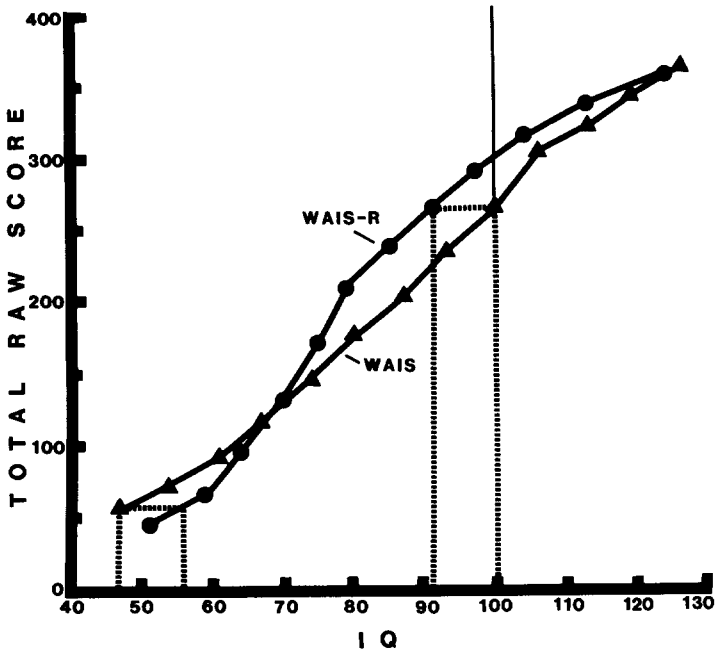


FIG. 2. Tabled values of raw score to scaled score conversions for the WAIS and WAIS-R over a wide range of IQ levels. Striped lines illustrate how IQ differences can be estimated.

WAIS-R IQ of about 91, just the opposite of what occurs at the lower IQ level. In the neighborhood of 70 IQ, and in the upper range of intelligence, the two scales are essentially equivalent.

In general, these results are compatible with the empirical results given in Figure 1. For the same raw score, the WAIS-R produces increasingly higher IQs than the WAIS from about IQ 65 down to IQ 50. From IQ 75 up to IQ 90, on the other hand, the raw score will produce progressively higher IQs on the WAIS than on the WAIS-R, after which differences gradually diminish up to IQ 125, where they disappear. No differences occur around IQ 70. The only minor discrepancy between the empirical and tabled findings is that in the empirical data the WAIS continues to produce somewhat higher IQs than the WAIS-R even in the 125–130 IQ range, whereas at that level the tabled raw score of IQ conversions are equivalent on the two scales.

**WISC-R/WAIS-R Comparisons.** Essentially the same general procedure was used to compare the differences in tabled conversions of scores for the WISC-R/WAIS-R comparison. However, comparisons were made at age 16, where the two scales overlap. Consequently, for the WAIS-R the table for age group 16–17 was used for converting scaled scores to IQ equivalents. In the WISC-R, on the

other hand, the same table for converting scaled scores to IQs is used for all ages, whereas there are age-dependent tables for converting raw scores to scaled scores. Consequently, for the WISC-R I used the table for age group 16–8 to 16–11. Note also that only 10 subtests are used to derive WISC-R IQs, which is why in Table 4 the scaled scores in each row are not the same for the two scales. The results given in Table 4 are shown graphically in Figure 3.

Unlike the WAIS/WAIS-R comparison, there is no reason why identical raw scores should produce equivalent IQs in the WISC-R/WAIS-R comparison. Indeed, higher raw scores are easier to obtain on the children's scale than on the adult scale because there are many more items that are easier for 16-year-olds, and consequently it should require a higher raw score on the WISC-R than on the WAIS-R to obtain an equivalent IQ. But our interest is in the way in which the disparities vary at different intelligence levels, and this is demonstrated in Figure 3 by shifting the WISC-R downward until the two curves are approximately at the same level in the average range. Once this is done, the increasing disparity of the two scales, starting at about IQ 75, parallels fairly closely the empirical results shown in Figure 1, although the disparity derived from the tables is somewhat larger than it is in the empirical data. For example, when the WISC-R is displaced downward so that in the average range the same raw score produces approximately equivalent IQs, Figure 3 shows that a raw score that produces a WAIS-R IQ of 64 will produce a WISC-R IQ of about 44, whereas the empirically derived regression equation predicts a WISC-R IQ of 51.

TABLE 4  
Raw Score to Scaled Score to IQ Conversions for the WISC-R and WAIS-R for 16-Year-Olds

WAIS			WAIS-R		
Raw Score	Scaled Score	IQ	Raw Score	Scaled Score	IQ
137.0	20	44	11.5	11	46
157.0	30	51	41.5	22	55
180.0	40	59	66.0	33	62
204.0	50	67	93.0	44	67
228.0	60	72	130.0	55	72
252.0	70	79	170.5	66	77
278.0	80	85	209.0	77	84
302.5	90	92	240.0	88	92
326.5	100	100	266.5	99	101
348.5	110	106	292.5	110	108
366.0	120	114	317.0	121	117
383.5	130	122	339.5	132	128

*Note.* WISC-R data are from tabled values for converting raw scores to scaled scores for age group 16–8 to 16–11, and from the single, age irrelevant table for converting scaled scores to IQs. WAIS-R data are from the single, age irrelevant table for converting raw scores to scaled scores, and from the tabled values for converting scaled scores to IQs for age group 16–17.

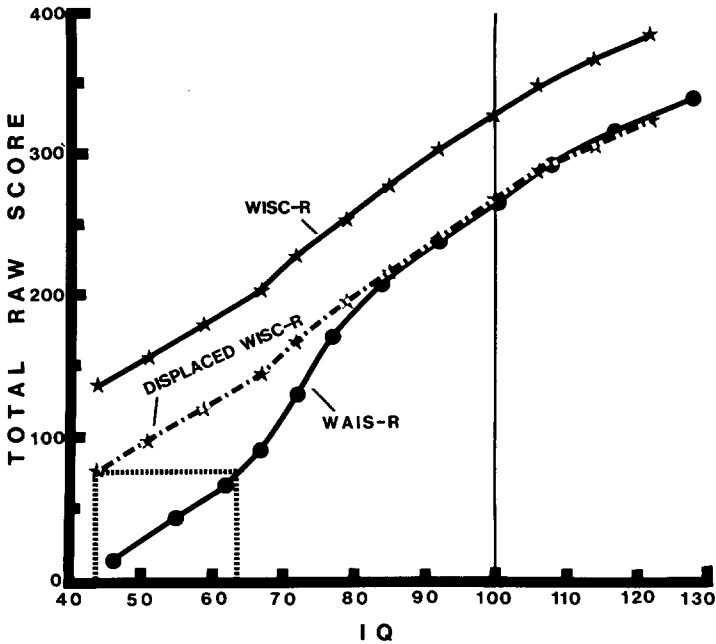


FIG. 3. Tabled values of raw score to scaled score conversions for the WISC-R and WAIS-R. The WISC-R is, in addition, displaced downward to be equated with the WAIS-R in the average range (see text).

### DISCUSSION

When the WAIS was revised, changes were made not only in some of the items of the subtests but also in the administration and scoring procedures. For example, in the WAIS all the Verbal subtests are given together, as are all the Performance subtests, whereas in the WAIS-R the Verbal and Performance subtests are alternated. On some WAIS-R subtests more help is given on the initial items. The Digit Span subtest is administered and scored differently on the two tests, and has a much larger scoring range on the WAIS-R. On the other hand, the Picture Arrangement subtest has a much larger scoring range on the WAIS. Nevertheless, these and other differences are unlikely candidates to account for the changing interscale IQ differences demonstrated here.

If, as Flynn (1984, 1987) demonstrated, test performance has been improving steadily over the 27 years between the standardization of the WAIS and the WAIS-R, then the empirical results indicate that this improvement is largest in the average range and is much less or nonexistent as you go up or down the IQ scale. Contrary to the general trend, performance has actually decreased in the retarded range, at least for the WAIS/WAIS-R comparison.

Only 7 years separated the standardization of the WAIS-R from the WISC-R,

and it is entirely unlikely that increasing disparities of the magnitude exhibited by retarded groups who took both tests can be explained by differences in the nature of the retarded individuals in the two standardization samples. Alternative explanations for this disparity in the low IQ range must be considered. In his description of the stratified standardization samples used for the WAIS, Wechsler (1955) says nothing about retarded individuals, but in both the WISC-R and WAIS-R Manuals he specifically notes that the stratified samples included no institutionalized mentally retarded individuals, although in the WISC-R Manual he adds that "Suspected mental defectives . . . were not excluded if they lived at home" Wechsler, 1974, p. 19).

Flynn's (1985) explanation for the IQ disparity in the retarded range is that special problems occur because of the small number of individuals at that level in the standardization sample. He estimates that at age 16, for example, there were only four or five retarded subjects in a scale's standardization sample, and progressively fewer subjects as you go lower in the scale. Consequently, the raw score to IQ conversions produce the discrepancies, divorced from any influence of changing intellectual performance. For nonretarded samples the large *N*s "tend to nullify the effects of different scoring practices because deviation IQs make sample distribution the primary determinant (sic) of IQs" (Flynn, 1985, p. 242). Presumably this same reasoning could be applied to the above average range. Nonetheless there are lawful functions on both sides of the 100 IQ point, not the random effects one might expect from sampling errors.

Flynn (1984) recognized the possibility that his results might be confined to a circumscribed IQ range: in presenting a correction table for certain intertest comparisons he specified that "simple allowances of this sort are sometimes reliable only for scores in the normal range of 90 to 110" (p. 39). The present results confirm the wisdom of his cautionary note, and by no means invalidate his conclusions about gains in intelligence test performance. After all, Flynn (1987) based his conclusions on large amounts of data based on many different tests from many nations, and used only data that met specified criteria. Nevertheless, the present study does uncover some striking divergences from the massive data provided by Flynn, and this additional information must eventually be fitted into a very perplexing puzzle.

## REFERENCES

- Edwards, B.T., & Klein, M. (1984). Comparison of the WAIS and the WAIS-R with *Ss* of high intelligence. *Journal of Clinical Psychology*, *40*, 300-302.
- Field, G.E., & Sisley, R.C. (1986). IQ score differences between the WAIS and the WAIS-R: Confirmation with a New Zealand sample. *Journal of Clinical Psychology*, *42*, 986-987.
- Flynn, J.R. (1984). The mean IQ of Americans: Massive gains 1932 to 1978. *Psychological Bulletin*, *95*, 29-51.
- Flynn, J.R. (1985). Wechsler intelligence tests: Do we really have a criterion of mental retardation? *American Journal of Mental Deficiency*, *90*, 236-244.

- Flynn, J.R. (1987). Massive IQ gains in 14 nations: What IQ tests really measure. *Psychological Bulletin*, *101*, 171–191.
- Goldman, J.J. (1987). Differential WAIS/WAIS-R IQ disparities among institutionalized mentally retarded persons. *American Journal of Mental Deficiency*, *91*, 633–635.
- Lippold, S., & Claiborn, J. M. (1983). Comparison of the Wechsler Adult Intelligence Scale and the Wechsler Adult Intelligence Scale-Revised. *Journal of Consulting and Clinical Psychology*, *51*, 315.
- Mishra, S.P., & Brown, K.H. (1983). The comparability of WAIS and WAIS-R IQs and subtest scores. *Journal of Clinical Psychology*, *39*, 754–757.
- Mitchell, R.E., Grandy, T.G., & Lupo, J.V. (1986). Comparison of the WAIS and the WAIS-R in the upper range of IQ. *Professional Psychology: Research and Practice*, *17*, 82–83.
- Nagle, R.J. (1986, August). *WISC-R and WAIS-R comparability among 16-year-old EMR children*. Paper presented at the convention of the American Psychological Association, Washington, DC.
- Parker, C.H. (1986). Changes in age, year-of-birth cohort, age by year-of-birth cohort interaction, and standardization of the Wechsler Adult Intelligence Tests. *Human Development*, *29*, 209–222.
- Quereshi, M.Y., & Ostrowski, M.J. (1985). The comparability of three Wechsler Adult Intelligence Scales in a college sample. *Journal of Clinical Psychology*, *41*, 397–407.
- Rabourn, R.E. (1983). The Wechsler Adult Intelligence Scale (WAIS) and the WAIS-Revised: A comparison and a caution. *Professional Psychology: Research and Practice*, *14*, 357–361.
- Rubin, H.H., Goldman, J.J., & Rosenfeld, J.G. (1985). A comparison of WISC-R and WAIS-R IQs in a mentally retarded residential population. *Psychology in the Schools*, *22*, 392–397.
- Sattler, J.M., Polifka, J.C., & Polifka, S. (1984). A longitudinal study of the WISC-R and WAIS-R with special education students. *Psychology in the Schools*, *21*, 294–295.
- Simon, C.L., & Clopton, J.R. (1984). Comparison of WAIS and WAIS-R scores of mildly and moderately mentally retarded adults. *American Journal of Mental Deficiency*, *89*, 301–303.
- Smith, R.S. (1983). A comparison study of the Wechsler Adult Intelligence Scale and the Wechsler Adult Intelligence Scale-Revised in a college population. *Journal of Consulting and Clinical Psychology*, *51*, 414–419.
- Spitz, H.H. (1986). Disparities in mentally retarded persons' IQs derived from different intelligence tests. *American Journal of Mental Deficiency*, *90*, 588–591.
- Spitz, H.H. (1988). Inverse relationship between the WISC-R/WAIS-R score disparity and IQ level in the lower range of intelligence. *American Journal of Mental Retardation*, *92*, 376–378.
- Spruill, J., & Beck, B.L. (1988). Comparison of the WAIS and WAIS-R: Different results for different IQ groups. *Professional Psychology: Research & Practice*, *19*, 31–34.
- Urbina, S.P., Golden, D.J., & Ariel, R.N. (1982). WAIS/WAIS-R: Initial comparisons. *Clinical Neuropsychology*, *4*, 145–146.
- Vance, H.R., Brown, W., & Hankins, N. (1987). A comparison of the WISC-R and the WAIS-R with special education students. *Journal of Clinical Psychology*, *43*, 377–380.
- Wechsler, D. (1955). *Manual for the Wechsler Adult Intelligence Scale*. New York: Psychological Corp.
- Wechsler, D. (1974). *Manual for the Wechsler Intelligence Scale for Children-Revised*. New York: Psychological Corp.
- Wechsler, D. (1981). *Manual for the Wechsler Adult Intelligence Scale-Revised*. New York: Psychological Corp.
- Zimmerman, I.L., Covin, R.M., & Woo-Sam, J.M. (1986). A longitudinal comparison of the WISC-R and WAIS-R. *Psychology in the Schools*, *23*, 148–151.