MANKIND QUARTERLY 2016 57:1 66-71

Sex Differences on the WISC-III in Taiwan and the United States

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Sex differences on the WISC-III are reported for the 13 subtests, the Verbal and Performance IQs, the four Index IQs and the Full Scale IQs in Taiwan and the United States. The sex differences are closely similar in the two samples with a correlation of .87 (p<.001) in the 13 subtests. Males obtained significantly higher Full Scale IQs in the two samples of .21*d* and .11*d*, respectively.

Key words: Gender differences; WISC-III; Taiwan; United States.

Sex differences in intelligence in children aged 6-16 years on the Wechsler Intelligence Scale for Children-III (WISC-III) have been reported for Sudan and the United States by Bakhiet et al. (2016). The results showed that the sex differences on the 13 subtests were closely similar in the two samples with a correlation of .878 (p<.001) and that males obtained significantly higher Full Scale IQs in the two samples at .23*d* and .11*d*, respectively. These results are therefore contrary to the assertion that has been made by Anderson (2004, p. 829): "the evidence that there is no sex difference in general ability is overwhelming. This is true whether general ability is defined as an IQ score calculated from an omnibus test of intellectual abilities such as the various Wechsler tests, or whether it is defined as a score on a single test of general intelligence, such as the Raven's Matrices"; and to Halpern's (2012, p. 233) assertion that "females and males

score identically on IQ tests"; and to Ritchie's assertion (2015, p. 105) that "women tend to do better than men on verbal measures, and men tend to outperform women on tests of spatial ability; these small differences balance out so that the average general score is the same." In the present paper we present data for sex differences in intelligence for children aged 6-16 years in Taiwan and the United States as a further test of the contention that "gender differences in general intelligence are small and virtually non-existent" (Brody,1992, p. 323).

Method

The WISC-III was constructed and standardized in the United States on a sample of 2200 children aged between 6 and 16 years and the results given in Psychological Corporation (2006). The test was standardized in Taiwan on a sample of 550 boys and 550 girls also aged between 6 and 16 years (Wechsler, 1997). The WISC-III consists of 13 subtests. Six of these are verbal and seven are performance (non-verbal), which are summed to give Verbal and Performance IQs. Factor analyses of the subtests have revealed the presence of four factors designated Index IQs and consisting of (1) Verbal Comprehension, scored as the sum of the Information, Similarities, Vocabulary and Comprehension subtests; (2) Perceptual Organization, scored as the sum of the Picture Completion, Picture Arrangement, Block Design and Object Assembly subtests; (3) Freedom from Distractibility, scored as the sum of the Arithmetic and Digit Span subtests; and Processing Speed, scored as the sum of the Coding and Symbol Search subtests. The scores of the 13 subtests are summed to give the Full Scale IQ as a measure of general intelligence defined as the average of a wide range of cognitive abilities.

Results

Table 1 gives the mean scores and standard deviations of the Taiwanese and American males and females on the 13 subtests, the Verbal, Performance and Full Scale IQs, and the four Index IQs. These are followed by the variance ratios (male standard deviation divided by female standard deviation), *d*s (difference between male and female means divided by the pooled standard deviation), the *t* values as tests of the statistical significance of the differences. Correlation between the two *d*s was statistically significant, r=.87; p<.001 (2-tailled). Correlation between the two variance ratios was positive (r=.355) but non-significant.

Table 1. *Sex differences on the WISC-III in the United States and Taiwan. VR, variance ratio (male SD / female SD); d, Cohen's d (male mean – female mean divided by pooled standard deviation); t, t statistic. *p < .05; **p < .01; *** p < .001.*

IQ subtests	Sex	Taiwan				USA			
		Mean±SD	VR	*d*	*t*	Mean±SD	VR	*d*	*t*
Information	M	10.56±3.26	1.17	.18	2.96**	10.43±3.28	1.10	.25	5.75***
	F	10.02±2.78				9.66±2.99			
Similarities	M	9.70±3.81	1.09	.00	0.00	10.11±3.15	1.02	.10	2.26*
	F	9.70±3.51				9.81±3.08			
Arithmetic	M	10.84±3.13	1.14	.18	3.04**	10.18±3.13	1.06	.11	2.47*
	F	10.30±2.75				9.86±2.95			
Vocabulary	M	10.09±3.65	1.06	.15	2.43*	10.03±3.22	1.02	.08	1.76
	F	9.57±3.43				9.79±3.16			
Comprehension	M	10.32±3.44	1.07	.07	1.14	10.03±3.23	0.94	.03	0.71
	F	10.09±3.22				9.93±3.42			
Digit span	M	10.22±3.29	1.11	-.07	1.16	9.96±3.07	1.54	-.07	1.54
	F	10.44±2.97				10.13±2.00			
Picture completion	M	10.65±3.16	1.09	.20	3.23**	10.23±3.24	1.05	.17	4.01***
	F	10.06±2.89				9.69±3.08			
Block design	M	10.56±3.29	1.13	.25	4.16***	10.29±3.56	1.07	.23	5.45***
	F	9.78±2.92				9.49±3.32			
Object assembly	M	10.82±3.08	1.00	.36	5.93***	10.28±3.37	1.08	.21	4.99***
	F	9.72±3.07				9.59±3.11			
Coding	M	9.79±3.08	0.98	-.23	3.89***	9.13±3.08	0.94	-.53	12.33***
	F	10.52±3.14				10.80±3.27			
Picture arrangement	M	10.40±3.31	1.01	.28	4.59***	10.08±3.23	0.99	.09	2.03*
	F	9.49±3.27				9.80±3.25			
Symbol search	M	10.04±3.32	1.05	-.19	3.07**	9.53±3.22	0.98	-.27	6.22***
	F	10.64±3.15				10.39±3.27			
Mazes	M	11.18±3.15	0.99	.34	5.71***	10.27±3.37	1.05	.16	3.70***
	F	10.09±3.18				9.75±3.22			
Verbal IQ	M	101.60±16.74	1.15	.13	2.15*	101.28±15.13	1.01	.16	3.17**
	F	99.57±14.57				99.25±14.91			
Performance IQ	M	102.66±15.21	1.10	.25	4.14***	100.65±15.21	1.03	.06	1.44
	F	99.03±13.87				99.73±14.75			
Full scale IQ	M	102.00±16.11	1.15	.21	3.43***	100.94±15.10	1.03	.11	2.59**
	F	98.88±13.99				99.30±14.60			
Verbal Comprehension Index	M	101.94±16.99	1.12	.11	1.75	101.25±15.04	1.01	.13	2.99**
	F	100.24±15.17				99.34±14.91			
Perceptual Organization Index	M	103.50±15.39	1.12	.36	5.90***	102.11±15.45	1.19	.08	1.94*
	F	98.31±13.76				100.93±13.00			
Freedom from Distractibility Index	M	102.38±16.07	1.18	.06	1.07	101.34±14.91	1.03	.19	4.44***
	F	101.42±13.60				98.55±14.53			
Processing Speed Index	M	99.99±14.45	1.00	-.25	4.06***	97.58±14.27	0.97	-.46	10.70***
	F	103.53±14.44				104.18±14.67			

Discussion

There are four points of interest in the results. First, the sex differences in the 13 subtests, the Verbal and Performance IQs, the four Index IQs and the Full Scale IQ are closely similar in the samples in Taiwan and the United States. This is shown by the correlation of .87 (p<.001) between the sex differences in the 13 subtests and the consistency of the sex differences in the Verbal and Performance IQs, the four Index IQs and the Full Scale IQs in the two samples. Thus, males obtained significantly higher scores on Picture Completion, Information, Picture Arrangement, Arithmetic, Block Design and Object Assembly in both samples, while females obtained significantly higher scores on Coding, Symbol Search and Digit Span in both samples. Sex differences are directionally consistent in all 13 subtests. There are only two minor inconsistencies. These were that males obtained a significantly higher score than females on Vocabulary in the Taiwan sample, while the higher score of males in the United States sample was not significant, and males obtained a significantly higher score than females on Similarities in the United States sample while the higher score of males in the Taiwan sample was not significant. The consistencies are also present in the four Index IQs and in the Verbal, Performance and Full Scale IQs. One minor difference is that the female advantage on the Processing Speed Index and its indicator tests (Coding, Symbol Search) was noticeably smaller in Taiwan than in the US. The close similarity between the sex differences in two such different cultures as Taiwan and the United States suggests that these differences likely have a biological basis.

Second, the assertions of Halpern (2000, p. 91; 2012, p. 115) and Anderson (2004, p. 829) that there is no sex difference in the Wechsler Full Scale IQ is disconfirmed by the two present samples showing that males obtained significantly higher average Full Scale IQs in Taiwan and the United States of .21*d* and .11*d*, respectively. The results are a further confirmation of the results of previous samples noted in the introduction and of the thesis advanced by Lynn (1994, 1999) that males have a higher average IQ than females. In particular, the present results are a disconfirmation of the assertion by Ritchie (2015, p. 105) that women tend to perform better than men on verbal measures. Contrary to this contention, the results show that in the samples in both Taiwan and the United States males obtained higher results on the Verbal Comprehension Index IQ of .11*d* (ns) and .13*d* (p<.01), and on the Verbal IQ of .13*d* (p<.05) and .14*d* (p<.01), respectively.

Third, the higher IQs obtained by males in all these Wechsler samples is obtained despite efforts by the test developers to construct tests on which males and females obtain the same IQs. Thus “From the very beginning test developers

of the best known intelligence scales (Binet, Terman, and Wechsler) took great care to counterbalance or eliminate from their final scale any items or subtests which empirically were found to result in a higher score for one sex over the other" (Matarazzo, 1972, p. 352); and "test developers have consistently tried to avoid gender bias during the test development phase" (Kaufman & Lichtenberger, 2002, p. 98). These endeavors have likely reduced the true male advantage but have evidently not succeeded in eliminating it.

Fourth, males showed greater variability than females on the Full Scale IQ, the Perceptual Organization Index, Verbal Comprehension Index, and Freedom from Distractibility Index for both Taiwan and the United States. Greater variability for males was also shown on thirteen of the fifteen subtests for the Taiwan sample and eleven of the fifteen subtests for the United States. However, females showed greater variability than males on the Processing Speed Index for both Taiwan and United States, as well as on two of the fifteen subtests for Taiwan and four of the fifteen for the United States. The greater variability of males on the majority of the measures is consistent with numerous previous studies (e.g. Arden & Plomin, 2006; Deary, Penke & Johnson, 2010; Eysenck, 1981, p. 42).

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