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Sex Differences on the WAIS-IV in Taiwan and the United States

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Sex differences are reported in the standardization samples of the WAIS-IV in Taiwan and the United States. In Taiwan, men obtained a significantly higher Full Scale IQ than women by 5.25 IQ points while in the United States men obtained a significantly higher Full Scale IQ than women by 2.25 IQ points. There were no consistent sex differences in variability in the Taiwan sample.
Key Words: Taiwan; WAIS-IV; Sex differences; Intelligence; Variability

From the early twentieth century up to the present it has been almost invariably asserted that there is no sex difference in general intelligence defined as the IQ obtained from tests like the Wechsler, the Stanford-Binet and the Cattell Culture Fair, e.g. Cattell (1971, p. 131), Jensen (1980, p. 360), Eysenck (1981, p. 40), Herrnstein and Murray (1994, p. 275), and Halpern (2012, p. 233): "Females and males score identically on IQ tests."

This consensus that there is no sex difference in intelligence was broken by the second author who advanced a developmental theory of sex differences in intelligence. The theory states that there is no difference between boys and girls up to the age of around 15 years but at the age of 16 years, boys have a small advantage that increases with age reaching an advantage among adults of around 4 IQ points (Lynn, 1994, 1998, 1999; Lynn & Irwing, 2004). This thesis was derived from the findings by Ankney (1992) and Rushton (1992) that men have a larger average brain size than women, even when controlled for body size. The correlation between brain size and intelligence is approximately .40,

calculated in a meta-analysis by Vernon et al. (2000, p. 248), or .33 according to McDaniel (2005). Therefore, it was argued that it follows that men should have greater average intelligence than women of around 4 IQ points. Despite a number of studies reporting that men do have a higher average IQ than women, this continues to be disputed in recent publications, e.g. "There are negligible gender differences in omnibus IQ assessments" (Ackerman, 2018, p. 8); "When it comes to intelligence, it has been convincingly established that there is no difference between women and men" (Saini, 2017, p. 85); "Sex differences in general cognitive ability are overall small, if not negligible" (Toivainen et al., 2017, p. 81).

The Wechsler intelligence tests for adults provide some of the best data with which to examine sex differences in intelligence. These tests measure a wide range of verbal, spatial, perceptual, reasoning and memory abilities that are summed to give the Full Scale IQ as a measure of general intelligence. They have been standardized on representative samples first in the United States and subsequently in a number of other countries. It has been asserted by those who contend that there is no sex difference in general intelligence that there is no difference between men and women in the Wechsler Full Scale IQ (Anderson, 2004; Halpern, 2012, p. 115), but it was shown that these assertions are incorrect in a summary of 35 studies in all of which men had higher Full Scale IQs than women. The median of these studies was a male advantage of 3.6 IQ points (Lynn, 2017). We report here a study of sex differences in intelligence on the WAIS-IV in Taiwan.

Method

The Wechsler Adult Intelligence Scale IV (WAIS-IV) was standardized in Taiwan from July, 2015 to January, 2016. The standardization sample consisted of 1105 individuals (49.6% male, 50.4% female) aged from 16 to 90 years and was drawn from the north, central, east and south geographical regions with percentages matched to those of the population given in the most recent census.

The structure of the Taiwan WAIS-IV (Wechsler, 2015) is the same as the American WAIS-IV (Wechsler, 2008) in consisting of 15 tests: Block Design, Similarities, Digit Span, Matrix Reasoning, Vocabulary, Arithmetic, Symbol Search, Visual Puzzles, Information, Coding, Letter-Number Sequencing, Figure Weights, Comprehension, Cancellation, and Picture Completion. Ten of these 15 tests are used to produce four index scales: Verbal Comprehension Index (VCI) based on three verbal tests (Similarities, Vocabulary and Information), Perceptual Reasoning Index (PRI) based on three perceptual reasoning tests (Block Design, Matrix Reasoning and Visual Puzzles), Working Memory Index (WMI) based on two working memory tests (Digit Span and Arithmetic), and Processing Speed

Index (PSI) based on two processing speed tests (Symbol Search and Coding). The Taiwan WAIS-IV and the American WAIS-IV also provide the Full Scale IQ based on the composites of the ten core tests.

Results

Table 1 (p.124) shows for the Taiwan sample the means and standard deviations for men and women for the Full Scale IQ, the four index scales VCI, PRI, WMI and PSI, and the 15 tests. Also given, reading from left to right, are the variance ratios (male SD / female SD); the *d*s (male mean minus female mean divided by pooled SD: positive *d*s denote higher means of males); and the *d*s in the American standardization sample of the WAIS-IV given by Piffer (2016).

Discussion

There are three points of interest in the results. First, men obtained a higher Full Scale IQ of 0.35*d.* This is equivalent to 5.25 IQ points and is greater than the 0.15*d* (2.25 IQ points) higher male Full Scale IQ in the American standardization sample of the WAIS-IV, and the median of 3.6 IQ points in the 35 studies reviewed in Lynn (2017). The 5.25 IQ points male advantage in the present standardization sample of the WAIS-IV in Taiwan is a further confirmation of the thesis that there is a male advantage of around 4-5 IQ points proposed by Lynn (1994, 2017) and a further disconfirmation of the assertions of Halpern (2000, 2012) and Anderson (2004) that there is no sex difference on the Wechsler tests.

Second, the sex differences in the Taiwan and American WAIS-IV subtests are closely similar; the correlation between the two is .935 (p<.001). Thus, in both samples men obtained higher scores than women on 17 of the measures in Table 1, while women obtained a higher score than men in Coding. In both countries women have an advantage on the Processing Speed Index, while men score higher on the other three indices. This similarity of the specific strengths and weaknesses of the sexes in the two cultures suggests not only a genetic basis of the sex differences in general mental ability. It also shows that sex differences in specialized abilities are most likely affected by biological (genetic and/or hormonal) factors, rather than being determined by cultural learning alone.

Third, there was no consistent sex difference in variability. On the Full Scale IQ the VR of 1.01 is negligible, and males had greater variability in 8 of the 15 subtests while females had greater variability in 7 of the subtests. These results do not confirm the greater variability of males reported in numerous previous studies e.g. Arden and Plomin (2006), Dykiert, Gale and Deary (2009), and Eysenck (1981, p. 42).

Table 1. *Sex differences on the WAIS-IV in Taiwan and the United States.*

IQ/subtest	Sex	Taiwan			US
		Mean ± SD	VR	*d*	*d*
Full Scale IQ	M	102.57 ± 14.88	1.01	0.35***	0.15***
	F	97.47 ± 14.69			
Verbal Compreh. Index	M	102.87 ± 15.09	1.05	0.39***	0.23***
	F	97.17 ± 14.38			
Perceptual Reasoning Index	M	102.79 ± 15.09	1.04	0.37***	0.24***
	F	97.27 ± 14.47			
Working Memory Index	M	102.24 ± 14.75	0.99	0.30***	0.22***
	F	97.80 ± 14.93			
Processing Speed Index	M	99.77 ± 14.24	0.91	-0.03	-0.30***
	F	100.23 ± 15.72			
Similarities	M	10.47 ± 2.95	0.97	0.31***	0.11**
	F	9.53 ± 3.04			
Vocabulary	M	10.30 ± 3.14	1.11	0.20**	0.05
	F	9.69 ± 2.83			
Information	M	10.74 ± 3.06	1.11	0.51***	0.45***
	F	9.27 ± 2.76			
Comprehension	M	10.53 ± 2.87	0.95	0.35***	0.14**
	F	9.49 ± 3.03			
Block Design	M	10.61 ± 3.03	1.04	0.41***	0.29***
	F	9.40 ± 2.91			
Matrix Reasoning	M	10.36 ± 2.94	0.98	0.24***	0.07
	F	9.64 ± 3.01			
Visual Puzzles	M	10.42 ± 3.08	1.07	0.28***	0.25***
	F	9.59 ± 2.89			
Figure Weights	M	10.55 ± 3.00	1.03	0.37***	0.21***
	F	9.45 ± 2.90			
Picture Completion	M	10.23 ± 2.99	1.00	0.15*	0.16***
	F	9.78 ± 2.99			
Digit Span	M	10.44 ± 2.96	0.99	0.29***	0.08
	F	9.57 ± 2.99			
Letter-Number Sequencing	M	10.38 ± 2.89	0.94	0.25***	0.05
	F	9.63 ± 3.07			
Arithmetic	M	10.57 ± 3.11	1.11	0.38***	0.32***
	F	9.44 ± 2.79			
Symbol Search	M	10.05 ± 2.91	0.94	0.03	-0.15**
	F	9.95 ± 3.10			
Coding	M	9.90 ± 2.88	0.91	-0.07	-0.39***
	F	10.10 ± 3.15			
Cancellation	M	10.08 ± 3.04	1.03	0.05	-0.07
	F	9.93 ± 2.96			

Note: *$p < .05$; **$p < .01$; *** $p < .001$ denote statistical significances.

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