MANKIND QUARTERLY 2018 59:1 108-114

Sex Differences in Intelligence of University Students in South Korea

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Data are reported for the IQs of men and women university students in South Korea showing that men obtained a higher IQ than women by 3 IQ points on the WAIS-R and by 1.8 IQ points on the Advanced Progressive Matrices. Men showed greater variability than women on both tests. The South Korea students obtained a British-scaled IQ of 112.5, approximately 6 IQ points higher than that of British students.
Key Words: Korea, WAIS-R, Progressive Matrices, Sex differences, Intelligence, Variability

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's and the Progressive Matrices. For example, nearly half a century ago Cattell (1971, p. 131) wrote: "it is now demonstrated by countless and large samples that on the

two main general cognitive abilities – fluid and crystallized intelligence – men and women, boys and girls, show no significant differences" … "gender differences in general intelligence are small and virtually non-existent." This conclusion was reasserted by Brody (1992, p. 323), Mackintosh (1996, p. 567), Halpern (2000, p. 218), Bartholomew (2004, p. 91) and Anderson (2004, p. 829).

This consensus has been disputed by Lynn (1994, 1999), who has argued that while there is virtually no sex difference in general intelligence up to the age of 16 years, from this age onwards males develop a small average advantage that increases with age reaching approximately 4 IQ points among adults. The Wechsler tests and the Progressive Matrices provide some of the best data with which to evaluate these two positions. The Wechsler 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. It has been asserted by Halpern (2000, p. 91; 2012, p. 115) and Anderson (2004) that there is no sex difference on the Full Scale IQ of the Wechsler tests.

These assertions are incorrect for the standardization samples of American adults. In the WAIS, standardized in 1955, men obtained a higher average IQ than women of 1.5 IQ points (Matarazzo, 1972, Table 12.10, p. 353). In the WAIS-R standardized in 1978 men obtained a higher average IQ than women of 2.2 IQ points (Matarazzo et al., 1986); in the WAIS-III standardized in 1995 men obtained a higher average IQ than women of 2.7 IQ points (Irwing, 2012); and in the WAIS-IV standardized in 2007 men obtained a significantly higher Full Scale IQ than women by 2.25 IQ points (Piffer, 2016).

The Progressive Matrices are also a good test with which to examine sex differences in intelligence because they provide one of the best measures of *g*, the general factor (Jensen, 1998). It has been asserted by Mackintosh (1996), Jensen (1998) and Anderson (2004) that there is no difference in the mean scores obtained by males and females on the Progressive Matrices and therefore that there is no sex difference in reasoning ability or in *g*. Contrary to these assertions, a meta-analysis of the Progressive Matrices has shown that in general population samples of adults men obtain a higher mean IQ than women by an average of 5 IQ points (Lynn & Irwing, 2004). Another meta-analysis of the Progressive Matrices showed that in university student samples, men obtain a higher mean IQ than women by an average of 4.6 IQ points (Irwing & Lynn, 2005).

Despite these results, Halpern (2012, p. 233) asserts in her textbook on sex differences in intelligence that "females and males score identically on IQ tests". To examine this disputed issue further, we report here data on sex differences on the WAIS-R and the Advanced Progressive Matrices for a sample in South Korea.

Method

Data for the Wechsler Adult Intelligence Scale-Revised (WAIS-R) and Raven's Advanced Progressive Matrices were collected for a sample of 271 university students in South Korea with a mean age of 20 years (155 men and 116 women). The data were collected for studies of the relation between intelligence and cortical thickness and neural activation by Choi et al. (2008) and of a possible link between *g* loadings and heritability by Choi, Cho and Lee (2015). Data for IQs of men and women in the standardization sample of WAIS-R in the United States are given by Matarazzo et al. (1986) and Kaufman, McClean and Reynolds (1988) and are presented here for a comparison with the Korean results. The American data are used for the 20-34 age group (N = 500), as closely matched for age as possible to the South Korean sample.

Results

Table 1 shows the WAIS-R data for the South Korean sample, and Table 2 shows the corresponding data for the American standardization sample. The tables give the means and standard deviations of the men and women on the 11 subtests and on the Verbal, Performance, and Full Scale IQs. The tables also give the variability as the variance ratio (VR), calculated as the standard deviation of the scores of the men divided by the standard deviation of the scores of the women. A VR greater than 1.0 indicates that males are more variable than females. The differences between the scores of the men and women are expressed as standard deviation units (*d*), calculated as difference between the means divided by the averaged standard deviations. The statistical significance of the difference in the scores obtained by men and women is calculated by *t*-tests. The last row of Table 1 gives the results of the South Korean sample for the Advanced Progressive Matrices.

Table 1. *Sex differences on the WAIS-R and Raven's Advanced Progressive Matrices (RAPM) in South Korea. Negative signs denote higher scores by females. N = 155 males, 116 females.*

	Males Mean ± SD	Females Mean ± SD	*VR*	*d*	*t*
Picture Completion	12.7 ± 1.9	12.3 ± 2.3	0.83	0.19	1.52
Picture Arrangement	13.2 ± 1.9	12.5 ± 1.8	1.06	1.38	3.09**
Block Design	14.2 ± 2.7	13.9 ± 1.9	1.42	0.13	1.07
Object Assembly	13.2 ± 2.2	13.2 ± 2.3	0.96	0.00	0.00
Digit Symbol	13.4 ± 2.0	14.4 ± 2.2	0.91	-0.48	-3.85***
Information	12.2 ± 2.4	12.0 ± 1.9	1.26	0.09	0.77

	Males Mean ± SD	Females Mean ± SD	*VR*	*d*	*t*
Digit Span	14.2 ± 2.6	13.8 ± 2.2	1.18	0.17	1.37
Vocabulary	13.3 ± 2.6	13.6 ± 2.2	1.18	-0.12	-1.03
Arithmetic	14.3 ± 2.8	13.2 ± 2.1	1.33	0.45	3.70***
Comprehension	15.0 ± 2.6	14.4 ± 2.6	1.00	0.23	1.88
Similarities	14.1 ± 2.6	13.9 ± 2.6	1.00	0.08	0.63
Verbal IQ	117.9 ± 16.3	114.5 ± 13.6	1.20	0.23	1.87
Performance IQ	116.0 ± 13.9	114.8 ± 12.4	1.12	0.09	0.75
Full Scale IQ	119.1 ± 15.5	116.2 ± 13.2	1.17	0.20	1.66
RAPM	28.2 ± 6.4	27.5 ± 5.4	1.19	0.12	0.97

**p<.01; ***p<.001. Two-tailed t test.

Table 2. *Sex differences on the WAIS-R in the United States. Negative signs denote higher scores by females. N = 250 males, 250 females aged 20-34.*

	Males Mean ± SD	Females Mean ± SD	*VR*	*d*	*t*
Picture Completion	10.31 ± 2.78	10.05 ± 2.94	0.95	.09	1.02
Picture Arrangement	10.30 ± 2.90	9.77 ± 3.00	0.97	.18	2.01*
Block Design	10.50 ± 2.94	9.52 ± 2.93	1.00	.33	3.73***
Object Assembly	10.40 ± 2.82	9.89 ± 3.13	0.90	.20	2.25*
Digit Symbol	9.64 ± 3.03	10.49 ± 2.92	0.91	-.29	-3.19**
Information	10.62 ± 3.13	9.58 ± 2.79	1.12	.35	3.92***
Digit Span	10.02 ± 3.08	9.99 ± 2.89	1.07	.01	0.11
Vocabulary	10.13 ± 3.14	9.93 ± 2.86	1.10	.07	0.74
Arithmetic	10.63 ± 3.23	9.50 ± 2.81	1.15	.37	4.17***
Comprehension	10.10 ± 2.96	9.93 ± 3.08	0.96	.06	0.63
Similarites	10.06 ± 3.15	10.11 ± 2.99	1.05	-.02	-0.18
Verbal IQ[a]	100.9 ± 15.1	98.7 ± 14.7	1.03	.15	3.20**
Performance IQ[a]	100.6 ± 15.2	99.2 ± 15.1	1.01	.09	2.00*
Full Scale IQ[a]	100.9 ± 15.3	98.7 ± 15.0	1.02	.15	3.15**

Note: [a] For these three IQ scores the sample size n = 1,880 (940 males and 940 females), as no subgroup results were available in the US normative sample.
*p<.05; **p<.01; ***p<.001. Two-tailed t tests.

Discussion

There are six points of interest in the results. First, in the South Korean university sample the men obtained a higher WAIS-R Full Scale IQ than women of .20*d*, equivalent to 3 IQ points. This male advantage is closely similar to that of approximately the same age group in the US standardization sample, in which

men obtained a higher Full Scale IQ of .15*d*, equivalent to 2.25 IQ points. It is also similar to the male advantages in the American standardization samples of WAIS, WAIS-R, WAIS-III and WAIS-IV of 1.5, 2.2, 2.7 and 2.25 IQ points, noted in the introduction. The present result is therefore a further disconfirmation of the numerous assertions that there is no sex difference in intelligence and a confirmation of the thesis advanced by Lynn (1994) that among adults, males have a higher average IQ than women.

Second, there is a considerable consistency between the sex differences in the Verbal and Performance IQs in the South Korean and United States samples. On the Verbal IQ the South Korean males had higher IQ of 0.23*d* and the American males had a higher IQ of 0.15*d*, while on the Performance IQ males had a higher IQ of 0.09*d* in both samples.

Third, there is also considerable consistency between the sex differences on the subtests in the South Korean and the United States samples. The correlation between the Korean and American *d*s for the eleven subtests is statistically significant at $r = .687$ ($p<.05$). The most prominent similarities are that males scored significant higher than females on Picture Arrangement in the South Korean (0.38*d*) and the United States samples (0.18*d*) and on Arithmetic in the South Korean (0.45*d*) and the United States samples (0.37*d*). Females scored significantly higher than males on Digit Symbol in the South Korean (0.48*d*) and the United States samples (0.37*d*).

Fourth, males showed greater variability than females in the South Korean and the United States samples on the Verbal, Performance and Full Scale IQs and in the majority of the sub-tests. The greater variability of males on the majority of the measures is consistent with numerous previous studies, e.g. Arden and Plomin (2006) and Dykiert, Gale and Deary (2009).

Fifth, the South Korean sample men obtained a higher score on the Advanced Progressive Matrices (APM) of .12*d*, equivalent to 1.8 IQ points. This male advantage is consistent with the results of the meta-analysis by Irwing and Lynn (2005) of sex differences on the Progressive Matrices in university students, finding that males had an advantage of 4.6 IQ points. Men had greater variability on the APM, consistent with the Wechsler results and many studies.

Sixth, the South Korean sample of men and women combined obtained a score of 27.85 on the Advanced Progressive Matrices. This is at the 79th percentile of 20 year olds on the British 1979 standardization given by Raven, Raven and Court (2000) and is equivalent to an IQ of 112.5. A sample of British university students given by Raven, Raven and Court (2000) obtained a score of 24.9 which is at the 65th percentile of 20 year olds on the British 1979 standardization and is equivalent to an IQ of 106. Thus the IQ of the South Korean

students was 6.5 IQ points higher than that of the British students. This is almost the same as the British IQ of 106 for South Korea given as the average of four studies by Lynn and Vanhanen (2012, p. 405) in their compilation of national IQs and is a further confirmation that the IQ in South Korea is approximately 6 points higher than in Britain.

Acknowledgment

This work was supported by a research grant from the Brain Research Program through the National Research Foundation of Korea funded by the Ministry of Science, ICT & Future Planning (NRF-2014M3C7A1046041).

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