

## Sex Differences on the WAIS-IV in Chile

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Data are reported for the scores of men and women in the standardization sample of the WAIS-IV in Chile. Men obtained a significantly higher Full Scale IQ than women by 3 IQ points. Men obtained significantly higher scores on the subtests of Block Design, Digit Span, Matrix Reasoning, Picture Arrangement, Information, Object Assembly, Cancellation and Picture Completion, and on the index IQs of Verbal Comprehension, Perceptual Organization and Working Memory.

**Key Words:** Chile, WAIS-IV, Sex differences, Intelligence.

The consensus position since the early twentieth century has been that there is no sex difference in general intelligence defined as the IQ obtained from tests like the Wechsler and the Cattell Culture Fair. Halpern (2012, p. 233) asserts in her textbook on sex differences in intelligence: "females and males score identically on IQ tests."

This consensus has been disputed by Lynn (1994, 1998, 1999), who has advanced a developmental theory of sex differences in intelligence that states that there is virtually no difference in intelligence in children up to the age of 15 years. At the age of 16 years, males have a small advantage that increases with age reaching around 4 IQ points among adults. 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), from which it was argued that it should follow that men have greater average intelligence than women.

The Wechsler tests provide some of the best data with which to evaluate the thesis as they measure a wide range of verbal, spatial, perceptual, reasoning and memory abilities. It has been asserted by Halpern (2000, p. 91) that the WAIS full scale IQ “does not show sex differences” and that on the American WAIS-IV there is no sex difference on the full scale IQ (Halpern, 2012, p. 115). The same assertion 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 Ravens Matrices.” However, contrary to these assertions studies in a number of countries have found that among adults men do have a higher average IQ than women. Standardization samples of the WAIS-R reported male advantages in full scale IQ of 4.9 IQ points in China (Lynn & Dai, 1993), 3.3 IQ points in Japan (Hattori & Lynn, 1997), 5.9 IQ points in Scotland (Lynn, 1998) and 1.5 to 2.7 IQ points in the United States (Piffer, 2016). Male advantages have also been reported on standardization samples of the WAIS-III full scale IQ of 1.65 IQ points in Canada (Longman, Saklofske & Fung, 2007), 3.6 IQ points in the Netherlands (Van der Sluis et al., 2006) and 3.6 IQ points in Spain (Colom et al., 2002).

There is therefore a conflict between the results of these studies showing that men obtain higher IQs on the Wechsler tests and the assertions of Halpern (2000, 2012) and Anderson (2004) that there is no sex difference on these tests. To provide further evidence on this issue we report data for sex differences on the WAIS-IV in Chile.

## **Method and Results**

The WAIS-IV was standardized in Chile in 2013 on a sample of 424 men and 463 women aged 16 to 90 years. The results are given in Table 1. This shows the mean scores and standard deviations of men and women on the subtests and IQs and the differences between them expressed as *d*s (standard deviation units calculated from the difference between the means divided by the standard deviations). The statistical significance of the differences in the scores obtained by men and women has been calculated by ANOVA and is denoted by asterisks. The last five entries give the Verbal Comprehension IQ consisting of the sum of Vocabulary, Similarities and Information subtests, the Perceptual Reasoning IQ consisting of the sum of Block Design, Visual Puzzles and Matrix Reasoning subtests; the Working Memory IQ consisting of the sum of Arithmetic and Digit Span, and the Processing Speed IQ consisting of the sum of Symbol Search and Coding subtests, and the Full Scale IQ consisting of the sum of all the subtests.

**Table 1.** Scaled means  $\pm$  standard deviations for men and women on the WAIS-IV in Chile, and sex difference  $d$  in standard deviation units.

Test	Men	Women	$d$
Block Design	10.52 $\pm$ 3.16	9.52 $\pm$ 2.76	.33***
Similarities	10.03 $\pm$ 3.11	10.00 $\pm$ 2.92	.01
Digit Span	10.34 $\pm$ 3.03	9.86 $\pm$ 2.98	.16*
Matrix Reasoning	10.41 $\pm$ 3.27	9.94 $\pm$ 3.11	.15*
Vocabulary	9.95 $\pm$ 3.06	9.88 $\pm$ 3.04	.02
Arithmetic	10.48 $\pm$ 2.99	9.63 $\pm$ 2.58	.30***
Symbol Search	9.94 $\pm$ 2.97	9.95 $\pm$ 3.02	-.03
Picture Arrangement	10.43 $\pm$ 3.06	9.91 $\pm$ 2.82	.18**
Information	10.58 $\pm$ 3.13	9.38 $\pm$ 2.93	.34***
Coding	9.90 $\pm$ 3.04	10.05 $\pm$ 2.96	-.05
Letter-Number Sequencing	10.10 $\pm$ 3.04	9.70 $\pm$ 3.07	.13
Object Assembly	10.58 $\pm$ 3.13	9.38 $\pm$ 2.93	.39***
Comprehension	10.06 $\pm$ 3.06	10.01 $\pm$ 2.94	.02
Cancellation	10.58 $\pm$ 3.13	9.38 $\pm$ 2.93	.35***
Picture Completion	10.38 $\pm$ 3.05	9.64 $\pm$ 2.91	.25***
Verbal Comprehension IQ	102.18 $\pm$ 15.12	99.78 $\pm$ 14.60	.16*
Perceptual Reasoning IQ	102.99 $\pm$ 15.60	99.13 $\pm$ 14.13	.26***
Working Memory IQ	103.38 $\pm$ 15.50	99.55 $\pm$ 14.35	.25***
Processing Speed IQ	101.27 $\pm$ 15.11	101.70 $\pm$ 14.98	-.03
Full Scale IQ	101.88 $\pm$ 15.40	98.92 $\pm$ 14.39	.20**

\*  $p < .05$ ; \*\*  $p < .01$ ; \*\*\*  $p < .001$ , two-tailed  $t$  test.

## Discussion

There are five points of interest in the results. First, the male advantage of .20 $d$  on the WAIS-IV Full Scale IQ is equivalent to 3 IQ points and is in the middle of the range of 1.65 and 5.9 IQ point advantages obtained by men in the eight previous standardization samples of the WAIS-R and the WAIS-III summarized in the introduction. This result is a further confirmation of Lynn's thesis that adult men have a higher average IQ than women on the WAIS and a disconfirmation of the assertions of Halpern (2000, 2012) and Anderson (2004) that there is no sex difference on the WAIS. It can also be regarded as a disconfirmation of the more general assertion of numerous experts that "females and males score identically on IQ tests" (Halpern, 2012, p. 233).

Second, the higher average IQs obtained by men in the present study and in the eight previous standardization samples have been found 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 endeavours have likely reduced the true male advantage but have evidently not succeeded in eliminating it.

Third, the higher average scores obtained by men on the subtests and index IQs are similar to those frequently reported in previous studies. Men obtained significantly higher scores on the spatial subtests of Block Design, Object Assembly and Picture Completion, confirming numerous studies of a male advantage in spatial ability reviewed by Tyler (1965) and Voyer, Voyer and Bryden (1995). Men obtained a significantly higher score on Matrix Reasoning confirming numerous studies of a male advantage in non-verbal reasoning ability reviewed in two meta-analyses of sex differences on the Progressive Matrices by Lynn and Irwing (2004) and Irwing and Lynn (2005). Men obtained a significantly higher score on Information confirming studies of a male advantage in general knowledge reported by Lynn and Irwing (2002), Lynn, Irwing and Cammock (2002) and Lynn, Wilberg and Margraf-Stiksrud (2004, 2005). Men obtained a significantly higher score on the Working Memory IQ consisting of the sum of Arithmetic and Digit Span confirming the studies in Australia (Jorm et al., 2004), China (Lynn & Dai, 1993), Scotland (Lynn, 1998), Northern Ireland (Lynn & Irwing, 2002) and the United States (Irwing, 2012).

Fourth, the absence of any sex differences on the verbal subtests of Similarities, Vocabulary and Comprehension is not wholly consistent with previous studies. According to Halpern (2012, p.115), “older versions of the WAIS showed sex differences favoring females on the verbal subscale”, but Tyler (1965, p. 244) in a review of early studies concluded that “girls and women do not have larger vocabularies than boys and men.”

Fifth, the absence of any significant sex differences on the Symbol Search and Coding subtests and on the Processing Speed Index IQ is generally consistent with previous studies although in the American WAIS-III females obtained a higher score of .15*d* on Symbol Search (Kaufman & Lichtenberger, 2002, p. 98).

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