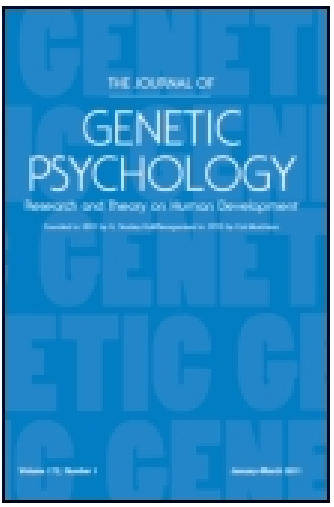

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Sex Differences on the Chinese Standardization Sample of the WAIS-R

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ABSTRACT. The Wechsler Adult Intelligence Scale-Revised (WAIS-R) has been adapted with minor revisions for use in China and standardized on a sample of 179 adults. Sex differences on the subtests are similar to those in the United States, with women obtaining higher means on the Digit Symbol subtest and men obtaining higher means on the Information and Arithmetic subtests. Men obtained higher verbal, performance, and full-scale IQs in China. The factor structure of the Chinese WAIS-R also is similar to those obtained on the Wechsler tests in the United States and Scotland.

IT IS WIDELY ASSERTED that women obtain slightly higher means on verbal abilities and men obtain slightly higher means on spatial abilities, and that when the two are averaged, there is no sex difference (Halpern, 1992; Hyde & Linn, 1988; Linn & Petersen, 1985; Maccoby & Jacklin, 1974; Vogel, 1990).

A useful source of data for the examination of sex differences in cognitive abilities consists of the standardization samples of the Wechsler tests. Sex differences have appeared with considerable consistency in various versions of these tests. American standardization samples of the Wechsler Intelligence Scale for Children (WISC), Wechsler Intelligence Scale for Children-Revised (WISC-R), Wechsler Adult Intelligence Scale (WAIS), and Wechsler Adult Intelligence Scale-Revised (WAIS-R) show that women obtain higher means on the Coding and Digit Symbol subtests (Jensen & Reynolds, 1983; Reynolds, Chastain, Kauf-

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man & McLean, 1987; Seashore, Wesman, & Doppelt, 1950; Wechsler, 1958). The same female advantage is present in the Scottish standardization sample of the WISC-R (Lynn & Mulhern, 1991). There is no general agreement on what these two subtests measure. They have been interpreted as measures of memory (Jensen & Reynolds, 1983) and "freedom from distractability" (Kaufman, 1990), and possibly as a measure of perceptual speed. On the remaining subtests in the Wechslers, men tend to score slightly higher than women.

How far the sex differences on the Wechsler subtests found in the United States and Scotland are present in other cultures is an interesting question. In the present study, we explored sex differences in the standardization sample of the WAIS-R in the People's Republic of China.

Method

A Chinese standardization of the WAIS-R was carried out in the early 1980s on a sample drawn from urban centers in the province of Hunan (Gong, 1982). The sample comprised 1,138 men and 841 women, stratified according to the 1980 census on the variables of age and education. Ages ranged from 16 years to 65 and older, and the level of education ranged from less than 3 years to 13 or more years. The Chinese version of the WAIS-R closely resembled the American original, except for minor changes in some items to make the test suitable for China.

Results

Table 1 contains the means and standard deviations for men and women for the 11 subtests and the verbal, performance, and full-scale IQs. These are followed by the male–female difference expressed in standard deviation units (d). This is the standard statistic used for expressing the magnitude of group differences (e.g., Hyde & Linn, 1988; Linn & Petersen, 1985). The next column gives the t values and significance levels for the sex differences. It often has been claimed that men show greater variability of intelligence than women (Feingold, 1992). In the Chinese standardization sample, women had slightly higher standard deviations for the verbal, performance, and full-scale IQs. Only the difference on the full-scale IQ was statistically significant. (The variance ratios were .93, .96, and .90, and a difference of .90 or less was statistically significant; see Feingold, 1992.)

For the Chinese WAIS-R, we first factored the correlation matrix by principal components followed by varimax rotation of the first three factors. There was no agreed consensus on the number of factors present in the WAIS. Kaufman (1990) holds that a three-factor solution is best, and we agree. The three-factor solution brings out the verbal, visuospatial, and the third (memory?) factors that are also present in the WISCs (Jensen & Reynolds, 1983; Lynn & Mulhern). Nevertheless, a three-factor solution is not warranted when strictly interpreting the rule that

TABLE 1
Scaled Scores of Men and Women on the Chinese WAIS-R Subtests and Verbal, Performance, and Full-Scale IQs

Subtest	Men		Women			
	M	*SD*	*M*	*SD*	*d*	*t*
Information	10.96	2.95	9.31	2.78	.55	12.59**
Comprehension	10.55	2.87	9.83	2.99	.24	5.41**
Arithmetic	10.45	2.93	9.51	3.06	.31	6.86**
Similarities	10.10	3.01	9.66	3.02	.15	3.22**
Digit Span	10.65	2.90	10.44	2.95	.07	1.56
Vocabulary	10.24	2.90	9.73	2.99	.18	3.82**
Digit Symbol	9.79	2.87	10.15	3.21	−.12	2.61*
Picture Completion	10.35	2.89	9.41	2.95	.32	7.04**
Block Design	9.85	2.95	9.60	2.90	.09	1.90
Picture Arrangement	10.11	2.96	9.75	3.09	.12	2.66*
Object Assembly	10.19	2.94	9.69	2.86	.17	3.81**
Verbal IQ	102.18	14.55	96.85	15.01	.35	7.93**
Performance IQ	101.40	14.76	97.67	15.09	.25	5.51**
Full-Scale IQ	102.00	14.66	97.02	15.16	.33	7.36**

*$p < .01$. **$p < .001$.

factors must have eigenvalues above unity to be statistically significant. In the Chinese WAIS-R, there are two such factors with a third factor fractionally below unit. Table 2 shows the factor structure of the Chinese WAIS-R, giving the first principal component, representing the general factor, and accounting for 51.5% of the variance, followed by the first three factors rotated by varimax. The three factors were identifiable as Verbal Comprehension, Visuospatial, and Memory (alternatively identified as freedom from distractability, with the familiar high loadings of the Digit Symbol and Digit Span subtests. The factor analysis made it possible for us to calculate factor scores for men and women for the four factors for the Chinese sample. Expressed as *d*s, these were .28, .39, and .18 in favor of men on the general, verbal, and visuospatial factors and .19 in favor of women on the memory factor, all statistically significant at $p < .001$.

Discussion

The results indicated fairly close agreement for sex differences and factor structure in the Chinese WAIS-R standardization sample as compared with the results on various Wechsler tests in the United States and Scotland. Men obtained slightly higher means on the verbal performance, and full-scale IQs. The male advantage was greater in the Chinese sample, amounting to 4.98 IQ points on the full-scale IQ, compared with approximately 1 to 3 IQ points typically found in American

TABLE 2
Factor Structure of the WAIS-R in China Showing First Principal Component and Varimax Rotated Three-Factor Solutions

Subtest	First principal component-g	Verbal comprehension	Visuospatial	Memory
Information	78	81	28	15
Comprehension	68	83	14	09
Arithmetic	68	60	20	34
Similarities	79	72	31	28
Digit Span	65	29	13	80
Vocabulary	78	79	20	27
Digit Symbol	70	22	37	72
Picture Completion	72	33	66	27
Block Design	74	30	64	39
Picture Arrangement	68	15	61	50
Object Assembly	64	21	86	05

Note. Decimal points have been omitted.

and Scottish samples. The pattern of the sex differences on the subtests is generally similar in China and the United States. In both countries, the difference in favor of women was greatest on the Digit Symbol subtest. On all the other tests, men obtained higher means in both countries, and the male advantage was particularly high in the Information and Arithmetic subtests.

Contrary to the general belief that women obtain higher means in verbal tests than men, in China, as generally in the United States and Scotland, women obtained lower means than men on the verbal scale. Women also obtained lower performance IQ means in both countries. The performance IQ, however, concealed higher female means on the Digit Symbol subtest and higher male means on the remaining subtests. A better picture of sex differences in abilities is obtained by factoring, which effectively splits off the Digit Symbol subtest and combines it with the Digit Span subtest to give a third factor, on which women obtain higher means, and aggregates the remaining four performance subtests to give a visuospatial factor, on which men obtain higher means.

The sex differences in the WAIS-R suggest that two revisions are required to the widespread view, as advanced by Maccoby and Jacklin (1974), to the effect that the only significant sex differences in intelligence lie in verbal, quantitative, and spatial abilities. The evidence from the WAIS in the United States and China, as well as from the WISC-R in the United States and Scotland (Jensen & Reynolds, 1983; Lynn & Mulhern, 1991), suggests that a female advantage in the Digit Symbol and Coding subtests needs to be added to this trio. More provocatively, the small but consistent male advantage on the verbal IQ in the standardization samples of the WAIS-R in China, and also in the standardization samples of the

WISC-R in the United States and Scotland, calls into question the commonly held view that women obtain higher means on verbal ability.

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