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The U.K. factor structure of the WAIS-R is robust and highly congruent with the U.S.A. standardisation sample

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Summary—The WAIS-R performance of 100 non-clinical subjects was factor analysed. Coefficients of congruence indicated that the resultant factor structure was highly similar to that obtained in both the U.S.A. WAIS-R standardisation sample and a previous U.K. sample. The implications of these results are discussed.

INTRODUCTION

With the publication of its British Supplement (Lea, 1986), it is to be expected that the Wechsler Adult Intelligence Scale—Revised (WAIS-R; Weschler, 1981) will become the major instrument for the assessment of intellectual abilities and deficits in the U.K. In view of this, and in the absence of a U.K. standardisation sample, information concerning the test's psychometric properties in the U.K. is urgently required.

One of the most fundamental questions is whether the constituent subtests of the WAIS-R measure the same underlying ability dimensions in the U.K. population as those observed in the U.S.A. There have now been a number of factor analytic studies of the standardisation sample and supplementary studies of U.S.A. clinical populations (see Leckliter, Matarazzo & Silverstein, 1986 for a review). These studies have commonly extracted three factors: a *verbal* factor, defined by high loadings from Vocabulary, Information, Comprehension, and Similarities: a *perceptual organisation* factor defined by high loadings from Block Design and Object Assembly (other Performance subtests load on this factor but to a lesser degree); lastly, a *freedom from distractibility* factor, defined by high loadings from Arithmetic and Digit Span.

To date, there has been only one study of the WAIS-R's factor structure in the U.K. Crawford, Allan, Besson and Stephen (1989) factor analysed the WAIS-R performance of a U.K. sample of non-clinical *S*s and, for comparison purposes, the subtest intercorrelation matrix of the standardisation sample. Encouragingly for U.K. users of the WAIS-R, the factor structures of the two samples were highly congruent. The present study aims to factor analyse the WAIS-R performance of a further (non-clinical) U.K. sample in order to determine whether the U.K. factor structure obtained by Crawford *et al.* is replicable. Furthermore, by comparing the present results with those obtained in the U.S.A. standardisation sample, it will be possible to either confirm of refute Crawford *et al.*'s conclusion that the U.S.A. and U.K. factor structures are essentially indistinguishable.

METHOD

A sample of 100 *S*s (58 females, 42 males), free of neurological, psychiatric, or sensory disability, were administered the WAIS-R. Most received a small honorarium for their participation. Mean age of the sample was 44.2 (SD = 20.5) and mean years of education was 13.0 (SD = 3.0). Mean WAIS-R Full Scale IQ was 108.2 (SD = 13.8). Principal components analysis with varimax rotation was performed on the scaled scores of the 11 WAIS-R subtests.

RESULTS AND DISCUSSION

Principal components analysis extracted three factors with eigenvalues >1.0. In factor analytic studies of cognitive measures, the first unrotated principal component is regarded as representing general intelligence or *g*. In the present study, *g* accounted for 55.8% of the total subtest variance. This figure is consistent with previous factor analytic studies in the U.S.A. and with Crawford *et al.*'s results for their U.K. sample. The rotated factor structure obtained in the present sample is presented in Table 1. Vocabulary, Comprehension, Information and Similarities all load highly on Factor I, which is readily identifiable as the *verbal* factor obtained in the U.S.A. standardisation sample. Similarly, Factor II is identifiable as the U.S.A. *perceptual organisation* factor (i.e. Block Design and Object Assembly load highly, while other Performance Scale subtests load to a lesser degree). Finally, *freedom from distractibility* emerges as the third factor, defined by the loadings of Digit Span and Arithmetic.

Coefficients of congruence (e.g. Harman, 1976) were calculated to quantitatively assess the degree of factorial similarity between the present factor structure and those obtained by Crawford *et al.* The coefficients are presented at the foot of Table 1. It can be seen that very high coefficients were obtained when the subtests loadings on each of the present factors were compared with those obtained in both the U.S.A. standardisation sample and Crawford *et al.*'s U.K. sample.

The present results indicate that the WAIS-R has a very robust factor structure in the U.K. Furthermore, they confirm that the WAIS-R measures the same underlying ability dimensions in U.K. *S*s as it measures in the U.S.A. population.

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Table 1. Factor structure of the WAIS-R in a U.K. sample

	Factor I	Factor II	Factor III
Information	**0.83**	0.21	0.09
Digit Span	0.16	0.07	**0.90**
Vocabulary	**0.87**	0.20	0.25
Arithmetic	0.42	0.39	**0.51**
Comprehension	**0.78**	0.24	0.32
Similarities	**0.71**	0.48	0.22
Picture Completion	**0.62**	**0.56**	0.10
Picture Arrangement	0.47	**0.66**	0.09
Block Design	0.28	**0.80**	0.24
Object Assembly	0.21	**0.88**	0.02
Digit Symbol	0.17	**0.71**	0.47
CoC PS vs U.S.A.	0.99	0.97	0.97
CoC PS vs U.K.	0.99	0.99	0.95

Loadings >0.50 are bold. CoC = coefficient of congruence; PS = present sample; U.S.A. = U.S.A. standardisation sample; U.K. = previous U.K. sample.

This is encouraging, as it permits U.K. clinicians and researchers to use the various factor score methods derived from the standardisation sample (e.g. Lawson, Inglis & Stroud, 1983; Canavan, Dunn & McMillan, 1986). The present results, and those of previous factor analytic studies, indicate that Wechsler's allocation of subtests to Verbal and Performance Scales has dubious construct validity. Therefore, it would be advisable to use such factor score methods (or at least be familiar with the factor structure) when interpreting a client's WAIS-R performance.

REFERENCES

Canavan, A. G. M., Dunn, G. & McMillan, T. M. (1986). Principal components of the WAIS-R. *British Journal of Clinical Psychology, 25,* 81–85.

Crawford, J. R., Allan, K. M., Besson, J. A. O. & Stephen, D. W. (1989). The Wechsler Adult Intelligence Scale—Revised (WAIS-R): Factor structure in a U.K. sample. *Personality and Individual Differences, 10,* 1209–1212.

Harman, H. H. (1976). *Modern factor analysis* (3rd edn). Chicago: University of Chicago Press.

Lawson, J. S., Inglis, J. & Stroud, T. W. F. (1983). A laterality index of cognitive impairment derived from a principal-components analysis of the WAIS-R. *Journal of Consulting and Clinical Psychology, 51,* 841–847.

Lea, M. (1986). *A British supplement to the manual of Wechsler Adult Intellignece Scale—Revised.* San Antonio: The Psychological Corporation.

Leckliter, I. N., Matarazzo, J. D. & Silverstein, A. B. (1986). A literature review of factor analytic studies of the WAIS-R. *Journal of Clinical Psychology, 42,* 332–342.

Wechsler, D. (1981). *Manual for the Wechsler Adult Intelligence Scale—Revised.* New York: The Psychological Corporation.