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ABSTRACT

This study attempts to integrate and extend previous research by multivariate investigation to determine multidimensional relationships among both the Wechsler Adult Intelligence Scale-Revised (WAIS-R) subscales and the demographic variables for the 1981 WAIS-R standardization sample. Canonical correlation with orthogonal rotation of composite structural components was performed in order to determine interrelationships between both sets of variables, thereby providing an integrated approach to previous research concerning subtest patterns of ability. A first rotated factor indicated a general factor with high loadings on all 11 subscales, education, race, and occupation. This factor represented "crystallized" intelligence or ability. A second rotated factor indicated a performance factor with loadings on the 5 performance subscales, age, and single/marital status. This factor represented "fluid" intelligence or ability. A third rotated factor revealed a gender-specific or manual dexterity factor for males on the Block Design subtest and skilled worker occupation. These factors may have relevance for adult education researchers by revealing potential aptitude-treatment interactions in a large, normal adult population. Four pages of references and three tables are provided. (Author/JAZ)

Multidimensional Relationships in the WAIS-R Subscales and Demographic Variables

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Running head: WAIS-R RELATIONSHIPS

Abstract

The standardization sample of the Wechsler Adult Intelligence Scale-Revised (WAIS-R) was the basis for an analysis of the WAIS-R subscales in relation to demographic variables. Canonical correlation with orthogonal rotation of composite structural components was performed in order to determine interrelationships between both sets of variables, thereby providing an integrated approach to previous research concerning subtest patterns of ability. A first rotated factor indicated a general factor with high loadings on all 11 subscales, education, race, and occupation. This factor represented "crystallized" intelligence or ability (Cattell, 1943). A second rotated factor indicated a performance factor with loadings on the 5 performance subscales, age, and single marital status. This factor represented "fluid" intelligence or ability. A third rotated factor revealed a gender-specific or manual dexterity factor for males on the Block Design subtest and skilled worker occupation. These factors may have relevance for adult education researchers by revealing potential aptitude-treatment interactions (Cronbach & Snow, 1977) in a large, normal adult population.

Introduction

For a variety of reasons, including test bias and underlying reasons affecting intelligence, IQ differences among groups according to gender, socioeconomic status, residence, and other variables have been explored for a variety of intelligence tests (Anastasi, 1958; Tyler, 1965). For example, the Wechsler Intelligence Scale for Children-Revised (WISC-R) has been analyzed to determine the relationships of WISC-R IQs to sex, occupation of head of household, urban-rural residence, and geographic region (Kaufman & Doppelt, 1976), while the Wechsler Adult Intelligence Scale-Revised (WAIS-R) has been analyzed to determine the relationships of WAIS-R IQs to age, sex, race, occupation, urban versus rural residence, geographic region of the country, and educational attainment (Chastain & Reynolds, 1985). Subscale patterns of abilities have been investigated for the WISC-R (Jensen & Reynolds, 1982; Reynolds & Jensen, 1983) by looking at socioeconomic status, separately. Both the WISC-R subtest scores (Kaufman, 1975; Ramanaiah, O'Donnell, & Ribich, 1976; Silverstein, 1977, 1982a; Wallbrown, Blaha, Wallbrown, & Engin, (1975) and the WAIS-R subtest scores (Blaha & Wallbrown, 1982; Silverstein, 1982b) have been subjected to various factor analyses.

These studies have shown statistical associations between IQ and demographic variables which have served as "bones of contention" in the literature. Because of the strength of these associations, they were the basis for estimating premorbid IQ through the use of weighted demographic variables, in the case of neurological trauma, on the WISC-R (Reynolds & Gutkin, 1979), the WAIS (Wilson, Rosenbaum, Brown, Rourke, Whitman, & Grisell, 1970), and the WAIS-R (Barona & Chastain, In Press; Barona, Reynolds, & Chastain, 1984). The strong, but imperfect, relationships between these IQ measures and the demographic variables suggest that other factors in addition to "intelligence" may be reflected in the IQ scores.

Although this body of research suggests overwhelming evidence for relationships between intelligence, as measured by the Wechsler Scales, and demographic variables, these studies have not considered the multidimensional nature of both sets of variables simultaneously and how these multiple dimensions are related. The present study attempts to integrate and extend previous research by a multivariate investigation to determine multidimensional relationships among both the WAIS-R subscales and the demographic variables for the 1981 WAIS-R standardization sample.

Method

Subject

The subjects for the present study consisted of a subset (N=1856) of the 1981 WAIS-R standardization sample (N=1880). Twenty-four nonwhite adults who were classified as "other" (neither black or white) were deleted from the study since these were too few in number relative to the blacks and whites to be analyzed effectively. The total WAIS-R sample was selected on the basis of random selection within stratification on seven demographic variables. These variables were age, sex, race, education, occupation, region of residence, and urban versus rural residence. More complete descriptions of this sample are provided elsewhere (Chastain & Reynolds, 1985; Wechsler, 1981).

Procedure

A canonical correlation analysis with rotation was performed between the set of WAIS-R subtests and the set of demographic variables. The first set consisted of the 11 WAIS-R subtests of Information, Digit Span, Vocabulary, Arithmetic, Comprehension, Similarities, Picture Completeion, Picture Arrangement, Block Design, Object Assembly, and Digit Symbol. These were measured in standard scores scaled to a mean of 10 and standard deviation of 3. The second set of variables consisted of 11 demographic variables which have been studied and shown to have associations with IQ (age, education, gender, race, birth order, urban-rural residence, handedness, place of birth, occupation, region of residence and marital status). Age and education were measured in years, while birth order was measured on a scale of 1 to 9. Gender, race, urban-rural residence, handedness, and place of birth were dichotomously scored 1 or 0 with a value of 1 equivalent to male, white, urban residence, right handedness, and born in the U.S., respectively. Occupation, region of residence, and marital status were "dummy" coded where one category from each of these three variables was deleted from the analysis since this was redundant information and would preclude analysis. Category number 6, not in the labor force, was deleted from the occupation variable. Category number 3, the South region, was deleted from the region variable. Category number 4, the category of being widowed, was deleted from the marital status variable.

In order to accomplish the rotation of canonical factors associated with the canonical correlation analysis, linear composite variables for the canonical factors were created by adding corresponding canonical variates from both sets. Each of these summed linear composites were correlated with all of the original variables from both sets of variables (WAIS-R subtests as well as the demographic variables) to provide the canonical structure of the between sets association, thereby providing more specific information concerning the interrelationships between sets. With more than one significant canonical correlation the weights corresponding to the second and succeeding canonical correlations are mathematically determined to be uncorrelated with the prior sets of weights and the signs attached to the weights after the first set are mathematical artifacts. Therefore, the interpretation given to the unrotated components after the first may not be entirely meaningful. As in factor analysis rotation of the factors is done to remedy this probelm. A similar procedure may be followed with the components of the canonical correlation analysis since the variance accounted for by the significant canonical correlations remains constant in rotation.

An orthogonal rotation to the varimax criterion was performed on these "components". Although rotations have been used in other multivariate analysis techniques such as factor analysis and multiple discriminant analysis, few studies have employed rotation with canonical correlation. Cliff and Krus (1976) and Bentler and Huba (1982) have suggested and applied various rotation strategies. However, most of these involved rotating each set of variables separately. The authors of this present study have previously employed varimax rotation of structural components (correlations of the original variables with linear composites) to assist in identifying variables which were related between sets from a canonical correlation analysis of reasons concerning initiation, continuation, and cessation of daily opioid use (Joe, Chastain, & Simpson, 1984). In the same manner, this procedure should shed light on underlying factors related to subtest patterns of abilities based upon demographic variables.

Results

The results of the canonical correlation analysis using the 11 WAIS-R subtests as the "V" variables and the 19 demographic indicators (determined from the 11 demographic variables) as the "W" variables revealed 6 significant ($p<.05$) canonical correlations. These 6 canonical correlations with resulting F statistics and probabilitites were: (1) .720 with F = 16.429 (p=.0001), (2) .696 with F = 10.608 (p=.0001), (3) .397 with F = 3.966 (p=.0001), (4) .228 with F = 2.216 (p=.0001), (5) .186 with F = 1.761 (p=.0001), and (6) .150 with F =

1.428 (p=.0064). The last 2 squared canonical correlations were only .03 and .02, respectively. This indicated that the first 3 or 4 canonical correlations might be the most meaningful. The squared canonical correlations for the first four canonical correlations were .52, .48, .16, and .05, respectively. There was a large decrease in R^2 from the second to the third and from the third to the fourth squared canonical correlations. The multivariate test statistics yielded F (209, 17470) = 16.429, p=.0001, and Wilks' Lambda was Λ = .18 with a total R^2 between set variation of .82. The structural correlations corresponding to significant canonical correlations were rotated to the varimax criterion to assist in identifying variables which were related between sets from the canonical correlation analysis. Since the initial analysis showed a maximum of six dimensions accounting for the interrelationships between the 11 subtests and 19 demographic indicators, the structures for 6, 5, 4, 3, and 2 dimensional solutions were each rotated, separately. The purpose of this was to identify solutions in which variables from both sets of variables loaded on each dimension.

The 6 and 5 dimensional solutions resulted in one or more dimensions defined by relatively low loadings (not reproduced here). The 4 dimensional solution is shown in Table 1. The last dimension or factor accounted for approximately 9% of the variance and there was no meaningful solution for this fourth factor.

The 3 dimensional solution appeared to be the "best" solution after examining both significant bivariate relationships (not reproduced here) and the resulting structural coefficients. This solution is shown in Table 2. Dimension 1 would ordinarily be interpreted as a "general intelligence" factor based upon the loadings which ranged from .42 to .80 for the 11 subtests. The demographic variables related to this factor were education (.86), professional occupation (.37), semi-skilled workers (-.33), and race (.35). Dimension 2 may be interpreted as an age-related performance factor since all five of the performance subtests were related to this factor as well as the demographic variables of age (-.88) and single marital status (.53). Dimension 3 may be interpreted as a gender-specific or manual dexterity factor since this factor was defined by a high positive loading on gender (.72), the performance subtest of Block Design (.49), and being in a skilled worker occupation (.38). Three out of the remaining four performance subtests also had relatively high loadings together with the Arithmetic subtest and race on this factor. These three factors accounted for almost 100% of the between set variation with approximately 59.5%, 25.5% and 15% accounted for by canonical factors 1, 2, and 3, respectively.

The 2 dimensional solution is shown in Table 3. This showed an even greater tendency for factor 1 to be a "general intelligence" factor in which all 11 subtests, education, professional occupation, semi-skilled occupation (negatively), and race were related to each other. Factor 2 was even more clearly defined as an age-related performance factor. This solution was consistent with the 3 dimensional solution, but was not as "good" a solution as the 3 dimensional solution since some information was lost.

Conclusions

Finding a "general intelligence" factor by this methodology substantiates many findings from previous research and was not surprising. The strength of relationship between this factor and the demographic variables of educational attainment, professional occupation, semi-skilled occupation, and race has some serious implications. It might be argued that those with higher levels of innate intelligence, if this is what the general factor measures, tend to obtain more education, be in professional occupations rather than semi-skilled or other occupations, and tend to be white, but it could also be argued that this general factor is measuring educational and occupational achievement where whites have historically had greater opportunities and perhaps better quality education or training as well. This latter interpretation is congruent with Cattell's (1943) distinction between "crystallized" and "fluid" intelligence. Crystallized intelligence represents abilities acquired through learning, practice, and exposure to education (Cattell, 1971). Horn and Cattell (1966) noted that crystallized abilities improve into middle age with a slow decline later. Finding a general intelligence factor representing crystallized intelligence in a large, normal adult population may have relevance for researchers investigating adult education. Potential aptitude-treatment interactions (Cronbach & Snow, 1977) should be addressed when adult educational instruction is given to groups with diverse educational, occupational, and racial backgrounds.

The second factor describes an age-related performance factor. Younger, unmarried persons seem to do better, in general, on the five performance subtests. Given the range in age (16 to 74 years), it seems reasonable to assume that older persons may be somewhat slower in responding when manipulating pictures, blocks, or symbols. In addition, younger persons are more likely to be unmarried. These findings indicate a factor that may represent more fluid abilities which decline with age (Horn & Cattell, 1966). This indication, too, may represent a potential source of aptitude-treatment interactions. Instructional practices with older adults should consider more structured situations that allow for more verbal interactions and build upon students' previous knowledge.

The third well-defined factor was also reasonable since males seem to do better than females on performance subtests in general, especially Block Design, and on the verbal subtest of Arithmetic. Males with high manual dexterity tend to be well suited for the skilled trades. This finding may also represent a lack of opportunity rather than a lack of innate ability for females. Older females may have had even less opportunities to develop manual dexterity.

This methodology allowed a multidimensional look at WAIS-R subtest scores and demographic variables simultaneously. Rather than looking at only one dimension, either for a single independent variable or for a single dependent variable, canonical correlation analysis with rotation of canonical factors allowed an examination of many pieces of the puzzle at the same time. This look found the WAIS-R to be a complex test that is multidimensional and related differentially to a number of demographic characteristics. The findings represent an integration of previous findings from diverse sources with educational relevance for adult education.

References

Anastasi, A. (1958). Diferential psychology (3rd ed.). New York: Macmillian.

Barona, A., & Chastain, R. L. (In Press). An improved estimate of premorbid IQ for blacks and whites on the WAIS-R. Journal of Clinical Neuropsychology.

Barona, A., Reynolds, C. R., & Chastain, R. L. (1984). A demographically based index of premorbid intelligence for the WAIS-R. Journal of Consulting and Clinical Psychology, 52, 885-887.

Bentler, P. M., & Huba, G. J. (1982). Symmetric and asymmetric rotations in canonical correlation analyses: New methods with drug variable examples. In N. Hirschberg and L.G. Humphreys (EDs.), Multivariate applications in the social sciences (pp. 21-46). Hillsdale, New Jersey: Lawrence Erlbaum Assoc., Inc.

Blaha, J., & Wallbrown, F. H. (1982). Hierarchical factor structure of the Wechsler Adult Intelligence Scale-Revised. Journal of Consulting and Clinical Psychology, 50, 652-660.

Cattell, R. B. (1943). The measurement of adult intelligence. Psychological Bulletin, 40, 153-193.

Cattell, R. B. (1971). Abilities: Their structure, growth, and action. Boston: Houghton-Mifflin.

Chastain, R. L., & Reynolds, C. R. (1985). *An analysis of WAIS-R performance by stratification variables used during standardization*. College Station, Texas, Texas A&M University. (ERIC Document Reproduction Service No. ED 249 409).

Cliff, N., & Krus, D. J. (1976). Interpretation of canonical analysis: Rotated versus unrotated solutions. *Psychometrika*, *41*, 35-42.

Cronbach, L. J., & Snow, R. E. (1977). *Aptitudes and instructional methods*. New York: Irvington.

Horn, J. L., & Cattell, R. B. (1966). Refinement and test of the theory of fluid and crystallized intelligence. *Journal of Educational Psychology*, *57*, 253-276.

Jensen, A. R., & Reynolds, C. R. (1982). Race, social class and ability patterns on the WISC-R. *Personality and Individual Differences*, *3*, 423-438.

Joe, G. W., Chastain, R. L. & Simpson, D. D. (1984). *Reasons for initiating, continuing, and quitting opioid addiction*. Technical Report to National Institute on Drug Abuse. College Station, Texas: Texas A&M University, Behavioral Research Program.

Kaufman, A. S. (1975). Factor analysis of the WISC-R at eleven age levels between 6-1/2 and 16-1/2 years. *Journal of Consulting and Clinical Psychology*, *43*, 135-147.

Kaufman, A. S., & Doppelt, J. E. (1976). Analysis of WISC-R standardization data in terms of the stratification variables. Child Development, 47, 165-171.

Ramanaiah, N. V., O'Donnell, J. P., & Ribich, F. (1976). Multiple-group factor analysis of the Wechsler Intelligence Scale for Children. Journal of Clinical Psychology, 32, 829-831.

Reynolds, C. R., & Gutkin, T. B. (1979). Predicting the premorbid intellectual status of children using demographic data. Clinical Neuropsychology, 1, 36-38.

Reynolds, C. R. & Jensen, A. R. (1983). WISC-R subscale patterns of abilities of blacks and whites matched on Full Scale IQ. Journal of Educational Psychology, 75, 207-214.

Silverstein, A. B. (1977). Alternative facator analytic solutions for the Wechsler Intelligence Scale for Children-Revised. Educational and Psychological Measurement, 37, 121-124.

Silverstein, A. B. (1982a). Alternative multiple-group solutions for the WISC and WISC-R. Journal of Clinical Psychology, 38, 166-168.

Silverstein, A. B. (1982b). Factor structure of the Wechsler Adult Intelligence Scale-Revised. Journal of Consulting and Clinical Psychology, 50, 661-664.

Tyler, L. E. (1965). The psychology of human differences (3rd ed.). New York: Appleton-Century-Crofts.

Wallbrown, F. H., Blaha, J., Wallbrown, J. D. & Engin, A. W. (1975). The hierarchical factor structure of the Wechsler Intelligence Scale for Children-Revised. Journal of Psychology, 89, 223-235.

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

Wilson, R. S., Rosenbaum, G., Brown, G., Rourke, D., Whitman, D., & Grisell, J. (1978). An index of premorbid intelligence. Journal of Consulting and Clinical Psychology, 46, 1554-1555.

Table 1

Two Dimensional Solution

	VW1	VW2	
SS1	81 *	19	INFORMATION
SS2	57 *	-12	DIGIT SPAN
SS3	84 *	19	VOCABULARY
SS4	73 *	6	ARITHMETIC
SS5	77 *	11	COMPREHENSION
SS6	72 *	-14	SIMILARITIES
SS7	56 *	-35 *	PICTURE COMPLETION
SS8	52 *	-41 *	PICTURE ARRANGEMENT
SS9	60 *	-40 *	BLOCK DESIGN
SS10	46 *	-38 *	OBJECT ASSEMBLY
SS11	55 *	-66 *	DIGIT SYMBOL
CED	86 *	-8	EDUCATION
CAGE	-8	88 *	AGE
BIRTH	-26	6	BIRTH ORDER
RSEX	8	18	GENDER
RRURAL	8	7	URBAN VS RURAL
OCC1	37 *	-8	PROFESSIONAL
OCC2	24	-17	MANAGERS
OCC3	-4	-14	SKILLED WORKERS
OCC4	-31	-16	SEMI-SKILLED WORKERS
OCC5	-19	-6	UNSKILLED WORKERS
RRACE	37 *	2	RACIAL GROUP
REG1	9	0	NORTHEAST
REG2	-4	-10	NORTH CENTRAL
REG4	6	2	WEST
RHAND	-1	4	RIGHT HANDEDNESS
USA	6	-18	U.S. BIRTHPLACE
STATUS1	-7	-53 *	SINGLE
STATUS2	20	30	MARRIED
STATUS3	-5	8	DIVORCED

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100
AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.35 HAVE BEEN FLAGGED BY AN '*'

VARIANCE EXPLAINED BY EACH FACTOR

VW1	VW2
6.17	2.49

FINAL COMMUNALITY ESTIMATES: TOTAL = 8.66

Table 2

Three Dimensional Solution

	VW1	VW2	VW3	
SS1	80 *	-16	18	INFORMATION
SS2	58 *	15	-3	DIGIT SPAN
SS3	85 *	-15	-2	VOCABULARY
SS4	71 *	-5	28	ARITHMETIC
SS5	77 *	-8	4	COMPREHENSION
SS6	72 *	17	4	SIMILARITIES
SS7	51 *	36 *	32	PICTURE COMPLETION
SS8	48 *	42 *	28	PICTURE ARRANGEMENT
SS9	54 *	40 *	49 *	BLOCK DESIGN
SS10	42 *	39 *	32	OBJECT ASSEMBLY
SS11	54 *	70 *	-10	DIGIT SYMBOL
CED	86 *	11	0	EDUCATION
CAGE	-3	-88 *	-18	AGE
BIRTH	-25	-7	-6	BIRTH ORDER
RSEX	1	-22	72 *	GENDER
RRURAL	9	-6	-7	URBAN VS RURAL
OCC1	37 *	9	0	PROFESSIONAL
OCC2	24	18	-7	MANAGERS
OCC3	-8	11	38 *	SKILLED WORKERS
OCC4	-33	14	3	SEMI-SKILLED WORKERS
OCC5	-20	5	8	UNSKILLED WORKERS
RRACE	35 *	-2	24	RACIAL GROUP
REG1	9	0	1	NORTHEAST
REG2	-5	10	-2	NORTH CENTRAL
REG4	4	-3	20	WEST
RHAND	0	-4	-7	RIGHT HANDEDNESS
USA	5	18	0	U.S. BIRTHPLACE
STATUS1	-10	52 *	9	SINGLE
STATUS2	21	-29	3	MARRIED
STATUS3	-4	-8	-6	DIVORCED

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100
AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.35 HAVE BEEN FLAGGED BY AN '*'

VARIANCE EXPLAINED BY EACH FACTOR

VW1	VW2	VW3
5.92	2.53	1.48

FINAL COMMUNALITY ESTIMATES: TOTAL = 9.93

Table 3

Four Dimensional Solution

	VW1	VW2	VW3	VW4	
SS1	80 *	-14	17	14	INFORMATION
SS2	53 *	15	1	33	DIGIT SPAN
SS3	87 *	-12	-7	-2	VOCABULARY
SS4	68 *	-4	31	27	ARITHMETIC
SS5	77 *	-6	1	5	COMPREHENSION
SS6	72 *	20	0	0	SIMILARITIES
SS7	52 *	37 *	29	-6	PICTURE COMPLETION
SS8	45 *	42 *	30	18	PICTURE ARRANGEMENT
SS9	57 *	42 *	43 *	-18	BLOCK DESIGN
SS10	46 *	41 *	26	-26	OBJECT ASSEMBLY
SS11	49 *	71 *	-9	20	DIGIT SYMBOL
CED	84 *	14	0	21	EDUCATION
CAGE	-1	-87 *	-19	-1	AGE
BIRTH	-27	-8	-3	9	BIRTH ORDER
RSEX	2	-23	75 *	9	GENDER
RRURAL	7	-6	-5	12	URBAN VS RURAL
OCC1	36 *	10	-1	7	PROFESSIONAL
OCC2	19	18	-2	31	MANAGERS
OCC3	-5	11	36 *	-17	SKILLED WORKERS
OCC4	-36 *	12	9	17	SEMI-SKILLED WORKERS
OCC5	-19	4	8	-7	UNSKILLED WORKERS
RRACE	41 *	1	16	-31	RACIAL GROUP
REG1	4	-1	8	36 *	NORTHEAST
REG2	-3	11	-4	-10	NORTH CENTRAL
REG4	11	-1	11	-40 *	WEST
RHAND	0	-4	-7	0	RIGHT HANDEDNESS
USA	5	18	0	-2	U.S. BIRTHPLACE
STATUS1	-12	52 *	10	-1	SINGLE
STATUS2	22	-29	2	0	MARRIED
STATUS3	-3	-8	-7	-1	DIVORCED

NOTE: PRINTED VALUES ARE MULTIPLIED BY 100
AND ROUNDED TO THE NEAREST INTEGER
VALUES GREATER THAN 0.35 HAVE BEEN FLAGGED BY AN '*'

VARIANCE EXPLAINED BY EACH FACTOR

VW1	VW2	VW3	VW4
5.86	2.59	1.37	1.03

FINAL COMMUNALITY ESTIMATES: TOTAL = 10.85