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ABSTRACT

This study evaluated the construct validity of the Wechsler Intelligence Scale for Children, Third Edition (WISC-III) with children (ages 8 to 13) having learning disabilities who were either Hispanic (N=120) or Non-Hispanic white (N=120). Factor analyses found that the WISC III has a three factor structure consisting of verbal comprehension, perceptual organization, and processing speed. This structure was found for the total, the Hispanic, and the Non-Hispanic White samples. Furthermore, the three-factor structure was supported in both canonical factor analysis and alpha factor analysis. Results support the validity of the WISC-III when used with Hispanic and Non-Hispanic white children with learning disabilities. Seven tables detail the factor analyses performed. (DB)

Factor Structure of the Wechsler Intelligence Scale for Children-III for Hispanic and Non-Hispanic White Children with Learning Disabilities

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Statement of the Problem

The purpose of this study was to determine the construct validity for the WISC-III among samples of Hispanic children and Non-Hispanic White children with learning disabilities. More specifically to (a) determine the factor structure of the WISC-III for the total sample, (b) determine the WISC-III factor structure for a sample of Hispanic children with learning disabilities, (c) determine the WISC-III factor structure for a sample of Non-Hispanic White children with learning disabilities, and (d) compare the WISC-III factor structure of samples of Hispanic and Non-Hispanic White children with learning disabilities.

Several factors led to the conceptualization of the present study. First, children who experience academic difficulties in school are often referred for evaluation, which includes a measure of general intelligence. The instruments most commonly used to assess intelligence in school-age children have been the Wechsler scales (Reynolds, Gutkin, Elliott, & Witt, 1984), of which the most recent revision is the WISC-III. Therefore, it seems critical that the WISC-III be psychometrically sound and appropriate for use with the target population. Second, while some researchers have found the WISC-III to consist of four factors: Verbal Comprehension, Perceptual Organization, Freedom from Distractibility, and Processing Speed (Roid, Prifitera, & Weiss, 1993; Schwean, Saklofske, Yackulic, & Quinn, 1993; Wechsler, 1991), others

have reported the WISC-III to have three factors: Verbal Comprehension, Perceptual Organization, and Processing Speed (Sattler, 1992). Third, although there is evidence to support the construct validity of the WISC-III among samples of children with learning disabilities (Wechsler, 1991), no attempts have been made to examine the factor structure of the WISC-III among samples of Hispanic children with learning disabilities.

Subjects

Data were obtained from 240 students (120 Hispanic and 120 Non-Hispanic White) from four school districts in the southwestern region of the United States. All subjects previously had been classified as learning disabled based on a significant difference between achievement and IQ scores. The subjects were male and female and ranged in age from 8 to 13.

Procedure

To investigate the factor structure of the WISC-III for the total sample of children with learning disabilities, all of the 12 subtest scores of the WISC-III were factor analyzed using two factor analytic methods: alpha factor analysis (Kaiser & Caffrey, 1965) and canonical factor analysis (Rao, 1955). Therefore, two separate factor analytic methods were employed to allow for comparison of factor structure across methods and to determine what variations, if any, were method specific.

To determine if the factor structure of the WISC-III was similar across ethnic groups, the WISC-III subtest scores were factor analyzed separately for Hispanic learning disabled children and for Non-Hispanic White learning disabled children using alpha and canonical factor analyses. Subsequently, coefficients of congruence were used to

determine the degree of factor similarity between the Hispanic and Non-Hispanic White groups.

Results

Results of the factor analyses indicated that the WISC-III has a three-factor structure consisting of Verbal Comprehension, Perceptual Organization, and Processing Speed for the total Hispanic, and Non-Hispanic White sample. Furthermore, the three-factor structure was supported in both canonical factor analysis and alpha factor analysis. The consistency across factor structure in alpha and canonical factor analyses suggest that these results are not method specific. Specifically, the alpha factor analysis for the total sample resulted in three factors. Factor 1 consists of Vocabulary, Similarities, Information, Comprehension, Arithmetic, and Digit Span. Factor 2 consists of Picture Completion, Object Assembly, and Block Design. Factor 3 consists of Coding and Symbol Search. The canonical three-factor solution for the total sample resulted in three factors. Factor 1 consists of Vocabulary, Similarities, Information, Comprehension, Arithmetic, and Digit Span. Factor 2 consists of Picture Completion, Object Assembly, and Block Design. Factor 3 consists of Coding and Symbol Search. Coefficients of congruence were calculated for the three factors between the two samples. The three factors, Verbal Comprehension, Perceptual Organization, and Processing Speed achieved significant coefficients of congruence.

Conclusions

The findings of this study may provide psychologists with useful information regarding the validity of the WISC-III for Hispanic and Non-

Hispanic students with learning disabilities. First, this study provides evidence that the WISC-III has a three-factor structure consisting of Verbal Comprehension, Perceptual Organization, and Processing Speed. Furthermore, the three-factor structure was supported in both canonical factor analysis and alpha factor analysis. Second, this study is the first to provide support of the existence of the Processing Speed factor among Hispanic children. Third, the alpha and the canonical factor analysis did not support the fourth factor, Freedom from Distractibility, which was reported in the WISC-III manual (Wechsler, 1991). The results of this study suggest that the WISC-III is valid for use with Hispanic and Non-Hispanic White children with learning disabilities.

The factor structure of the WISC-III for a sample of Hispanic and Non-Hispanic White children with learning disabilities was examined. Data from 240 Hispanic and Non-Hispanic White children with learning disabilities were subjected to both alpha and canonical factor structure consisting of Verbal Comprehension, Perceptual Organization, and Processing Speed for the total Hispanic and Non-Hispanic White sample. Coefficients of congruence between the sample were significant, suggesting that the WISC-III is valid for use with Hispanic and Non-Hispanic White children with learning disabilities.

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Table 1

Three Factor Patterns for the Total Sample

Using Alpha Factor Analysis

Subtests	Factor 1	Factor 2	Factor 3
Picture Completion	.216	.423*	.041
Information	.789*	.012	.082
Coding	.033	.161	.677*
Similarities	.795*	.095	.148
Picture Arrangement	.283	.341	.053
Arithmetic	.608*	.069	.059
Block Design	.042	.692*	.059
Vocabulary	.839*	.058	.109
Object Assembly	.113	.801*	.037
Comprehension	.688*	.101	.071
Symbol Search	.079	.138	.737*
Digit Span	.440*	.063	.161
Eigenvalues	9.516	2.318	1.681
% Variance	70	18	12
Inter-Factor Correlations			
Factor 1	1.000	.541	.393
Factor 2	.541	1.000	.465
Factor 3	.393	.465	1.000

*Criterion for factor loading is greater than .35.

Table 2

Three Factor Patterns for the Total Sample

Using Canonical Factor Analysis

Subtests	Factor 1	Factor 2	Factor 3
Picture Completion	.245	.392*	.071
Information	.772*	.040	.007
Coding	.002	.155	.646*
Similarities	.792*	.097	.121
Picture Arrangement	.249	.335	.099
Arithmetic	.526*	.000	.244
Block Design	.001	.743*	.056
Vocabulary	.859*	.061	.107
Object Assembly	.093	.758*	.070
Comprehension	.713*	.111	.080
Symbol Search	.055	.117	.768*
Digit Span	.417*	.028	.160
Eigenvalues	8.714	1.415	2.602
% Variance	69	12	19
Inter-Factor Correlations			
Factor 1	1.000	.419	.529
Factor 2	.419	1.000	.338
Factor 3	.529	.338	1.000

*Criterion for factor loading is greater than .35.

Table 3

Three Factor Patterns for the Hispanic Sample Using Alpha Factor Analysis

Subtests	Factor 1	Factor 2	Factor 3
Picture Completion	.205	.351*	.207
Information	.655*	.004	.095
Coding	.232	.236	.535*
Similarities	.665*	.083	.005
Picture Arrangement	.34	.364*	.159
Arithmetic	.664*	.017	.032
Block Design	.077	.682*	.080
Vocabulary	.831*	.192	.024
Object Assembly	.104	.649*	.207
Comprehension	.683*	.076	.073
Symbol Search	.066	.158	.675*
Digit Span	.428*	.051	.178
Eigenvalues	9.215	2.158	1.898
% Variance	71	16	13
Inter-Factor Correlations			
Factor 1	1.000	.572	.340
Factor 2	.572	1.000	.332
Factor 3	.340	.332	1.000

*Criterion for factor loading is greater than .35.

Table 4

Three Factor Patterns for the Hispanic Sample Using Canonical Factor Analysis

Subtests	Factor 1	Factor 2	Factor 3
Picture Completion	.301	.330	.157
Information	.692*	.021	.261
Coding	.303	.160	.422*
Similarities	.674*	.134	.142
Picture Arrangement	.235	.395*	.040
Arithmetic	.487*	.139	.158
Block Design	.074	.674*	.070
Vocabulary	.830*	.091	.038
Object Assembly	.048	.540*	.252
Comprehension	.711*	.002	.134
Symbol Search	.084	.105	.990*
Digit Span	.297	.126	.023
Eigenvalues	6.177	1.166	.781
% Variance	57	13	30
Inter-Factor Correlations			
Factor 1	1.000	.433	.031
Factor 2	.433	1.000	-.083
Factor 3	.031	-.083	1.000

*Criterion for factor loading is greater than .35.

Table 5

Three Factor Patterns for the Non-Hispanic White Sample Using Alpha Factor Analysis

Subtests	Factor 1	Factor 2	Factor 3
Picture Completion	.222	.455*	.002
Information	.798*	.048	.080
Coding	.151	.072	.718*
Similarities	.801*	.120	.129
Picture Arrangement	.176	.370*	.129
Arithmetic	.484*	.090	.415*
Block Design	.080	.676*	.017
Vocabulary	.844*	.041	.189
Object Assembly	.068	.810*	.021
Comprehension	.606*	.090	.131
Symbol Search	.139	.129	.806*
Digit Span	.331	.214	.404*
Eigenvalues	8.302	1.936	2.752
% Variance	62	14	24
Inter-Factor Correlations			
Factor 1	1.000	.398	.372
Factor 2	.397	1.000	.472
Factor 3	.372	.472	1.000

*Criterion for factor loading is greater than .35.

Table 6

Three Factor Patterns for the Non-Hispanic White Sample Using Canonical Factor Analysis

Subtests	Factor 1	Factor 2	Factor 3
Picture Completion	.223	.385*	.090
Information	.752*	.093	.009
Coding	.081	.039	.656*
Similarities	.830*	.091	.144
Picture Arrangement	.167	.311	.229
Arithmetic	.462*	.061	.361*
Block Design	.039	.765*	.030
Vocabulary	.865*	.035	.124
Object Assembly	.109	.837*	.035
Comprehension	.644*	.142	.141
Symbol Search	.081	.053	.860*
Digit Span	.362*	.149	.335
Eigenvalues	7.142	2.555	1.375
% Variance	62	24	14
Inter-Factor Correlations			
Factor 1	1.000	.432	.320
Factor 2	.432	1.000	.435
Factor 3	.320	.435	1.000

*Criterion for factor loading is greater than .35.

Table 7

Item Loadings Used for the Coefficient of Congruence

	Item Loadings		
	Hispanic	Non-Hispanic White	Coefficient of Congruence
Alpha Factor Analysis			
Verbal Comprehension			.984**
Information	.655*	.798*	
Similarities	.666*	.802*	
Arithmetic	.664*	.485*	
Vocabulary	.832*	.845*	
Comprehension	.684*	.607*	
Digit Span	.428*	.332	
Perceptual Organization			.991**
Picture Completion	.316	.456*	
Picture Arrangement	.365*	.371*	
Block Design	.682*	.677*	
Object Assembly	.650*	.810*	
Processing Speed			.998**
Coding	.536*	.718*	
Symbol Search	.676*	.806*	

(table continues)

Table 7 (continued)

	Item Loadings		
	Hispanic	Non-Hispanic White	Coefficient of Congruence
Canonical Factor Analysis			
Verbal Comprehension			.995**
Information	.693*	.752*	
Similarities	.674*	.831*	
Arithmetic	.487*	.483*	
Vocabulary	.830*	.865*	
Comprehension	.712*	.644*	
Perceptual Organization			.979**
Picture Completion	.330	.386*	
Picture Arrangement	.395*	.311*	
Block Design	.674*	.765*	
Object Assembly	.540*	.837*	
Processing Speed			.969**
Coding	.422	.656	
Symbol Search	.991	.860	

* = Subtests which loaded significantly and clustered.

** = Coefficient of congruence reached .90 level of significance.