DOCUMENT RESUME

ED 434 918 TM 030 154

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TITLE An Exploratory Factor Analysis of the Differential Ability Scales.
PUB DATE 1999-04-00
NOTE 8p.; Paper presented at the Annual Meeting of the National Association of School Psychologists (31st, Las Vegas, NV, April 6-10, 1999).
PUB TYPE Reports - Research (143) -- Speeches/Meeting Papers (150)
EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS *Cognitive Ability; *Factor Analysis; Factor Structure; *Intelligence; Intelligence Tests; *Preschool Children; Preschool Education; *Test Use
IDENTIFIERS *Differential Ability Tests; *Exploratory Factor Analysis

ABSTRACT

The primary goal of this study was to investigate the underlying structure of the Differential Ability Scales (DAS) using Exploratory Principal Axis Factoring (PAF) with 62 nonclinical preschoolers. While previous factor analyses of the DAS Core subtests revealed the derivation of two distinct factors, the current results revealed only one factor, general cognitive ability. When the DAS Core and Diagnostic subtests were combined, two factors emerged, general cognitive ability and visual memory. Overall, these results suggest that the DAS Core subtests are a measure of general intelligence. Recommendations for users of the DAS with young children are provided. (Author/SLD)

An Exploratory Factor Analysis of the Differential Ability Scales

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ABSTRACT

The primary goal of the study was to investigate the underlying structure of the Differential Ability Scales using Exploratory Principal Axis Factoring (PAF) with 62 non-clinical preschoolers. While previous factor analyses of the DAS Core subtests revealed the derivation of two distinct factors, the current results revealed only one factor, general cognitive ability. When combining the DAS Core and Diagnostic subtests, two factors emerged, general cognitive ability and visual memory. Overall, these results suggest that the DAS Core subtests are a measure of general intelligence. Recommendations for users of the DAS with young children are provided.

SUMMARY

Purpose

The purpose of the present study was to determine if the previously-reported DAS factor structure could be replicated in a non-clinical preschool population. An Exploratory Principal Axis Factoring (PAF) method was chosen to investigate the structure of the DAS Core and Diagnostic subtests.

Content

Participants

The sample consisted of 62 preschoolers with a mean age of 56.85 months (SD = 5.48). The sample was composed of fifty-five Caucasians, four African Americans, and one Native American. The thirty-five males and twenty seven females resided in rural Oklahoma (n = 32) and rural Indiana (n = 30). The participants for this study were obtained from the general population by soliciting parental cooperation from daycare centers and preschools. Assessments were conducted by graduate students who were supervised and trained to administer the Differential Ability Scales.

Results

Means, standard deviations, and ranges for the DAS Core, Diagnostic and Cluster scores for the preschool participants are shown in Table 1. Sample size, multivariate normality, outliers, homogeneity of variance-covariance matrices, linearity, and multicollinearity were addressed prior to conducting the exploratory factor analysis. Intercorrelations among the DAS Core subtests are presented in Table 2. PAF using the DAS Core subtests resulted in one Factor (see Table 3).

An additional PAF was conducted using the Core subtests forcing a two factor solution. This was done to determine whether a two factor solution (verbal and nonverbal) could be supported (see Table 4). Lastly, Table 5 presents the PAF analysis using both DAS Core and Diagnostic subtests.

OUTCOMES AND IMPLICATIONS

1. The DAS Core subtests appear to be a measure of general ability. Only one factor emerged using Exploratory Principal Axis Factoring with the Core subtests—overall ability. A two Factor solution (verbal and nonverbal) did not emerge using PAF, suggesting that it is difficult to separate these abilities among young children and that clinicians should be cautious when comparing verbal and nonverbal performance with preschoolers on the DAS. When a two Factor solution was forced using the Core subtests, the resulting solution appeared to be a measure of general ability and expressive vocabulary. The Verbal/Nonverbal structure was not supported.

2. Combining the Core and Diagnostic subtests in the PAF analysis yielded two factors, a general cognitive factor and a memory factor. While the Matching Letter-Like Forms and Recall of Digits Diagnostic subtests loaded on the general cognitive factor, the Recall of Objects-Immediate, Recall of Objects-Delayed, and Recognition of Pictures Diagnostic subtests appeared to be measuring visual memory.

3. The authors recommend that clinicians still consider each child's performance on and make comparisons between the Verbal and Nonverbal clusters of the DAS. This comparison seems particularly relevant when the DAS is used with bilingual children or children with language deficits, and when additional information (e.g., speech/language data) is available. However, the clinician should be aware that for young children, the DAS is predominantly a measure of general ability.

4. The results support the need for additional research on the DAS at the Preschool level to determine exactly what is being assessed. Additionally, research on the DAS at the Preschool level with bilingual children and children with language deficits would be helpful to determine if the verbal/nonverbal structure is supported.

5. Despite the lack of support for a verbal/nonverbal factor structure, the DAS's brevity and overall reliability suggests that it is a valuable tool for use in preschool evaluations as a measure of general cognitive development.

Table 1

The DAS Core and Diagnostic subtest T Scores, Cluster Ability Score Ranges, Means, and Standard Deviations for the Sample

Subtest/Cluster	Mean	Range	SD
Core			
Verbal Comprehension	46.10	22 - 70	8.37
Picture Similarities	50.82	23 - 71	11.59
Naming Vocabulary	49.08	35 - 74	8.77
Pattern Construction	51.27	27 - 69	9.11
Early Number Concepts	47.24	28 - 67	8.95
Copying	47.4	20 - 67	11.40
Diagnostic			
Matching Letter-like Forms	52.05	30 - 80	9.34
Recall of Digits	48.79	25 - 73	10.59
Recall of Objects-Immediate	49.58	23 - 73	11.19
Recall of Objects-Delayed	52.65	32 - 77	10.07
Recognition of Pictures	49.74	29 - 75	9.49
Cluster			
Verbal	95.69	72 - 126	12.52
Non-Verbal	99.27	56 - 129	18.00
General Cluster	97.26	62 - 126	15.07

Note: N = 62

Table 2

Intercorrelations among the DAS Core, Diagnostic, and Cluster Scores for the Sample

Subtest	2	3	4	5	6	7	8	9	10	11	12	13	14
Core													
1.VC	.36	.52	.43	.57	.47	.48	.49	.35	.27	.40	.86	.49	.71
2.PS	---	.56	.50	.50	.52	.45	.38	.03	.26	.28	.53	.81	.77
3.NV		---	.54	.39	.40	.41	.43	.19	.25	.25	.88	.58	.74
4.PC			---	.55	.72	.49	.49	.14	.28	.19	.56	.85	.80
5.EN				---	.59	.35	.58	.24	.27	.28	.54	.65	.77
6.COPY					---	.59	.50	.22	.35	.33	.50	.88	.80
Diagnostic													
7.MLLF						---	.42	.16	.29	.26	.51	.60	.60
8.ROD							---	.17	.19	-.01	.52	.53	.62
9.RO-I								---	.59	.43	.31	.53	.62
10.RO-D									---	.38	.30	.16	.25
11.ROP										---	.35	.34	.36
Cluster													
12.Verb											---	.62	.83
13.NVerb												---	.93
14.GCA													---

VC = Verbal Comprehension; PS = Picture Similarities; NV = Naming Vocabulary; PC = Pattern Construction; EN = Early Number Concepts; COPY = Copying MLLF = Matching Letter-Like Forms; ROD = Recall of Digits; RO-I = Recall of Objects-Immediate; RO-D = Recall of Objects-Delayed; ROP = Recognition of Pictures; Verb = Verbal; NVerb = Nonverbal; GCA = General Conceptual Ability

Note: N = 62

Table 3

Factor Loadings for Principal Axis Factor Analysis for the DAS Core subtests

	Factor 1
Verbal Comprehension	.64
Picture Similarities	.68
Naming Vocabulary	.66
Pattern Construction	.79
Early Number Concepts	.73
Copying	.79
Eigenvalues[a]	3.07
Percent of Variance	51.2
Total Variance	51.2

Note: N = 62

[a]Eigenvalues are for unrotated factors.

Table 4

Two Factor Loadings for Principal Axis Factoring Analysis with Oblimin rotation for the DAS Core Subtests

	Factor 1	Factor 2
Verbal Comprehension	.60	.48
Picture Similarities	.63	.53
Naming Vocabulary	.59	.98
Pattern Construction	.78	.49
Early Number Concepts	.74	.41
Copying	.86	.38
Eigenvalues[a]	3.19	.56
Percent of Variance	53.1	9.3
Total Variance	53.1	62.4

Correlation between Factors = .57

Note: N = 62

[a]Eigenvalues are for unrotated factors. Loadings >.50 have been underlined.

Table 5

Two Factor Loadings for Principal Axis Factoring Analysis with Oblimin rotation for the DAS Core and Diagnostic Subtests

	Factor 1	Factor 2
Verbal Comprehension	.67	.48
Picture Similarities	.68	.22
Naming Vocabulary	.65	.30
Pattern Construction	.78	.27
Early Number Concepts	.72	,36
Copying	.80	.39
Matching Letter-Like Forms	.64	.32
Recall of Digits	.65	.21
Recall of Objects-Immediate	.24	.87
Recall of Objects-Delayed	.37	.66
Recognition of Pictures	.33	.56
Eigenvalues[a]	4.88	1.57
Percent of Variance	44.4	14.3
Total Variance	44.4	58.7

Correlation between Factors = .42

Note: N = 62

[a]Eigenvalues are for unrotated factors. Factor loadings >.50 have been underlined.

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