1992

Discriminate validity of the DAS

Patricia G. Dvorquez
San Jose State University

Order Number 1348670

Discriminate validity of the DAS

Dvorquez, Patricia Gitta, M.A.

San Jose State University, 1992

U·M·I
300 N. Zeeb Rd.
Ann Arbor, MI 48106

DISCRIMINATE VALIDITY OF THE DAS

A Thesis
Presented to
the Faculty of the Department of Psychology
San Jose State University

In Partial Fulfillment
of the Requirements for the Degree
Master of Arts

by
Patricia G. Dvorquez
May, 1992

Advisor: Dr. Jeffery Braden Ph.D.

APPROVED FOR THE DEPARTMENT OF PSYCHOLOGY

Dr. Jeffery Braden

Dr. Robert Witte

Dr. Nancy Eldred

APPROVED FOR THE UNIVERSITY

ABSTRACT

DISCRIMINATE VALIDITY OF THE DAS

by Patricia G. Dvorquez

This thesis addresses the construct and discriminate validity of the Differential Ability Scales (DAS) with children who are hearing impaired. Discriminate validity was tested with three distinct populations (ie., learning disabled (LD), educable mentally retarded (EMR), and hearing impaired (HI)). Twenty-four subjects were tested with the DAS. Nine subjects were enrolled in classes for hearing impaired (HI), 9 in classes for learning disabled (LD), and 6 were enrolled more than part time in classes for educable mentally retarded (EMR).

The pattern of results supported the construct validity of the DAS with children who are hearing impaired. Also, the DAS effectively discriminated children who are educable mentally retarded from children with hearing impairments, but it did not discriminate children with learning disabilities from children with hearing impairments. The results imply that the DAS is an appropriate tool for differentially diagnosing mental retardation from the concomitants of deafness, but not for discriminating learning disabilities from deafness.

ACKNOWLEDGMENTS

I would like to take this opportunity to thank Dr. Jeffery Braden for all of the time and guidance he has given me during the course of this thesis. I also want to thank Dr. Robert Witte and Dr. Nancy Eldred for taking the time to be on my committee.

A special thanks to William Ruby for all of his love and support, and for always being there for me. In addition, I want to thank Janis Crockett for volunteering her time and interpreting skills. Without her, I probably wouldn't have been able to complete my thesis on time.

A great big Thank You to my parents, Samuel and Mira Dvorquez, and loving family for all of their love and support throughout the years. I couldn't have done it without them!

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Discriminate Validity of the DAS

Patricia G. Dvorquez
San Jose State University

Running head: DAS: DISCRIMINATE VALIDITY

Footnotes

Requests for reprints should be sent to Patricia Dvorquez, Department of Psychology, San Jose State University, San Jose, California 95192.

Abstract

The construct and discriminate validity of the Differential Ability Scales (DAS) with children who are hearing impaired was examined. Discriminate validity was tested with three distinct populations (ie., learning disabled (LD), educable mentally retarded (EMR), and hearing impaired (HI)). Twenty-four subjects were tested with the DAS. Nine subjects were enrolled in classes for hearing impaired (HI), 9 in classes for learning disabled (LD), and 6 were enrolled more than part time in classes for educable mentally retarded (EMR). The pattern of results supported the construct validity of the DAS with children who have a hearing impairment. Also, the DAS effectively discriminated children who are educable mentally retarded from children with hearing impairments, but it did not discriminate children with learning disabilities from children with hearing impairments. The results imply that the DAS is an appropriate tool for differentially diagnosing mental retardation from the concomitants of deafness, but not for discriminating learning disabilities from deafness.

DISCRIMINATE VALIDITY OF THE DAS

It has been demonstrated that scores (IQs) obtained from standardized intelligence tests are helpful for discriminating disabled from nondisabled children. The IQ presents teachers, psychologists and parents with a helpful index for planning a child's progress, because IQs are one of the best available long range predictors of outcome and adjustment (Sattler, 1988).

However, the assessment of children with hearing impairments has presented a variety of problems for educators, psychologists, and physicians (Sapp, Chisson & Horton, 1984). Whereas IQs have traditionally been used as a reference point to estimate the academic potential of children with normal hearing, children with hearing impairments have been erroneously labeled as mentally retarded or emotionally disturbed on the basis of verbal intelligence tests. Verbal intelligence tests confound intelligence with language acquisition. For example, as far back as 1915, Pintner and Patterson revealed IQs of children with hearing impairments to be in the mentally retarded range, hence they developed a test designed to assess the intelligence of children with hearing impairments independent of language.

The use of nonverbal intelligence tests has been recommended consistently for use with hearing impaired persons (Mullen, 1989), whereas verbal intelligence tests are not recommended for estimating the intelligence of persons who have a hearing impairment. Nonverbal intelligence tests are not affected by the child's hearing and language impairment. However, there is a controversy regarding the relationship between nonverbal IQ and academic achievement of children who have a hearing impairment. Intelligence test scores are not considered to be reliable predictors of achievement for children who have a hearing impairment because their IQ and Achievement scores are only modestly correlated. The low IQ-Achievement correlations may be caused by attenuation due to the hearing impairment and restriction of range due to depressed achievement scores.

There is also doubt as to whether nonverbal IQs can be used as a reference point in educational planning for children who are hearing impaired (Watson, Goldgar, Kroese, & Lotz, 1986). It is interesting to note that Watson et al. emphasize caution when using nonverbal ability measures to predict academic achievement. However, nonverbal intelligence tests may be of value to clinicians who need to differentially diagnose deafness from mental retardation (Braden, 1989). Children who are mentally retarded have low scores across intelligence, achievement and adaptive behavior domains. Likewise, children who are hearing impaired often have low verbal IQs, achievement scores and adaptive behavior skills. However, if a child who is deaf has a nonverbal IQ in the average range, a psychologist may conclude that the child's intelligence is not impaired (Braden, 1989). A substantial amount of evidence suggests that deafness imposes no limitations on some intellectual capabilities of individuals. Intelligence may be viewed as an attribute which is reflected in the assemblage of various learned experiences of an individual. In the case of deaf persons, although their learned experiences may differ from hearing persons, this should have little bearing on their nonverbal reasoning and novel problem solving abilities.

Another topic open to investigation is the differences between children with learning disabilities and children with hearing impairments. Although the discrimination between learning disabilities and deafness is dependent on hearing status, the psychometric profiles of children who are hearing impaired and children who are learning disabled may be similar. Children who are hearing impaired and children who are learning disabled have average intelligence and depressed achievement, but the causes of the aptitude-achievement discrepancy are dissimilar. Children who are deaf score low because their hearing impairment precludes the acquisition of academic achievement, whereas neurological complications interfere with learning disabled childrens' acquisition of academic skills. Therefore, can one appropriately differentiate children who are hearing impaired from children who are learning disabled based on their psychometric profiles? Is the inconsistency between IQ and achievement similar in hearing impaired and learning disabled children? One of the goals of this study is to explore these questions.

Recently, The Psychological Corporation has published a new tool to test conceptual ability, the Differential Abilities Scale

(DAS) (Elliot,1990). This test was designed for the primary purpose of assisting in educational placement and for identifying special children. The DAS is meant to apply to schools, clinical settings, and research. It contains six cognitive subtests, which yield a General Conceptual Ability Score (GCA), Verbal Composite Score (VCS), a set of diagnostic subtests, and three Achievement Subtests (Mathematics, Spelling, and Reading). Additionally, there is a set of nonverbal subtests which yield a Nonverbal Conceptual Ability Score (NVGCA). The normative sample is representative of the United States population, and it includes children with learning disabilities, speech and language impairments, educable mental retardation, gifted intelligence, and those with mild hearing impairments. Elliot (1990) recommends using the NVGCA with children who are hearing impaired, and provides special instructions for its implementation. Currently, there are no data on the use of this instrument with children who are hearing impaired.

The construct and discriminate validity of the DAS for use with children who are hearing impaired was examined. Specifically, the construct validity of the DAS was tested by proposing the following Hypothesis (1): The means for hearing impaired subjects will be lower than the DAS normative sample means on the GCA, VCS, Reading, Spelling, and Mathematics subtests, but their NVGCA means will be similar to the normative sample mean.

To test the discriminate validity of the DAS, Hypotheses #2 and #3 were proposed. Hypothesis #2 states that the NVGCA mean for hearing impaired subjects will be higher than the NVGCA mean for mentally retarded subjects; however, the means from the GCA, VCS, and the Reading, Spelling, and Mathematics subtests will be equal to the means for mentally retarded subjects. As an exploratory hypothesis, Hypothesis #3 asks whether the pattern of scores for hearing impaired and learning disabled subjects will differ on the GCA, NVGCA, VCS, Reading, Spelling, and Mathematics subtests?

The outcomes were expected by reason of previous studies (Braden, 1989) which have shown that mentally retarded children and hearing impaired children's verbal IQs are low, and that hearing impaired children were closer in nonverbal intelligence to hearing children than on verbal intelligence tests.

Method

Subjects

A total of 16 male and 8 female subjects were tested. They ranged in age from 7-13 years. The subjects were selected from Oster Elementary School in San Jose, CA, Brownell and El Roble Elementary Schools in Gilroy, CA, and Franklin Elementary School in Burlingame, CA. Six subjects were enrolled more than part time in classes for the educable mentally retarded (EMR), nine were enrolled in classes for learning disabled (LD), and nine were enrolled in classes for the hearing impaired (HI). The criteria for placement into the classes were as follows: (a) EMR subjects' IQs = 55-70, their Adaptive Behavior score was $\leq$ 70, and their Achievement score was ≤ 70, (b) LD subjects had an IQ-Achievement discrepancy of 1.5 standard deviations (California Administrative Code, Title 5), this discrepancy not being due to other handicaps, (c) Hearing impaired subjects had pre-lingual, severe to profound bilateral hearing impairments with no additional handicaps. Six of the 9 hearing impaired subjects used hearing aides. Their primary mode of communication was Signing Exact English (SEE) and/or American Sign Language (ASL).

Materials

The Differential Abilities Scale (DAS) (Elliot, 1990) was administered to the children. The DAS is an individually administered battery of cognitive and achievement tests for children and adolescents from ages 2 1/2 to 17 years. It contains six cognitive subtests, which yield a General Conceptual Ability Score (GCA), a Nonverbal General Conceptual Ability Score (NVGCA), a Verbal Composite Score (VCS), a set of diagnostic subtests, and three Achievement subtests (Mathematics, Spelling, and Reading). For the purpose of this study, the diagnostic subtests were not administered.

Procedure

The subjects were selected from various public schools in the Santa Clara Valley. Children who have been diagnosed as educable mentally retarded, learning disabled, or hearing impaired, with no additional handicaps, were selected. A letter and a written consent form was sent to parents requesting the participation of their children.

After written consent was obtained, children were tested in their respective schools. Directions stated in the DAS manual (Elliot, 1990) were followed for administering the test, except that Total communication was used in administering the test to the hearing impaired subjects. Total communication is defined as "a philosophy incorporating the appropriate aural, manual, and oral modes of communication in order to ensure effective communication with and among hearing impaired persons" (Pahz & Pahz, 1978). Total communication was implemented by an interpreter who used SEE, speech, and facial expressions simultaneously. Although Total Communication was not used in the normative sample test administration, Elliot (1990) recommends using sign language when testing children who are hearing impaired.

An ideal condition in conducting research would be to include a blind or double blind procedure. Because the experimenter in this study administered the test to the subjects, it was impossible for the experimenter to be blind to the subjects condition. Jensen (1980) reported that the expectancy effect exerted by examiners in IQ test situations are nonsignificant, and so no examiner expectancy effects were anticipated.

Data Analyses

In order to analyze the data for Hypothesis #1, six, one sample *t*-tests, five of which are one-tailed, with alpha = .05, were performed. One-tailed tests were performed on the GCA, VCS, and the three Achievement subtests for hearing impaired subjects against the population mean ($\underline{M}$ = 100, $\underline{SD}$= 15). A two-tailed $\underline{t}$-test was performed on the NVGCA mean and the population mean. To correct for multiple comparisons, the $\underline{t}$ scores were compared against a critical values table for multiple comparisons (Owen, 1962).

For Hypothesis #2, two families of comparisons were made: 1) one $\underline{t}$-test, alpha = .05, with two independent samples, was used to determine whether the NVGCA mean for hearing impaired subjects is higher than the NVGCA mean for mentally retarded subjects, 2) five $\underline{t}$-tests, alpha = .05, for two independent samples were conducted on the GCA, VCS, and Achievement means for hearing impaired subjects against the means for mentally retarded subjects. Within Hypothesis #2, the critical values table for multiple comparisons was used (Owen, 1962).

For Hypothesis #3, a 2x6 mixed design multiple analysis of variance (MANOVA), alpha = .05, was used. The two level factor was divided into hearing impaired subjects and learning disabled subjects. The six multiple measures were the NVGCA means, GCA means, VCS means, and three Achievement means. Differences in the pattern of scores for the two groups were tested by the interaction between levels and multiple measures.

Results

As was predicted in Hypothesis #1, hearing impaired subjects scored significantly lower than the population mean (M = 100, SD = 15) on the GCA, VCS, and the three Achievement subtests. On the NVGCA, hearing impaired subjects' scores did not significantly differ from the population mean. Results of the t-tests are listed in Table 1.

Hypothesis #2 was partially supported. The means of hearing impaired subjects were not significantly different from the means of mentally retarded subjects for the VCS and the three Achievement subtests. The means of hearing impaired subjects were significantly higher than the means of mentally retarded subjects on the NVGCA. However, hearing impaired subjects scored significantly higher than mentally retarded subjects on the GCA, which was not expected. Results of the t-tests are listed in Table 2.

As an exploratory hypothesis, the results from Hypothesis #3 demonstrated that hearing impaired and learning disabled subjects did not significantly differ in their pattern of scores, as shown by the nonsignificant interaction of groups by tests (Hotellings Multivariate Test of Significance, $F(6,11) = 3.00$, ns). The means and standard deviations are listed in Table 3. The pattern of scores are illustrated in Figure 1.

TABLE 1
Hearing Impaired Subjects v. Normal Population

Tests	Mean (SD)	*t*-score	*df*	Significance Level
GCA	80.89 (13.28)	4.32*	8	*p<.05
VCS	57.33 (8.41)	15.22*	8	*p<.05
MATH	77.00 (21.67)	3.18*	8	*p<.05
SPELL	72.56 (17.66)	4.66*	8	*p<.05
RDNG	70.77 (14.56)	6.02*	8	*p<.05
NVGCA	88.33 (18.75)	1.87	8	ns

Note: The compared normal population had a mean of 100 (15). The spelling and reading subtests are abbreviated by SPELL and RDNG, respectively

*p<.05, one-tailed. ~p<.05, two-tailed.

TABLE 2
Hearing Impaired Subjects v. Educable Mentally Retarded Subjects

Tests	Group	Mean Score (SD)	t-score	df	Significance Level
GCA	HI	80.89 (13.30)	*3.29	12	~p<.05
	EMR	60.33 (10.80)			
VCS	HI	57.33 (8.41)	0.41	7	ns
	EMR	59.83 (13.40)			
MATH	HI	77.00 (21.67)	1.84	11	ns
	EMR	62.00 (9.20)			
SPELL	HI	72.56 (17.66)	1.57	7	ns
	EMR	52.83 (27.24)			
RDNG	HI	70.77 (14.56)	1.90	12	ns
	EMR	60.00 (7.13)			
NVGCA	HI	88.33 (18.75)	*2.93	13	*p<.05
	EMR	64.67 (12.48)			

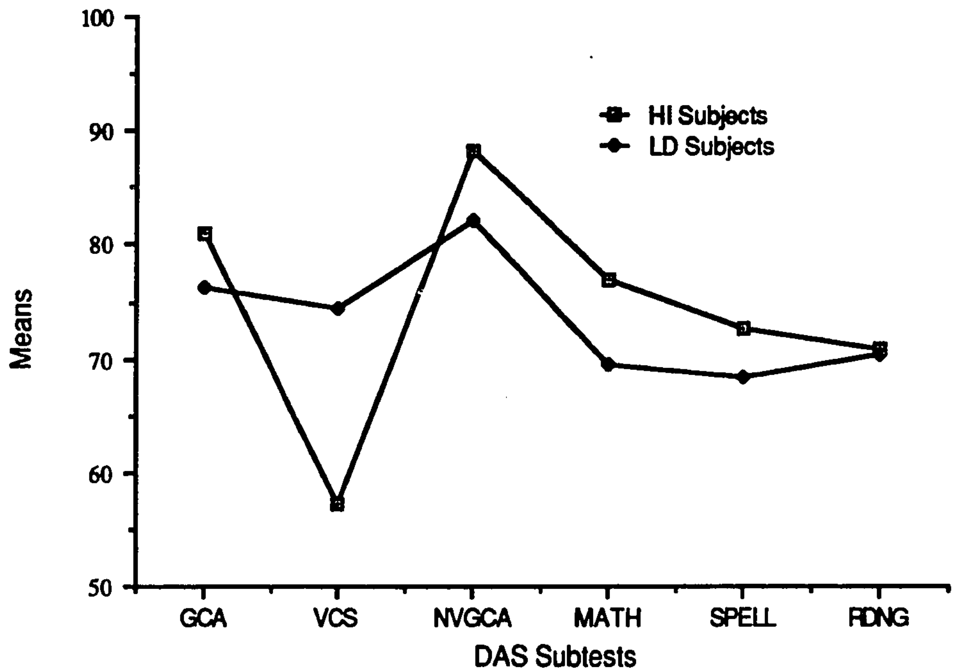
Note: The spelling and reading subtests are abbreviated by SPELL and RDNG, respectively. *p<.05, one-tailed. ~p<.05, two-tailed.

Table 3
Hearing Impaired Subjects v. Learning Disabled Subjects

Test	Group	Mean (SD)
GCA	HI	80.89 (13.28)
	LD	76.33 (13.19)
VCS	HI	57.33 (8.41)
	LD	74.33 (17.78)
NVGCA	HI	88.33 (18.74)
	LD	82.22 (11.62)
MATH	HI	77.00 (21.67)
	LD	69.56 (10.81)
SPELL	HI	72.56 (17.66)
	LD	68.33 (10.44)
RDNG	HI	70.77 (14.55)
	LD	70.44 (15.10)

NOTE: The spelling and reading subtests are abbreviated by SPELL and RDNG, respectively.

Figure 1. Pattern of means from Hearing Impaired (HI) and Learning Disabled (LD) subjects.



Discussion

Children who are deaf are believed to be among the most frequently tested individuals in the United States (Furth, 1973). Therefore, it is vital that professionals, who conduct psychoeducational assessment for children who are deaf, use instruments which have reliable diagnostic utilities.

The results of this study are consistent with the expectations. The DAS appears to treat children who are hearing impaired as other tests of intelligence do. Children who are hearing impaired score below average on verbal tests, but their nonverbal scores are comparable to the normal population. Hearing impaired subjects score significantly higher on nonverbal tests than do mentally retarded subjects, although their academic achievement levels are comparable.

As was shown in Figure 1, hearing impaired and learning disabled subjects demonstrated a similar pattern of scores. Both children with learning disabilities and children with hearing impairments score average on aptitude tests and low on achievement tests.

With psychometric profiles alone, it may be difficult to correctly differentiate between a child who is hearing impaired with no additional handicaps and a child who has a learning disability. As with children who are hearing impaired, a generally accepted characteristic of children who are learning disabled is that they possess normal intelligence but are likely to demonstrate a significant discrepancy between aptitude and achievement (Zingale & Smith, 1978).

In summary, the DAS's construct validity was supported, the DAS treats children who are hearing impaired comparable to other tests of intelligence. The DAS was able to appropriately differentiate between children who are mentally retarded and children who are hearing impaired. However, it was not able to properly differentiate between children who have a learning disability and children who have a hearing impairment.

Although this study yielded expected results, there is opportunity for improvement. Future studies may include: (a) obtaining a larger sample size, which will provide greater power to reject the null hypothesis, give more accurate estimates of the scores, and enable us to generalize the findings; (b) testing the DAS against other instruments with children who are hearing impaired to examine whether the DAS yields results similar to those produced by popular, well researched tests of intelligence.

References

Braden, J. P. (1985) The structure of nonverbal intelligence in deaf and hearing subjects. American Annals of the Deaf, 130(6), 496-501.

Braden, J. P. (1989) The criterion-related validity of the WISC-R Performance Scale and other nonverbal IQ tests for deaf children. American Annals of the Deaf, 134, 329-332.

California Administrative Code Title 5. 3030ja (1987).

Elliot, C. D. (1990) Differential Ability Scales: Introductory and technical handbook. New York: The Psychological Corporation.

Elliot, C. D. (1990) Differential Ability Scales: Administration and scoring manual. New York: The Psychological Corporation.

Furth, H. G. (1973) Deafness and learning: A psychosocial approach. California: Wadsworth.

Jensen, A. R. (1980) Bias in mental testing. New York: The Free Press.

Moores, D. F. (1978) Educating the deaf: Psychology, principles, and practices. Boston: Houghton Mifflin.

Mullen, J. (1989) Nonverbal ability and hearing impaired. Psychology in the Schools, 26, 27-31.

Owen, D. B. (1962). Handbook of statistical tables. Massachusetts: Addison-Wesley.

Pahz, J. A. & Pahz, C. S. (1978). Total Communication: The meaning behind the movement to expand educational opportunities for deaf children. Illinois: Thomas Publisher.

Pintner, R. & Patterson, D. G. (1915) The Binet Scale and the deaf child. Journal of Educational Psychology, 6, 201-210.

Pintner, R. & Patterson, D. G. (1924) Results obtained with the non-language group tests. Journal of Educational Psychology, 15, 473-483.

Sapp, G. L., Chissom, B. S. & Horton, W. O. (1984) An investigation of the ability of selected instruments to discriminate areas of exceptional class designation. Psychology in the Schools, 21, 258-263.

Sattler, J. M. (1988) Assessment of Children (3rd ed.). San Diego: Sattler.

Sullivan, P. M. & Vernon, M. (1979) Psychological assessment of hearing impaired children. School Psychology Digest, 8(3), 271-290.

Vernon, M. (1968) Fifty years of research on the intelligence of deaf and hard of hearing children: A review of literature and discussion of implications. Journal of Rehabilitation of the Deaf, 1(4), 1-12.

Watson, B., Goldgar, D., Kroese, J., & Lotz, W. (1986) Nonverbal intelligence and academic achievement in the hearing impaired. The Volta Review, 88(3), 151-158.

Zingale, S. A. & Smith, M. D. (1978) Wisc-R patterns for learning disabled children at three SES levels. Psychology in the Schools, 15(2),199-204.

Zwiebel, A. & Mertens, D. M. (1985) A comparison of intellectual structure in deaf and hearing children. American Annals of the Deaf, 130(1), 27-31.