DOCUMENT RESUME

ED 314 443 TM 014 238

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TITLE Three Short Form Versions of the WISC-R for Rural Students in Grades 1-4, 5-8, and 9-10.
PUB DATE Nov 89
NOTE 16p.; Paper presented at the Annual Meeting of the Mid-South Educational Research Association (Little Rock, AR, November 8-10, 1989).
PUB TYPE Reports - Research/Technical (143) -- Speeches/Conference Papers (150)

EDRS PRICE MF01/PC01 Plus Postage.
DESCRIPTORS Age Groups; *Elementary School Students; Elementary Secondary Education; Intelligence Quotient; *Intelligence Tests; *Predictive Measurement; Predictor Variables; Psychological Testing; *Rural Youth; Screening Tests; *Secondary School Students; *Test Format; Test Use
IDENTIFIERS Appalachian People; Full Scale IQ; Kentucky; *Wechsler Intelligence Scale for Children (Revised)

ABSTRACT

The tetrad of subtests of the Wechsler Intelligence Scale for Children-Revised (WISC-R) that best predicts the WISC-R Full-Scale intelligence quotient (IQ) was determined for 1,589 Appalachian students referred for evaluation in grades 1-4, 5-8, and 9-10. The sample was divided into three groups. Students in grades 1 through 4 (n=655) were those with chronological ages (CAs) of 6 years 0 months to 9 years 11 months); students in grade 5 through 8 (n=716) were those with CAs of 10 years 0 months to 13 years 11 months); and students in grades 9 through 10 (n=218) were students with CAs of 14 years 0 months to 16 years 11 months). Students attended three rural county school systems in eastern Kentucky. Stepwise multiple regression analysis was used to ascertain which of the 10 WISC-R subtest scores would be the best tetrad for estimating the full-scale IQ in each age group. Only subtests that were significant at the 0.01 level or less were retained. Results indicate that the picture arrangement, information, block design, and comprehension subtests accounted for 90% of the variance associated with the Full-Scale IQ for grades 1 through 4. The subtests for vocabulary, object assembly, picture arrangement, and coding accounted for 88% of the variance associated with the Full-Scale IQ for grades 5 through 8. The vocabulary, picture arrangement, object assembly, and picture completion subtests accounted for 91% of the variance associated with the Full-Scale IQ for grades 9 through 10. The results indicate that a short version of the WISC-R would be practical, economical, and reliable as a screening instrument for Appalachian students in grades 1 through 10. Three tables show the variables selected by stepwise regression for the age groups. (Author/SLD)

Three Short Form Versions of the WISC-R for Rural Students in Grades 1-4, 5-8, and 9-10

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Running Head: WISC-R Short Form

Paper presented at the Annual Meeting of the Mid-South Educational Research Association, Little Rock, Arkansas
November 1989

Abstract

The purpose of this study was to determine the tetrad of subtests which best predicted WISC-R Full-Scale IQ for 1589 Appalachian students referred for evaluation in grades 1-4, 5-8, and 9-10. The WISC-R was administered to students from three rural county school systems in eastern Kentucky. Stepwise multiple regression analysis was used to ascertain which of the 10 WISC-R subtest scores would constitute the best tetrad for estimating Full-Scale IQ in each group. Only those subtests that were significant at the .01 level or less were retained. The results indicate that the Picture Arrangement, Information, Block Design, and Comprehension subtests accounted for 90% of the variance associated with the Full-Scale IQ for grades 1-4. The subtests Vocabulary, Object Assembly, Picture Arrangement, and Coding accounted for 88% of the variance associated with the Full-Scale IQ for grades 5-8. The subtests Vocabulary, Picture Arrangement, Object Assembly, and Picture Completion accounted for 91% of the variance associated with Full-Scale IQ for grades 9-10. These results indicate that a short form version of the WISC-R is practical, economical, and reliable as a screening instrument for Appalachian students in grades 1-10.

Introduction

Past research on short-form versions of the WISC-R have yielded inconsistent results with regard to which subtests predict Full-Scale IQ most successfully (Clarizio & Veres, 1984; Kaufman, 1976; Kennedy & Elder, 1982). Furthermore, previous studies have focused upon diverse groups such as disabled readers, delinquents, gifted, Afro-American, and the emotionally disturbed (Brown, 1985; Haynes, 1983; Karnes & Brown, 1981; Resnick & Entin, 1971; Zimet, Farley, & Dahlem, 1985). In all of these studies age and grade ranges were limiting factors affecting external validity.

In several previous studies it was concluded that the short form version of the WISC-R had limited utility in placement decisions. However, it was acceptable as a screening instrument saving both time and money. The elements of time and economics are particularly noteworthy with regard to the screening of Appalachian students in eastern Kentucky. This is primarily due to the severe shortage of qualified professionals required to conduct intellectual and psychological evaluations. The current ratio of school psychologists to students in eastern Kentucky is 1 to 5000 (J. Batts, personal communication, January 18, 1989).

This tremendous case load creates a need for expedient evaluations. In addition, it has been pointed out that, "...nearly 40% of children referred for evaluation fail to qualify for special education placement largely because their IQ's fall to meet criterion levels" (Sexton & Street, 1985, p. 142).

The need for expedient evaluatons, coupled with age and grade limitations of previous studies, promted the search for a short form of the WISC-R which could be used with Appalachian students. This shortened version would serve as a screening device for students in the elementary, middle, and secondary grades.

Method

Subjects

The sample included 1589 students divided into three groups. Students with chronological ages (CA) 6 years 0 months to 9 years 11 months were categorized as belonging in grades 1-4 (N=655). Students with CA's 10 years 0 months to 13 years 11 months were categorized as belonging in grades 5-8 (N=716). Students with CA's 14 years 0 months to 16 years 11 months were categorized as belonging in grades 9 and 10 (N=218). This total group represented all etudents referred for educational evaluation for possible placement

in special education services from May 1980 through October 1985. There were 756 males and 833 females. All students were from rural Appalachian homes in the coal mining regions of eastern Kentucky.

Procedure

The students were referred for evaluation by teachers or administrators. Students were evaluated by state-certified examiners for possible placement in special education services. WISC-R data were collected as part of the educational evaluation.

Analysis

Stepwise multiple regression analysis was employed to determie which of the 10 subtests of the WISC-R would best predict the Full-Scale IQ for each of the three groups. Stepwise multiple regression is used, "...when a researcher wishes to isolate a subset of available predictor variables that will yield an optimal prediction equation with as few terms as possible" (Nie, Hull, Jenkins, Steinbrunner, & Bent, 1975, P. 345). The analysis was conducted using the Statistical Package for the Social Sciences program Multiple Regression (Nie, Hull, Jenkins, Steinbrunner, & Bent, 1975). Only those subtests that were significant at the .01 level or less were retained.

Results

Shown in Tables 1 through 3 are the four subtests selected by each of the stepwise multiple regression analyses for predicting Full-Scale IQ. Table 1 indicates that Picture Arrangement, Information, Block Design, and Comprehension best predicted Full-Scale IQ for grades 1-4. These four subtests combined accounted for 90% of the variance associated with the Full-Scale IQ for this group.

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Table 1 About Here

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Shown in Table 2 are the four subtests selected for grades 5-8. They were Vocabulary, Object Assembly, Picture Arrangement, and Coding. This tetrad accounted for 88% of the variance associated with Full-Scale IQs.

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Table 2 About Here

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Shown in Table 3 are the four subtests that best predicted Full-Scale IQs for grades 9-10. (Note that the WISC-R has an age ceiling of up to the age of 17 years). These subtests were Vocabulary, Picture Arrangement, Object

Assembly, and Picture Completion. This tetrad accounted for 91% of the variance associated with Full-Scale IQs.

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Table 3 About Here

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Discussion

The purpose of this study was to determine the tetrad of WISC-R subtests which would be most useful in predicting the Full-Scale IQ for Appalachian students in grades 1-4, 5-8, and 9-10, respectively.

Table I indicates the four subtests which best predicted Full Scale IQ for grades 1-4. As can be seen from the table, Picture Arrangement accounted for 58% of the variance associated with Full Scale IQ. Information added an additional 19%, Block Design added 8% and Comprehension added 5%. It should be noted that Picture Arrangement, which was the single best predictor for grades 1-4, was the only subtest to also appear as a significant predictor of Full Scale IQ for grades 5-8 and 9-10. As Sattler (1988) has pointed out, Picture Arrangement "...is primarily a nonverbal reasoning test which may be viewed as a measure of planning ability..." (p.157). Picture Arrangement also

measures visual organization, ability to anticipate, and is less influenced by cultural opportunities than many of the other subtests (Sattler, 1988). In as much as the Appalachian population of eastern Kentucky is thought to experience both cultural and educational disadvantages, it is particularly noteworthy that Picture Arrangement emerges as a significant nonverbal predictor at all three grade levels.

Table 2 indicates the four subtests which best predicted Full-Scale IQs for grades 5-8. As can be seen in the table, the Vocabulary subtest accounted for 57% of the variance, Object Assembly added an additional 19%, Picture Arrangement added 7%, and Coding added 5%. The single best predictor of Full Scale IQ was the Vocabulary subtest. Sattler (1988) has indicated that the Vocabulary subtest may reveal information about the examinee's culture, background, and social development. In an area which has traditionally deemphasized education in lieu of monitary rewards via mining, the Vocabulary subtest becomes an excellent predictor of what these students have <u>not</u> experienced. Poor word knowledge, inadequate verbal comprehension, and impaired language development, coupled with limited

educational backgrounds of family members all contribute to developmental lags within this group.

Table 3 indicates the four subtests which best predicted Full-Scale IQ in grades 9-10. Vocabulary was selected first and accounted for 58% of the variance, Picture Arrangement increased the R^2 by 19%, Object Assembly added 10%, and Picture Completion added 4%. As in grades 5-8, the Vocabulary subtest was the single best predictor of Full-Scale IQ in grades 9-10. As with grades 5-8, the Vocabulary subtest may reflect a lack of emphasis on verbal skills within this group. Picture Arrangement, which accountd for the largest increase in R^2 after Vocabulary may reflect the reliance on noverbal skills in visually organizing and anticipating tasks.

In summary, the data suggests that three short forms of the WISC-R for use with Appalachian students in grades 1-4, 5-8, and 9-10 have been indentified. Limitations and cautions associated with the use of short forms of the WISC-R have been well documented (Brown, 1985; Kaufman, 1976; Ryan, 1981; Sattler, 1988). However, as Kaufman (1976) has pointed out, "The fact that it is not a perfect predictor of Full-Scale IQ, and that numerous misclassifications will result when it is used, is not

sufficient justification for abandoning this short form. Rather, knowledge of the strong and weak points of the short form should be used to delineate its range o usefulness" (p. 194). Given the lack of financial resources and personnel who are qualified to evaluate students in this geographic region the limitations may not be as important as the information gathered. Because of this, the three short forms identified should prove successfull in screening students who may later be refered for complete psycho-educational assessment.

Table 1

Variables Selected by Stepwise Multiple Regression Analysis That Best Predict Full-Scale IQ For Grades 1-4

Variables	Multiple R	R^2	F	P
Pict. Arrange.	.76	.58	573.60	.0001
Information	.88	.77	333.57	.0001
Block Design	.92	.85	412.68	.0001
Comprehension	.95	.90	285.92	.0001

	Multiple R	R^2	df	F	P
All Variables	.95	.90	4,651	1397.29	.0001

Table 2

Variables Selected by Stepwise Multiple Regression Analysis That Best Predict Full-Scale IQ For Grades 5-8

Variables	Multiple R	R^2	F	P
Vocabulary	.75	.57	890.32	.0001
Obj. Assembly	.87	.76	294.04	.0001
Pict. Arrang.	.91	.83	487.76	.0001
Coding	.94	.88	280.27	.0001

	Multiple R	R^2	df	F	P
All Variables	.94	.88	4,712	1307.32	.0001

Table 3

Variables Selected by Stepwise Multiple Regression Analysis That Best Predict Full-Scale IQ For Grades 9-12

Variables	Multiple R	R^2	F	P
Vocabulary	.76	.58	276.14	.0001
Pict. Arrang.	.88	.77	135.70	.0001
Obj. Assembly	.93	.87	127.70	.0001
Pict. Comp.	.95	.91	87.94	.0001

	Multiple R	R^2	df	F	P
All Variables	.95	.91	4,214	508.57	.0001

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