The Relationship of Non-Verbal Intelligence Measures to Academic Achievement Among Deaf Adolescents

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Abstract

This study examined the correlations between academic achievement and two tests of non-verbal intelligence often used with the deaf population, the Hiskey-Nebraska Test of Learning Aptitude (H-NTLA) and the Wechsler Adult Intelligence Scale-Revised (WAIS-R) Performance Scale, in a sample of 35 deaf high school students. Both tests correlated significantly positively with measures of reading comprehension and mathematical calculation and were, in fact, in the same range as typical correlations between overall IQ and achievement in the hearing population. The WAIS-R Performance Scales correlated significantly higher with reading comprehension than did the H-NTLA. The results seem to validate the use of the WAIS-R as a predictor of academic achievement and a potential aid in identifying learning problems in the deaf population.

A familiar and often frustrating decision facing psychological evaluators in working with deaf clients is choosing an appropriate tool to assess nonverbal intelligence. Levine (1974) found that evaluators participating in a survey selected the Performance Tests from the Wechsler scales with the greatest frequency. Also chosen, but with less frequency, was the Hiskey-Nebraska Test of Learning Aptitude. Both these scales are highly reliable with Wechsler (1981) reporting test-retest reliability of .93 for the Performance Scale and Hiskey (1955) reporting a split-half reliability coefficient of .96.

This choice of Wechsler Performance Scales over the H-NTLA merits study because the H-NTLA is the only test of intellectual abilitites developed specifically for the deaf population (Roeser & Downs, 1981). Research has suppor-

ted the use of the WISC-R Performance Tests with deaf children (Hirshoren, Hurley, & Kavale, 1979; Hirshoren, Kavale, Hurley, & Hunt, 1977; Hirshoren, Hurley, & Hunt, 1977) and normative work has been completed to add to the usefulness of this scale with deaf persons (Anderson and Sisco, 1977). Sullivan and Vernon (1979) have suggested the WISC-R Performance Scale be used in conjunction with the H-NTLA in assessing school-aged, hearing impaired children.

In contrast to the WISC-R applications, much less information is available supporting the use of adult level Wechsler tests with deaf persons. Goetzinger and Rousey (1957) found the Wechsler-Bellevue Adult Scale of Intelligence Performance scale to be useful with deaf adolescents. Also, in reviewing available intelligence tests, Vernon (1968) recommended the Performance Scale of the Wechsler Adult Intelligence Scale for deaf individuals aged 16 to 70 years.

Watson, Goldgar, Kroese, and Lotz (1968) administered both Wechsler Performance Scales and the H-NTLA to deaf students and correlated them with academic achievement measures. Their achievement measures were: the Stanford Achievement Test-Hearing Impaired Form, the Woodcock Reading Mastery Test, and the Peabody Individual Achievement Test. They found that both the Wechsler Performance Scales and the H-NTLA correlated significantly with most achievement measures and that the H-NTLA correlation was consistently, but nonsignificantly higher than the Wechsler Performance correlation with the same achievement measure. Two of the highest correlations were with the Stanford reading comprehension (H-NTLA – .46; Wechsler – .36) and math computation (H-NTLA – .62; Wechsler – .53). These correlations are similar to the .50 which is the average cor-

THE RELATIONSHIP OF NON-VERBAL INTELLIGENCE MEASURES TO ACADEMIC ACHIEVEMENT AMONG DEAF ADOLESCENTS

relation between IQ and achievement for the hearing population (Jensen, 1980) and considerably higher than some reported correlations of .33 between achievement and Performance IQ (Zimmerman & Woo-Sam, 1972).

The present study was conducted to examine the question of which of these two measures of intellectual ability is a better predictor of academic achievement in the deaf population in that age group in which they overlap. The authors hypothesized, based on clinical experience, that the Performance Scale of the WAIS-R correlated higher with achievement in deaf adolescents than the H-NTLA.

Method

Subjects

Subjects were 35 deaf adolescents (20 females and 15 males) aged 16-1 to 18-0 years who were students at the residential school for the deaf in Arkansas. All students had bilateral, sensorineural hearing losses ranging from moderately severe to profound. The orientation of the program at this residential school is total communication.

Procedure

All students were administered both the WAIS-R Performance Scale and the H-NTLA, but at separate testing sessions. Testing was done by two psychological examiners experienced in working with deaf persons and fluent in sign language. Each student was administered one instrument by one examiner and the other instrument by the other, in counterbalanced order. The examiner administering the second test was in all cases unaware as to the results of the first testing. One examiner administered 18 WAIS-R Perfor-

gestures.

Achievement test scores were obtained from the routine annual achievement testing which is part of the school program. The achievement scores were from the Stanford Achievement Test, Special Edition for the Hearing Impaired in reading comprehension and mathematical computation, and were reported as percentile scores.

Results

Scores on the H-NTLA ranged from 40 to 103 with a mean of 79; on the Wechsler Performance from 58 to 126 with a mean of 90; on the Stanford reading comprehension from 2 to 99 with a mean of 54.4; and on the Stanford math computation from 2 to 88 with a mean of 48.9.

The results of the analysis using the Pearson Product-Moment correlation are shown in Table I. These correlation coefficients were all significant at the $p < .01$ level of confidence. Further, one-tailed t-tests for the significance of differences between dependent correlations showed that the WAIS-R Performance Scale correlated higher with reading comprehension than did the H-NTLA (t=2.38; df=32; $p < .05$). There was no significant difference between the WAIS-R Performance Scale and the H-NTLA in their correlations with mathematical calculations. We also computed the correlation between the H-NTLA and the WAIS-R Performance Scale and found that these two instruments were significantly correlated (r=.75; $p < .01$).

Discussion

The major hypothesis of this study, that the WAIS-R Performance Scale would be a better predictor of academic achievement than the H-NTLA was only partially supported in that there

TABLE 1

Achievement Measure	H-NTLA	WAIS-R
SAT-Reading Comprehension	.53*	.73*
SAT-Mathematical Calculations	.60*	.70*

*P<.01

mance Scales and 17 H-NTLA's while the other administered 17 WAIS-R Performance Scales and 18 H-NTLA's. The standardized directions for the WAIS-R were given by both speech and sign language whereas directions for the H-NTLA were given in the standardized way through

was only a significantly higher correlation of the WAIS-R with reading, but not with mathematical computation. WAIS-R — mathematical computation correlations were in the same range as WAIS-R — reading comprehension correlations, but the H-NTLA seemed to correlate slightly

2

THE RELATIONSHIP OF NON-VERBAL INTELLIGENCE MEASURES
TO ACADEMIC ACHIEVEMENT AMONG DEAF ADOLESCENTS

higher (though not statistically significantly) with mathematical computation than with reading comprehension.

These results seem at variance with other comparisons of the Wechsler Scales and the H-NTLA (Watson et al., 1986) in which the H-NTLA was judged to be a better predictor of academic achievement than the Wechsler. It should be remembered, however, that although Watson et al. (1986) considered the H-NTLA a better predictor of academic achievement than the Wechsler, they reported no significant differences or even trends toward significance between the correlations. The present results would seem to support what others (Hirshoren et al., 1977; Hirshoren et al., 1979; Anderson & Sisco, 1977) have said about the usefulness of the WISC-R and WAIS and validate the use of the WAIS-R in predicting academic achievement and monitoring academic progress in the deaf population. Some caution should be exercised in generalizing these results to the entire deaf population. The generalizability of these results may be limited by the small size of the sample and by the fact that the subject pool was comprised of only deaf adolescents in a residential school setting and not a more heterogeneous population.

It is interesting to note that the correlations between these achievement measures and intellectual measures are in at least the same range, if not slightly higher than the correlation of .50 which is often cited as a median correlation between IQ and achievement (Jensen, 1980). A partial explanation for these relatively high correlations may be in the fact that this sample had a quite broad range of scores on both intellectual and achievement measures, which may be somewhat atypical for a population of deaf youngsters.

A second possible factor in the relatively high correlations obtained may be the age group comprising this sample, all youngsters in grades 10-12. Other research (Giangrew, 1966) also shows substantial correlations between intelligence and achievement in younger (grades 2-4) and older (grades 11-12) children but not in the age group in between.

The particular achievement tests used in this study also may have a bearing on the high correlations found. Watson et al. (1986) also found that the SAT-HI reading comprehension resulted in some of the highest correlations with both the H-NTLA (.46) and the WAIS-R (.36) as did the SAT-HI math computation (H-NTLA – .62; WAIS-R – .53). It should be noted that the authors did not select these achievement measures but simply utilized the results of the tests which the school routinely used for evaluation of academic progress.

In conclusion, the results of the present study would seem to support the use of either the H-NTLA or the WAIS-R Performance Scale as a predictor of academic problems in high school aged deaf adolescents. The results also suggest that the WAIS-R Performance Scale may be a superior evaluation instrument in making these kinds of decisions in the area of reading comprehension. Further research with larger samples may provide a more definitive answer to the question of whether one of these ability measures may be more predictive of academic achievement than the other.

THE RELATIONSHIP OF NON-VERBAL INTELLIGENCE MEASURES TO ACADEMIC ACHIEVEMENT AMONG DEAF ADOLESCENTS

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4