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ABSTRACT

The performance of 79 elementary school students referred for learning disability evaluation was compared on the Kaufman Assessment Battery for Children (K-ABC), the Wechsler Intelligence Scale for Children-Revised (WISC-R) and the Woodcock-Johnson Psychoeducational Battery (WJPEB). Pearson product-moment correlations were performed on the global standard scores of the three instruments to determine the nature of relationships among them. Results supported the use of the mental processing score on the K-ABC for the assessment of general ability in LD students. Moderate correlations indicated that the same general construct is being measured on all three instruments, but also that the K-ABC has enough unique qualities to contribute new information to the assessment of ability. (CL)

Referred Students' Performance on the K-ABC, WISC-R, and Woodcock-Johnson

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Referred Students' Performance on the K-ABC, WISC-R, and Woodcock-Johnson

The Kaufman Assessment Battery for Children (K-ABC; Kaufman & Kaufman, 1983) is a recently developed instrument designed to measure intelligence and achievement in children ages 2 1/2 to 12 1/2. Kaufman and Kaufman define intelligence on the K-ABC as "an individual's style of solving problems and processing information." (p. 2) Achievement is assessed by tasks similar to many of the verbal items on previous scales of intelligence (i.e. WISC-R, WPPSI, and Stanford-Binet).

The authors of the K-ABC maintain that the instrument is useful in diagnosing learning disabilities (LD). They support this claim by noting that a representative number of LD students were included in the standardization sample, the battery contains measures of both intelligence and achievement, and the results can be used to generate teaching strategies that accomodate a student's preferred style of processing information (i.e. simultaneous or sequential). More specifically, they state that , "low levels of sequential or successive processing may be associated with poor reading performance for mentally retarded and learning disabled children." (p. 11)

In the Interpretive Manual for the K-ABC, 43 validity studies are described. Most of these studies relate K-ABC scores with scores on either the Wechsler Intelligence Scale for Children-Revised (WISC-R) or Stanford-Binet Intelligence Scale for normal or previously identified handicapped children. A total of six preliminary investigations of K-ABC performance patterns among LD students (n=249) were conducted. One additional study of dyslexics (n=55) (Hooper & Hynd, 1982) was also reported. The general findings indicated that LD students obtained Simultaneoaus (SIM) processing standard scores approximately 2-5 points higher than their Sequential (SEQ) processing scores. These SIM scores were also approximately 7-8 points higher (1/2 standard deviation) than their Achievement (ACH) scores. Several of the studies also found equal proportions of SEQ>SIM and SIM>SEQ patterns among the students.

One consistent finding in most of the studies was a subtest performance pattern of highest scores on Gestalt Closure, Triangles (both SIM subtests), and Riddles (an ACH subtest highly amenable to simultaneous precessing); and lowest scores on Hand Movements, Word Order (both SEQ subtests), and the ACH subtests of Faces and Places (an analogue to general information), Arithmetic, Reading/Decoding, and Reading/Understanding. Kaufman and Kaufman (1983) point out that while a consistent simultaneous processing preference does not emerge for LD students, the pattern described is consonant with previous research on other standardized instruments indicating that many LD students have relative strengths in spatial abilities and weaknesses in sequencing, acquired knowledge, and achievement (Bannatyne, 1971, 1974; Kaufman, 1979).

Several additional studies examining LD students' performance on the K-ABC and other measures have recently been reported (Haddad, 1984;

Anderman, Perney, & Kroeschell, 1984; Naglieri, 1984; Naglieri & Jad, 1984; Obrzut, Obrzut, & Shaw, 1984). All of these studies have documented a strong relationship between the Mental Processing Composite (MPC) on the K-ABC and the WISC-R Full Scale IQ (r=.71 to .85). However, most of the studies have also confirmed the findings of the preliminary investigations that no consistent SEQ-SIM processing differences exist for LD students as a group. In most cases, both the mean SEQ and SIM standard scores have been in the Below Average range (i.e. 80-89), whereas the mean ACH standard score has been either Below Average or Well Below Average (i.e. 70-79). The general tendency has been for the ACH score to be approximately 4-10 points lower than the MPC for groups of LD students as one might expect. However, recent critiques of the K-ABC factor structure (Keith, 1985; Bracken, 1985) raise questions about the legitimacy of interpreting the entire cluster of ACH subtests as a distinct factor. Some argue that the placement of the two reading subtests on a separate achievement factor is justified but that the status of the other ACH subtests is less clear at varying age levels. If this is in fact the case, the meaning of MPC-ACH differences on the K-ABC also becomes less clear.

In summary, a number of studies reported to date have focused on K-ABC performance for both previously identified and recently referred LD students. Most of these studies have compared K-ABC and WISC-R performance and there remains a need to compare K-ABC performance with performance on other measures of cognitive ability. The purpose of this study was to compare performance on the K-ABC, WISC-R, and Woodcock-Johnson Psychoeducational Battery (WJPEB) for a group of students referred for LD evaluation.

Method

Subjects

The subjects for this study were 79 elementary school students referred for LD evaluation in a suburban midwestern school district. The district serves predominantly white children and is comprised of families from lower-middle SES to upper-middle SES. Permission to participate in the study was originally sought from 102 parents of students referred for LD evaluation in a single school year at seven elementary schools. The participation rate was 77%. The subjects ranged in age from 6 years, 9 months to 12 years, 1 month (M=8.1; SD=1.3) and were in the first (n=47) through sixth grades (n=1). Fifty-one males and 28 females were included in the sample. Of the 79 students referred for evaluation, 38 were identified as having mild learning problems and placed in a special secondary prevention program called "Primary Project" (PP), 11 were identified as having learning disabilities and placed in an LD program, and 30 were not identified and remained in their regular classroom placements.[1]

Procedure

The 79 students in the sample were all administered both the K-ABC and the WJPEB during an eight-month period of one academic year. The WJPEB is routinely administered by district personnel as a part of LD evaluations. Because many of the students included in the study were in the first grade, the Preschool Scale Cluster and the Skills Cluster were used as measures of cognitive ability and achievement, as recommended by Woodcock and Johnson (1977). The remaining students were given the full cognitive battery. All of the subjects in the third through sixth grades (n=20) were also given the WISC-R. All 79 subjects received the complete version of the K-ABC appropriate for his or her age.

Data Analysis

In order to determine the nature of the relationships among K-ABC, WISC-R, and WJPEB performance, Pearson product-moment correlations were performed on the global standard scores of the three instruments. One-way analyses of variance (ANOVAs) were used to compare K-ABC, WISC-R, and WJPEB performance among the PP, LD, and not identified groups. Finally, t tests for related samples were performed to compare global scale performance patterns on the three instruments for each of the three groups.

Results

The descriptive results of the study are presented in Table 1. On the K-ABC, the mean MPC, SEQ, SIM, and ACH scores were in the Average

Insert Table 1 about here

range for all three groups. For those students who were given the complete WJPEB cognitive scale, the same result was obtained. The performance of both LD and not identified students was in the Average range on the Broad Cognitive Ability Cluster (BCA), Verbal Ability Cluster (VERB), Reasoning Cluster (REAS), Perceptual Speed Cluster (SPEED), and Memory Cluster (MEM). The WISC-R also yielded scores in the Average range for the FSIQ, VIQ, and PIQ for both LD and not identified groups. The one exception to this pattern was obtained on the abbreviated version of the WJPEB. The Preschool Scale Cluster (PS) was in the Average range for both PP and not identified students, but the Skills Cluster (SC) was Below Average for the PP group and Average for the not identified group.

The correlational results of the study are presented in Table 2. Although these results must be interpreted with caution due to the large

Insert Table 2 about here

number of intercorrelations given the sample size, several of the relationships are consistent with previous findings. The correlations between the MPC and FSIQ (r=.59) and BCA (r=.52) are slightly lower, but similar to those reported in earlier validity studies of the K-ABC with other measures of cognitive ability. The correlation between the MPC and PS (r=.35), however, is much lower and indicates that only 12% of the variance is shared between the MPC and Preschool Scale of the WJPEB. This is probably due to the limited content of the PS as compared to the BCA on the WJPEB.

In contrast to several previous studies, the MPC for this sample of referred youngsters also correlated more highly with the VIQ (r=.66) than the FSIQ on the WISC-R and with the VERB (r=.57) than the BCA on the WJPEB. The MPC also correlated strongly with MEM (r=.60) on the WJPEB. These findings appear consistent with recent suggestions that the K-ABC contains a strong verbal mediated memory component (Keith, 1985). Low correlations were obtained between all of the global scales of the K-ABC and REAS on the WJPEB (r=.08 to .22). However, the same result was obtained with the WISC-R and the other clusters of the WJPEB itself. The REAS score did not correlate significantly with a single other variable.

Consistent with nearly all previous studies and Kaufman and Kaufman's (1983) rationale for a separate Achievement scale, the ACH scale correlated more strongly with the FSIQ (r=.71), BCA (r=.64), and PS (r=.54) than did the MPC. However the intercorrelation of the MPC and ACH scale (r=.39) is substantially lower than in most reported studies, accounting for only about 16% of shared variance. A restriction in range of Achievement scores for this sample of students, all of whom were referred for academic difficulties, may be the explanation for this result.

The results of the ANOVAs performed on all of the global scale means among the three groups of students yielded only one significant finding. A significant difference was found on the Skills Cluster of the WJPEB comparing the performance of the PP and not identified groups (F(1,48)=33.83; p<.001). The not identified group had a mean SC score of 98.79 (Average) whereas the PP group had a mean SC score of 88.33 (Below Average). This finding is consistent with the fact that the latter group was described as having mild learning problems. The concomitant comparison on the ACH scale of the K-ABC yielded group means of 98.10 (not identified) and 95.50 (PP) which was not a significant difference.

T tests for related samples were also performed on the global standard scores of each instrument in order to ascertain differences in performance patterns among the three groups. For the not identified group, there were no significant differences among scores on any of the K-ABC scales (i.e. SEQ-SIM), WISC-R scales (i.e. VIQ-PIQ), or WJPEB clusters (i.e. PS-SC). For the PP children, however, significant differences were found between the MPC and ACH scores (t(37)=2.33; p<.05) and SIM and ACH scores (t(37)=2.65; p<.01), with the ACH mean about 3 points lower than the MPC and 4 points lower than SIM. Similarly, a significant difference was found between the PS and SC means on the WJPEB for this group (t(37)=6.57; p<.001), with the SC mean about 8 points lower than the PS mean. For the LD group, significant differences were found between the SIM and SEQ means ($t(10)=3.75$; $p<.01$) and the MPC and SEQ means ($t(10)=3.48$; $p<.01$), with the SEQ processing mean nearly 12 points lower than the SIM processing mean. There was no comparable PIQ-VIQ discrepancy on the WISC-R for the LD group.

Table 3 presents the individual subtest results on the K-ABC for all three groups of students. It can be seen that the pattern described

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Insert Table 3 about here

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by Kaufman and Kaufman (1983) for LD students is generally approximated. The highest subtest scores for this group occurred on Gestalt Closure, Triangles, Matrix Analogies (SIM subtests), and Riddles (an ACH subtest). The lowest scores occurred on Hand Movements, Word Order (SEQ subtests), Reading/Decoding, and Reading/Understanding (ACH subtests). This pattern does not appear for either of the other two groups. Additionally, the proportions of SEQ>SIM, SIM>SEQ, and MPC>ACH patterns are quite different for the three groups. For the SEQ>SIM pattern, there was 1 (3%) not identified student, 6 (16%) PP students, and 0 (0%) LD students. For the SIM>SEQ pattern, there were 5 (17%) not identified students, 5 (13%) PP students, and 5 (45%) LD students. For the MPC>ACH pattern, there were 3 (10%) not identified students, 7 (18%) PP students, and 5 (45%) LD students. For the total sample of referred students, only 22 (28%) displayed distinct processing preferences on the K-ABC in contrast to nearly 50% of normal children included in the standardization sample.

Discussion

The results of this study support the use of the mental processing score on the K-ABC for the assessment of general ability in students referred for LD evaluation. The moderate correlations between both the MPC and FSIQ and BCA indicate that the same general construct is being measured on all three instruments, but also that the K ABC has enough unique qualities to contribute new information to the assessment of ability. The fact that the mean scores on the MPC, FSIQ, and BCA were all in the same range (Average) and within 2-6 points of each other for all three groups of students also support this conclusion.

The restriction in range on the ACH scale makes the correlational results involving this scale difficult to interpret. However, the pattern of MPC>ACH differences obtained is somewhat consistent with what would have been expected for the three groups. Only 10% of the not identified students displayed this pattern, 18% of the PP students displayed it, and 45% of the LD students displayed it. The results with the LD students must be tentatively interpreted, however, due to the small sample size of this group. For the PP group, the difference between the PS and SC (achievement) scores was more diagnostically significant than that between the MPC and ACH scores on the K-ABC.

The fact that 45% of the LD students displayed a SIM>SEQ pattern while none of the LD students displayed a SEQ>SIM pattern may also be significant. It was originally hypothesized by the authors of the K-ABC that a preponderance of LD students might display this pattern. Although research to date has not supported this hypothesis, Kaufman and Kaufman (1983) point out that the extraneous variables of differing criteria for LD placement and using previously identified LD students for a number of preliminary studies on the K-ABC may be clouding the issue. Because the cooperating school district in this study differentiated students with mild learning problems from those with learning disabilities, a more stringently categorized group of LD students may have been obtained. Under these conditions the SIM>SEQ pattern was seen with greater frequency. It is not being suggested here that this group of students is somehow more representative of LD students than those obtained in other studies, but rather that the issue raised by Kaufman and Kaufman warrants further investigation. Certainly no conclusions can be reached on the basis of the small number of LD students included in this study.

Finally, the fact that only 28% of the referred students, all of whom were experiencing some difficulty with classroom learning, displayed a distinct processing preference (compared to about 50% of normal children in the standardization sample) deserves comment. Kaufman and Kaufman have noted that lack of a processing preference on the K-ABC for groups of students may be diagnostically significant, particularly when both mental processing scores are near the Below Average range or below. We have obtained this same result with two other samples of students referred for LD evaluation (Smith & Lyon, unpublished data) and two samples of handicapped preschoolers (Lyon & Smith, unpublished data). In every case, less than 25% of these youngsters displayed either SIM or SEQ processing preferences. It may be that under these circumstances, when both processing scores ar at or near the Below Average range, learners lack a viable means of compensating for weaker skills in one area by capitalizing on strengths in the other area. This is an empirical question and one that may prove fruitful to investigate.

Footnote

[1]In all cases placement decisions were made on the basis of WJPEB performance and results on other measures routinely used by school district personnel for LD evaluations. The K-ABC results were not used for decision-making purposes.

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Table 1

K-ABC, WICS-R, and WJPEB Global Scale Means, Standard Deviations, Minimums and Maximums for NOt Identified, PP, and LD Groups

Variable	Mean	SD	Minimum-Maximum
MPC			
Not identified	99.17	12.02	73-129
PP	98.71	8.66	83-116
LD	100.91	11.42	86-127
SEQ			
Not identified	97.38	12.71	69-129
PP	98.40	10.81	80-126
LD	93.73	9.74	74-106
SIM			
Not identified	100.66	11.04	76-130
PP	99.37	8.39	84-115
LD	105.64	12.29	91-136
ACH			
Not identified	98.10	8.81	82-116
PP	95.50	7.14	83-114
LD	94.18	10.74	76-112
BCA			
Not identified	101.67	11.77	88-135
LD	94.00	10.43	82-114
VERB			
Not identified	98.60	12.24	81-125
LD	98.18	17.02	81-135
REAS			
Not identified	97.67	9.51	77-110
LD	102.00	14.21	82-123
SPEED			
Not identified	97.87	10.09	74-118
LD	92.82	12.06	78-116
MEM			
Not identified	102.80	14.07	77-135
LD	91.82	9.44	78-107
PS			
Not identified	95.29	10.99	74-115
PP	96.11	8.96	83-115
SC			
Not identified	98.79	5.07	91-108
PP	88.33	5.92	74-97

Table 1 continued

Variable	Mean	SD	Minimum-Maximum
FSIQ			
Not identified	104.90	13.87	87-128
LD	102.86	8.53	92-120
VIQ			
Not identified	103.80	12.14	84-118
LD	99.86	5.24	94-106
PIQ			
Not identified	105.30	14.05	88-132
LD	106.29	14.33	86-131

Table 2

Correlations of the Global Standard Scores on the K-ABC, WISC-R, & WJPEB

	MPC	SEQ	SIM	ACH	BCA	VERB	REAS	SPEED	MEM	FSIQ	VIQ	PIQ	PS	SC
MPC		.79+++	.90+++	.39+++	.52+++	.57+++	.22	.39+	.60+++	.59+++	.66+++	.45+	.35++	.20
SEQ			.44+++	.26+	.40+	.45++	.20	.28	.56+++	.31	.53++	.12	.40++	.13
SIM				.39+++	.53++	.56++	.20	.39+	.53++	.68+++	.66+++	.58++	.20	.20
ACH					.64+++	.67+++	.08	.49++	.42+	.71+++	.69+++	.56++	.54+++	.37++
BCA						.67+++	.24	.28	.60+++	.65+++	.60+++	.51++	--	--
VERB							.17	.19	.26	.53++	.49+	.44+	--	--
REAS								-.09	.09	.21	.17	.20	--	--
SPEED									.22	.43+	.27	.44+	--	--
MEM										.41+	.45+	.28	--	--
FSIQ											.82+++	.89+++	--	--
VIQ												.47+	--	--
PIQ													--	--
PS														.34++
SC														

+ P<.05
++ P<.01
+++ P<.001

Table 3

K-ABC Subtest Means, Standard Deviations, Minimums and Maximums for PP, LD, and Not Identified Groups

Variable	Mean	SD	Minimum-Maximum
Sequential			
Hand Movements			
Not identified	8.66	2.32	5-13
PP	9.40	2.03	5-13
LD	7.55	2.02	4-11
Number Recall			
Not identified	10.14	2.74	3-15
PP	9.68	2.38	6-16
LD	10.09	2.66	4-13
Word Order			
Not identified	10.00	2.78	4-15
PP	10.26	2.47	6-16
LD	9.46	2.42	5-13
Simultaneous			
Gestalt Closure			
Not identified	10.10	2.70	4-17
PP	10.95	2.78	5-16
LD	11.73	3.26	7-17
Triangles			
Not identified	10.24	2.56	4-16
PP	9.34	2.58	4-14
LD	11.73	2.41	8-16
Matrix Analogies			
Not identified	10.35	2.33	6-17
PP	9.58	1.86	6-16
LD	10.91	2.66	7-15
Spatial Memory			
Not identified	9.79	2.47	5-18
PP	10.50	1.64	6-15
LD	9.82	1.47	7-12
Photo Series			
Not identified	10.41	2.04	4-14
PP	9.58	1.57	4-12
LD	10.00	2.32	6-14

Table 3 continued

Variable	Mean	SD	Minimum-Maximum
Achievement			
Faces & Places			
Not identified	96.76	10.47	75-115
PP	95.18	7.06	81-110
LD	97.82	14.75	76-122
Arithmetic			
Not identified	99.62	12.20	76-127
PP	97.40	8.51	72-122
LD	95.27	15.79	72-123
Riddles			
Not identified	98.52	8.58	85-117
PP	97.37	9.55	81-117
LD	105.00	12.30	85-128
Reading/Decoding			
Not identified	98.35	9.50	81-120
PP	97.68	8.93	81-120
LD	87.91	7.81	77-100
Reading/Undstding			
Not identified	97.25	10.56	80-122
PP	93.71	9.46	78-116
LD	89.73	12.15	70-104