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ABSTRACT

Two alternative models for identifying kindergarten children with a high risk of becoming reading failures were compared in this study. One model places primary emphasis on psychometric test procedures assessing linguistic and perceptual-motor skills related to reading readiness. The alternative strategy is based upon the kindergarten teacher's evaluation of the child's skills and behavior, with particular emphasis on the discrepancy between a child's specific competencies and those required for success in a particular first-grade classroom. Significant and encouraging correlations were obtained between the various measures taken in kindergarten and reading achievement test scores obtained at the end of first grade. (Author/WR)

Abstract

Early Identification of Children with High Risk of Reading Failure

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Two alternative models for identifying kindergarten age children with a high risk of becoming reading failures are compared. One model places primary emphasis on psychometric test procedures assessing linguistic and perceptual-motor skills related to reading readiness. The alternative strategy is based upon the kindergarten teacher's evaluation of the child's skills and behavior, with particular emphasis on the discrepancy between a child's specific competencies and those required for success in a particular first grade classroom. Significant and encouraging correlations were obtained between the various measures taken in kindergarten and reading achievement test scores obtained at the end of first grade.

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EARLY IDENTIFICATION OF CHILDREN WITH HIGH RISK OF READING FAILURE

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Previous research efforts to develop an effective predictive index of reading failure have placed emphasis on the use of psychometric test procedures assessing a delimited set of linguistic and perceptual-motor skills. The present investigation evaluates and contrasts the major psychometric predictive index developed by de Hirsch and her colleagues (1966) with that of an alternative strategy we have developed to assess the impact of a broader range of key variables which interact in shaping school success and failure (Adelman and Feshbach, 1971).

The alternative model proposed entails several inter-related components. The predictive efficiency of each of these components and of meaningful combinations generated by our overall strategy, can be separately evaluated and compared with that of more standard psychometric procedures such as the de Hirsch battery. The key component is a behavioral analysis made by the kindergarten teacher of those cognitive, affective and social attributes of the child which, on a largely a priori basis, have been judged as relevant to success in various first grade reading programs. The kindergarten teachers' ratings of these behaviors constitutes the first step in our predictive sequence. The second step is an assessment of the first grade environment to which our kindergarten youngster is assigned. There are two modes of analysis which we intend

to make of the variations in first grade environments -- normative and interactive. The normative analysis attempts to identify characteristics of first grade environments which are correlated with reading achievement. However, although some teachers and some programs may prove to be more effective than others, there is still a great deal of variation in first grade environments that may be equivalent with regard to this overall success. Some children may thrive in a classroom in which others do poorly, while these same children may do poorly in a classroom in which others are successful. It is this interaction which we propose to analyze. In essence, the strategy involves an assessment of the discrepancy between a youngster's skills and behaviors as manifested in kindergarten and those required for success in a particular first grade classroom.

The uniqueness and strength of this approach lies in (1) the use of teacher observations and ratings to assess a broad range of children's behaviors over an extended period of time as contrasted to a single test session; (2) the similarity between the assessment and criterion settings; and (3) the effort to take into account variation among first grade programs and to deal with the interactions between these variations and specific competencies the child brings to a particular classroom.

Subjects and Procedures

During the spring of the first two years of the project, the kindergarten children in 10 middle class urban schools, 888 in Year I and 844 in Year II, were administered the Wechsler Preschool and Primary Scale of Intelligence (WPPSI), the Otis-Lennon group intelligence test and the de Hirsch predictive index of reading failure (de Hirsch, et al., 1966). Although the revised de Hirsch test battery consisted of 9 sub-

tests assessing linguistic and perceptual-motor skills, an additional three sub-tests from the original battery were included in the psychometric assessment. Also, measures of cognitive style were administered to subgroups in the sample.

During this same period, kindergarten teachers observed and then rated their pupils on an instrument developed by us, labeled the Student Rating Scale (SRS). This scale includes items dealing with the child's cognitive, affective and social functioning in the classroom. Each item is rated on a 1 to 5 scale, with the lower scores reflecting deficits, and the higher scores competencies, in the particular behavior being assessed. After revising and refining the instrument, 41 items were included in the final version. The instrument was then distributed to the 32 kindergarten teachers participating in the project, who were given an 8 week period in which to observe the indicated behaviors and skills and complete the instrument.

There are several ways in which the reliability of the instrument can be estimated. One of the more critical indices is rater reliability. An opportunity to assess rater reliability in a natural context was provided by four classrooms which were team taught by teachers who shared morning and afternoon kindergarten classes. The inter-rater correlation proved to be .81, a particularly impressive figure in view of the skewed nature of the ratings, most children receiving average item scores in the upper ranges, between 4 and 5.

During the 8 week time period in which the teachers were asked to observe the children systematically, they also filled out the Kohn Social Competence Scale, which is designed to measure the social and emotional functioning of the child. This scale has been shown to correlate with

other indices of psychopathology and, in addition, is related to the child's subsequent reading achievement. For the purposes of the present paper, the results obtained for the two factors of the Social Competence Scale: I) Interest-Participation vs. Apathy-Withdrawal and II) Cooperation-Compliance vs. Anger-Defiance -- are of particular interest.

Concurrent with the assessment of each kindergartener's behavior and cognitive functioning, an appraisal was made of the first grade environments. Observers, who were placed in the classroom, scored the frequency of specified interactions and, in addition, described particular classroom procedures. These data are still in the process of analysis. A second procedure entailed having each first grade teacher rate behavior and skill items which parallel those included in the Student Rating Scale. The first grade teachers rated how important specific skills and behaviors were to success in t. ir classrooms and how frequently such skills and behaviors were required. The data permit an analysis of both the normative and idiosyncratic aspects of behavioral and skill demands made by first grade teachers.

When the children who had been tested and rated in kindergarten were near the end of the first grade, a number of criterion measures were obtained. The key measures are standardized reading achievement tests - the Cooperative Primary Reading Tests and the Comprehension part of the Gates McGinitie Reading Test-Primary A, as well as a systematic behavior and skills evaluation of each child on the Student Rating Scale by the first grade teacher. Additional measures to be used as criterion data include a sample of the child's composition work using a standard topic, and an appraisal of performance in other academic areas. Comparable criterion data will also be obtained at the end of the second and third grades.

Results

The findings presented here are restricted to specific sets of data collected in connection with Year I's kindergarten sample. (The first grade criterion data on Year II's kindergarteners, who are intended as a replication sample, are still being collected.) We will be concerned with two types of information. The first pertains to the interrelationships among the various measures obtained on the kindergarten children, with a specific focus on the Student Rating Scale - its factorial structure and its shared variance with and independence of I.Q., the de Hirsch battery and the Kohn Scales. The second category of data bears on the predictive validity of the Student Rating Scale and the de Hirsch, recognizing the limitations of being restricted, for the present, to first grade performance criteria.

With regard to the Student Rating Scale, a factor analysis yielded five factors. These, in descending order of the amount of variance explained, were readily labeled as I) Impulse Control or Classroom Behavior, II) Verbal Ability and Language Development, III) Perceptual Discrimination, IV) Recall, and V) Perceptual-Motor skills. The intercorrelations of these factors with the other kindergarten sample variables are presented in Table 1. (For this purpose, a Z-score transformation of each child's factor score was made, based upon the child's relative position in his or her class.) Although the factors relate similarly to some variables -- such as Performance I.Q., Otis I.Q., de Hirsch scores, a number of interesting differences emerge which bear on the validity of the labels given to these factors. Compare, for example, Factor I, Impulse Control and Classroom Behavior, with Factor II, Language Development and Verbal Ability. The Verbal Factor correlates

more highly with Verbal I.Q. than does the Impulse Control factor, while the Impulse Control factor correlates more highly with the Cooperation vs. Defiance factor of the Kohn Scale. It is pertinent that Factor V, Perceptual-Motor skills, correlates more highly with Performance I.Q. and the Koppitz Scoring of the Bender Gestalt than do any of the other factors. While these correlations are far from sufficient to establish the validity of the factors, the results thus far are supportive. They suggest that the teachers ratings reflect more than a simple halo effect and indeed do discriminate among different components of the child's functioning.

Since the thrust of this report is in the comparison of the de Hirsch with the SRS scales, their respective intercorrelations are also of interest. As one might expect, Student Rating Scale scores are more highly correlated than are de Hirsch Scores with the Kohn Social Competence rating, both correlating more strongly with Interest-Withdrawal than with the Cooperation-Defiance factor. Their respective correlations with each other and with the Otis and WPPSI I.Q.'s are strikingly similar, ranging from .46 to .52.

With this information regarding some of the descriptive characteristics of our major predictive instruments, we now turn to an examination of the relationship of these variables with first grade performance criteria. The analyses of the behavioral evaluation data and of the composition samples are still in process, and consequently the presentation will be restricted to the First Grade Reading Achievement scores. The correlations of the Kindergarten measures with the Cooperative Primary Reading Test and the Gates MacGinitie Reading Achievement test raw scores and converted Grade Placement scores are presented in Table 2.

There are a number of observations of note in this table. First, because a child cannot get a grade placement less than 1.0, the Achievement test scores are markedly skewed in an upward direction. This is particularly the case for the Cooperative, on which fully 82% of the sample received a grade placement higher than 1.7, the school year and month in which the achievement tests were given. The distribution for the Gates was more normal, 70% obtaining a grade placement better than 1.7 on this measure. We suggest that the better discrimination which the Gates provides at the lower levels of reading achievement is the principal reason why the various kindergarten measures correlate more highly with the Gates than with the Cooperative Primary test.

A second methodological point that warrants comment are the stronger correlations obtained when Student Rating Scale Z scores rather than raw scores are used. In converting the raw Student Rating Scale scores to Z scores, based on within-class means and standard deviation, one is essentially equating the means for each of the 32 kindergarten classes. The loss in discrimination entailed by assuming equivalence between classes is more than balanced by the gain resulting from eliminating error variance due to teacher rating scale biases.

The correlations of the respective Student Rating Scale Factors with the Reading Achievement scores are fairly similar, with the exception of Factor III, Perceptual Discrimination, which correlates as highly with the criterion measures as does the total Student Rating Scale score. Although cross-validation is needed to confirm the suggested greater predictive validity of this factor, the finding is all the more striking when one considers that there are only four items that load on this perceptual discrimination factor. These items pertain to the child's

ability to discriminate letters and words visually and auditorily.

Comparing the SRS correlations and those of the other predictive indices with reading test scores, we find that respectable correlations are attained by the Student Rating Scale scores, the de Hirsch battery, the Koppitz Bender score, WPPSI I.Q., Otis I.Q., and Kohn Factor I. The lower but significant correlations found between sex and reading achievement, reflect the expected better performance by girls on the reading measures. The highest correlations obtained are with the total SRS (and SRS Factor III) scores, the de Hirsch battery running a close second. The largest difference between the Student Rating Scale and de Hirsch measure is in their correlations with the Gates raw score, although it must be noted that .60 is not significantly greater than .53.

There are several other bases for comparing the relative predictive efficiency of the Student Rating Scale and the de Hirsch battery. A stepwise multiple regression analysis was carried out such that the contribution of each of the predictive factors could be determined while accounting for both correlation with the criterion and independence from other predictor variables. The Student Rating Scale emerged consistently as the best single predictor while the de Hirsch battery and WPPSI I.Q. ranked second and third. Beginning with a .57 correlation with Gates grade placement, the addition of the de Hirsch raises the multiple R to .63 while adding I.Q. increases the multiple R to only .64. The multiple correlation when all predictor variables are used is .68, which is not very much greater than the Student Rating Scale r of .57.

In terms of the need to identify children who are potential reading failures for the purpose of early intervention, a more relevant datum than overall correlation is the efficiency in predicting those children

who, by virtue of their falling below a specific criterion, can be considered reading failures. Although first grade is too early a period in which to define reading failure in the clinical sense, it is useful to compare the Student Rating Scale and de Hirsch procedures in terms of their ability to identify children who achieve above and below some reading norm. For this purpose, we used a grade placement score of less than 1.7 as the defining criterion of "poor" reading performance, preferring this term to reading "failure." In addition, we eliminated from this analysis all children with an I.Q. below 90.

For the Student Rating Scale, we chose a Z score of -1.25 as the cutoff point in making our predictions of good and poor reading performance in first grade. For the de Hirsch, we used a previously established cutoff of less than 5 passed, of the 9 subtests, for predicting probable poor performance. These criteria included the bottom 10% on each measure. The efficiency of the Student Rating Scale and the de Hirsch in predicting the failure criterion can be examined in Table 3. Both are about 75% accurate in their predictions. However, they differ markedly in the types of errors made. With the de Hirsch, there are about twice as many false positives as when the Student Rating Scale is used. Although the proportion of false negatives with either predictor is relatively small, the absolute number of false negatives is quite large. There are clearly other factors that need to be taken into account if the numbers of false negatives are to be reduced. Variations in classroom experiences are undoubtedly among these factors. For example, initial analyses of these data reveal that first grade teachers ratings of the importance of the items in Factor 5, the Perceptual-Motor factor, correlate .39 with the mean scores obtained by their classes on the Cooperative

Achievement test and .43 with the Gates. In future analyses, we intend to examine in detail the interactions between a child's deficits as indicated on the kindergarten Student Rating Scale, and the demands and procedures which the child experiences in first grade.

For the present, we are encouraged by the finding that a kindergarten teacher's ratings can predict first grade reading achievement at least as efficiently as a psychometric battery that had been designed for this purpose. The results thus far indicate that the approach we have taken to the early identification of children who have a high rate of developing a reading difficulty is a fruitful one. However, we need to await the verdict of cross-validation and of our longitudinal follow-up of these youngsters' performance in the second and later grades.

References

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Table 1

INTERCORRELATIONS OF YEAR I KINDERGARTEN VARIABLES

	2.	3.	4.	5.	6.	7.	8.	9.	10.	11.	12.	13.	14.	15.	16.
1. SEX	-.10	-.04	.01	-.02	.04	.09	-.04	.13	.25	.27	.13	.15	.16	.23	.24
2. AGE		-.21	-.20	-.24	-.14	.15	-.20	-.11	-.09	-.05	-.08	-.03	-.04	-.02	-.05
3. VERBAL IQ (WPPSI)			.49	.87	.68	.41	-.23	.27	.01	.28	.43	.44	.36	.32	.41
4. PERF. IQ (WPPSI)				.86	.53	.40	-.42	.29	.10	.30	.37	.37	.36	.40	.40
5. FULL SCALE IQ (WPPSI)					.70	.46	-.38	.32	.06	.33	.47	.47	.42	.42	.47
6. OTIS IQ						.51	-.31	.34	.16	.42	.47	.50	.46	.44	.52
7. DE HIRSCH							-.43	.31	.19	.42	.44	.48	.43	.46	.51
8. KOPPITZ BENDER ERROR SCORE								-.18	-.06	-.27	-.27	-.30	-.29	-.38	-.34
9. KOHN FACTOR I (INTEREST VS. WITHDRAWAL)									.62	.48	.51	.40	.44	.35	.54
10. KOHN FACTOR II (COOPERATION VS. DEFIANCE)										.54	.20	.19	.27	.23	.41
11. Z-SRS FACTOR I (IMPULSE CONTROL)											.58	.61	.71	.62	.90
12. Z-SRS FACTOR II (LANGUAGE DEV.)												.69	.66	.57	.79
13. Z-SRS FACTOR III (PERCEPT. DISCRIM.)													.73	.68	.82
14. Z-SRS FACTOR IV (RECALL)														.64	.85
15. Z-SRS FACTOR V (PERCEPT'L-MOTOR)															.77
16. Z-SRS TOTAL															

N = 587

$r_{.05} = .09$

$r_{.01} = .12$

Table 2

CORRELATION OF MAJOR KINDERGARTEN VARIABLES WITH

FIRST GRADE READING TEST SCORES - YEAR I SAMPLE

	COOPERATIVE PRIMARY		GATES MacGINITIE	
	Raw Score	Grade Placement	Raw Score	Grade Placement
Sex	.17	.15	.23	.23
Age	.11	.11	.05	.07
WPPSI Verbal IQ	.40	.40	.44	.43
WPPSI Perf. IQ	.29	.26	.38	.37
WPPSI Full Scale IQ	.39	.37	.47	.46
Otis (group) IQ	.45	.42	.50	.47
de Hirsch	.47	.44	.53	.52
Koppitz Bender Error Score	-.29	-.26	-.33	-.33
Kohn Factor I (Interest)	.28	.26	.41	.3
Kohn Factor II (Cooperation)	.12	.13	.23	.21
SRS Factor I	.32	.30	.44	.42
" Z-score	.37	.35	.47	.45
SRS Factor II	.35	.32	.42	.40
" Z-score	.41	.38	.50	.46
SRS Factor III	.43	.39	.55	.52
" Z-score	.51	.48	.60	.57
SRS Factor IV	.31	.28	.42	.40
" Z-score	.41	.39	.52	.49
SRS Factor V	.35	.31	.41	.41
" Z-score	.45	.42	.50	.48
SRS Total	.41	.39	.53	.51
" Z-score	.50	.47	.60	.57

N = 433

$r_{.05}$ = .10

$r_{.05}$ = .13

Z-scores are based on within-class mean and s.d.

Table 3

PREDICTION OF READING PERFORMANCE ON GATES-MacGINITIE

READING TEST USING S.R.S. AND DE HIRSCH

A. S.R.S. Alone: Predicted poor reader if average item score on S.R.S. is 1.25 standard deviations below classroom mean. (bottom 11%)

GATES*	poor (S.R.S. -1.25)	good
good	11 (17%)	395 (76%)
poor	54 (83%)	125 (24%)

HITS: 449 (77%)

MISSES: 136 (23%)

N: 585

B. de Hirsch Alone: Predicted poor reader if 4 or fewer tests passed. (bottom 13%)

False pos.?

GATES*	poor (de Hirsch 4)	good
good	28 (39%)	374 (75%)
poor	44 (61%)	126 (25%)

HITS: 418 (72%)

MISSES: 154 (27%)

N: 572

C. Joint Prediction: Predicted poor reader if both of above criteria are met (bottom 6%)

GATES*	poor (S.R.S. -1.25 and de Hirsch 4)	good
good	5 (15%)	396 (74%)
poor	28 (85%)	142 (26%)

HITS: 424 (74%)

MISSES: 147 (26%)

N: 571

*Criterion for poor performance on Gates: grade placement score of 1.7 or below.