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ABSTRACT

Evaluated were variables effecting the differential performance of 627 educable mentally retarded Ss (mean age 14.5 years) on a test-train-retest task designed to measure learning potential. Family, social, health, schooling, and testing data were collected for the Ss of which 75% were students in public school special classes and 25% were residents of state institutions for the retarded. The test designs of the Kohs Block Designs were administered individually three times: prior to coaching, 1 day following, and 1 month following coaching. Findings indicated that the learning potential procedure resulted in a stable assessment of ability to reason (as seen in the high correlation between immediate posttest and delayed posttest), that 23% of the variance in the delayed posttest was uniquely predicted by training, that the training procedure did not elicit systematic differences in scores from children of different racial and social class backgrounds, that the nonverbal block designs permitted some students from poor language backgrounds to demonstrate ability to reason, and that greater than expected effects of training were demonstrated by children from large families, Southern-born blacks, and foreign-born children. (DB)

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STUDIES IN LEARNING POTENTIAL

DEMOGRAPHIC AND PSYCHOMETRIC FACTORS RELATED TO IMPROVED PERFORMANCE ON THE KOHS LEARNING POTENTIAL PROCEDURE

By

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Demographic and Psychometric Factors Related to Improved Performance on the Kohs Learning Potential Procedure[1]

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Budoff and his associates (1964, 1967, 1969, 1971) have demonstrated the relevance of a cognitive training based assessment strategy supplementary to the traditional intelligence test, which seeks to determine ability to reason through use of a nonverbal reasoning problem (Kohs Block Designs). In learning potential (LP) assessment, a child is seen for a pretest session, followed by a period of individual or group tuition which teaches principles relevant to solution of the problems. The child is posttested following tuition. Learning potential assessment provides the severely school-failing child with an opportunity to learn principles relevant to solution of the reasoning problems in a supportive context. The posttest permits the subject to demonstrate whether he has profited from the training by comparison with his pretest score. Learning potential is thus defined operationally, as demonstrated ability to profit from the learning experience. This contrasts with traditional definitions of intelligence which determine the abstractions, facts, and problem-solving skills expressed spontaneously by the child in a right-wrong context. For low IQ students, with serious academic difficulties the hypothesis is that the child who demonstrates increased competence following training on the reasoning task is more able than the low IQ score indicates. The nongainer is hypothesized to be functionally more generally at the level of his attained low IQ score.

Support for the foregoing hypothesis has been provided by studies of the relationship between Kohs learning potential status and motivational variables (Harrison, Singer, Budoff, & Folman, 1972; Harrison & Budoff, 1972; Mankinen, 1971; Pines & Budoff, 1970; and Budoff & Pagell, 1968). These studies indicate that the attitudes and/or performances of the LP-designated, more able special class students approximate the pattern expected of higher IQ students. On the other hand, those who had failed to profit from learning potential training expressed attitudes or performed in a manner consonant with descriptions of retarded children. Budoff, Meskin, & Harrison (1971) showed that the more able special class students by the learning potential criterion performed as adequately as low school achieving, regular class children (with higher IQs) following involvement in an electricity course which empirically taught simple principles of electricity and nonverbally tested their ability to apply them. The non-gainers following instruction on the learning potential task and the electricity course operationally defined themselves as mentally retarded since they did not profit markedly from either set of experiences. Interviews regarding vocational plans (Folman & Budoff, 1971) and attitudes toward school (Folman & Budoff, 1972) also indicated a similarity of views of the high scoring (LP) special class students and low achieving higher IQ peers of the same chronological age. Hausman (1972) has demonstrated the utility of the learning potential approach with Mexican-Americans placed in special classes for the mentally retarded.

The purpose of the present study was to examine demographic and psychometric factors related to an improved posttest performance by psychometrically defined educable mentally retarded (EMR) adolescents, after training was provided. By using multiple regression techniques to partition the variance of the posttraining scores, the investigators sought to determine the factors that accounted for the significant portions of this variance.

Method

Subjects.

The sample consisted of 627 EMRs from nine cities and towns in Massachusetts. Seventy-five percent (N = 471) were students in segregated special classes in public schools. Most of the remainder (N = 134) were residents of state institutions for the retarded; 22 were participants in a community workshop. The subjects ranged in age from eight to forty years, with a mean of 14.55 years (SD = 2.75) at the time of initial testing. Fifty-nine percent were males, 38% were white, and 79% had fathers who were manual laborers or menial service workers. Stanford-Binet IQ scores ranged from 65 to 98, with a mean of 68.81 and standard deviation of 10.26.

Data collection procedures.

Data on the following variables were collected from school or institutional records: place and date of birth, father's occupation, race, family size and degree of intactness, number of diseases, age at entry into special class, and WISC and Stanford-Binet IQs.

Raven's Progressive Matrices were group administered by project staff. Sets A, A_B, and B were first administered in the colored format (Raven, 1956), followed by Sets C, D, and E in the 1958 form. Total raw score for Sets A, B, C, D, and E was used in the analysis. When an individual IQ score was not available within two years of the Kohs learning potential assessment, school or project staff tested the S individually.

Kohs learning potential measure was administered individually to each subject. The materials consisted of a test series of 16 of the original Kohs Block Designs (Kohs, 1923), including five designs with 16 blocks. The designs were arranged in order of increasing difficulty. Design 7 from the Wechsler Adult Intelligence Scale was added. The designs were printed on 5" x 6" white cards to double the scale of the original Kohs designs so that the stimulus designs and the block constructions were equivalent in size. A design of four blocks was drawn as a two-inch square; one of nine blocks as a three-inch square; one of the 16 blocks as a four-inch square. The four colors, i.e., red, white, blue, and yellow were retained. The usual one-inch cubes were used as the blocks. The five coaching designs consisted of three four-block designs (C from WISC; 3 and 7 from the Kohs series) and two nine-block designs (5 from the WISC and 8 from the WAIS). The coaching designs were printed in the same format and dimensions as the test designs.

The sixteen test designs were administered individually three times: prior to coaching, and then one day and again one month following coaching. Kohs' instructions for administering the block design test were used at each test session (Kohs, 1923). A sample problem was demonstrated by the examiner. The child had to construct it correctly before the remainder of items were presented. Testing was discontinued after three successive failures. Budoff and Friedman (1964) present additional details on the procedure.

Data analysis.

Preliminary analysis included means and standard deviations of continuous variables (Table 1), frequency distributions of discrete variables, and an intercorrelation matrix of all variables, part of which is presented in Table 2. This matrix was then used in a multiple regression procedure employing the least squares solution.

A number of stepwise multiple regression analyses were performed against four main dependent variables: Stanford-Binet IQ, pretraining score (K1), immediate posttraining score (K2) corrected by pretraining score, and delayed posttraining score (K3) corrected by the two prior Kohs scores. Major background predictors were evaluated both for their simple relationships to these four dependent variables and for their unique contributions to the variance of the dependent variables.

Simple relationships between predictors and criteria were described by zero-order correlation coefficients. In order to test the unique contributions of predictors, the set of independent variables in question (e.g., all of the age-related variables) were forced into the regression equation after all of the other variables had been entered. From the remaining partials, one can infer each variable's unique contribution in predicting the dependent variable (see columns labeled "all variables partialled out" in Table 3).

In specific instances, other regression analyses with selected independent variables and immediate (K2) or delayed (K3) posttraining scores as the dependent variable were carried out to answer certain questions, particularly about race and social class, in a more precise way.

Improvement immediately after training and beyond was assessed by residualized posttraining scores, rather than by simple gain (i.e., posttest score minus pretest score). The multiple regression technique was considered preferable to the use of a gain score because of the unreliability inherent in a score derived from the subtraction of pretest from posttest scores (Cronbach, 1970). In the multiple regression context, the gain for each subject can be thought of as the difference between his actual score and his predicted score as calculated from the regression weights of a given equation.

Sets of independent variables in the equations included chronological age, race (Black and Caucasian), social class, sex, birthplace, family size (number of children) and intactness, number of diseases, and scores on various psychometric measures. Turner's classification (Turner, 1964) was used as the measure of social class. Variables whose distributions were extremely positively skewed (father present in home, mother present in home, number of diseases) were converted to logarithmic scales.

Missing data were handled by the procedure outlined by Cohen (1968). Subjects whose scores on a variable were missing were given a score equal to the mean for that variable. A new dichotomous variable was created for each variable on which many subjects had missing scores; these missing data variables were scored as 0 or 1, indicating the presence of absence of information for a subject.

All analyses were performed an an IBM 370/155 computer at the joint Harvard-MIT facility, with the use of programs in the SPSS software language (Nie, Bent, & Hull, 1970).

Results

Table 1 shows that the mean scores (i.e., the number of correct designs) on the pretest (K1), immediate posttest (K2), and delayed posttest (K3) were 3.06, 5.56, and 5.97 (SDs--2.67, 3.84, and 4.02), respectively. It was thought that there might be a large increment immediately following tuition, but that this increment might be reduced considerably after an interval of one month to about midway between pretest and immediate post-test score. The negligible difference between means on the immediate and delayed posttests, however, showed that this reduction did not occur, in fact the trend is toward further increase.

Insert Table 1 about here

Table 2 presents the intercorrelation coefficients among several of the variables. The correlation of .74 between the pretest and immediate posttest on the block designs indicated that those Ss who solved some designs successfully initially did tend to solve more designs following coaching than those who solved few or no designs on the pretest. A similar correlation was obtained between the pretest and the delayed posttest (K3) ($r = .74$). The relationship between scores on the two posttests was even higher($r = .87$), indicating that subjects who did well on the immediate posttest also did well on the delayed posttest, and vice-versa.

Insert Table 2 about here

Other significant intercorrelation coefficients ($p < .05$) among the variables in Table 2 indicated the following relationships:

1) Members of the sample who were institutionalized were significantly older ($r_{pbi} = -.36$), were more often female ($r_{\emptyset} = .37$), and had lower Stanford-Binet IQ scores ($r_{pbi} = .47$) than students in special classes.

2) Members of the sample with intact families were younger ($r = -.31$), had spent fewer years in special class ($r = -.31$), tended to be males ($r_{pbi} = .14$), born in the Northeast ($r_{pbi} = .36$), and had higher Stanford-Binet IQ scores ($r = .42$) than the older subjects.

3) Students with the highest Stanford-Binet IQs were younger ($r = -.36$), not as likely to be institutionalized ($r_{pbi} = .47$),

tended to be born in the Northeast (r_{pbi} = .22) and to have intact families (r = .42).

4) The high positive relationships among scores on the Kohs, Stanford-Binet, WISC Performance IQ, and Raven Progressive Matrices (.28 $<r<$ .45) indicated that these tests are measuring much of the same ability. The lower magnitude of correlations between these tests and WISC Verbal IQ suggest that this Kohs-Raven ability has a more nonverbal than verbal component.

Table 3 indicates the zero-order correlations of Stanford-Binet IQ and pretraining (K1) block design scores with the independent variables, as well as the partial correlation coefficients for these sets of variables after the effects of all other variables have been partialled out. Immediate posttraining (K2) block design scores were adjusted for pretest levels ($r_{K2.K1}$),

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Insert Table 3 about here

Variables significantly related to the Stanford-Binet IQ can be contrasted with those significantly related to the Kohs by comparing the zero-order correlation coefficients of Stanford-Binet IQ and pretraining Kohs scores (K1). The Stanford-Binet score was more highly related to age, non-institutionaization, family intactness, birthplace, and WISC Verbal IQ than were the pretraining Kohs (K1) scores. K1 was significantly correlated with sex, non-institutionalization, family intactness, Stanford-Binet IQ, both WISC scores, and the Raven score. The multiple r with all predictors included was .72 for the Stanford-Binet and

.57 for K1.

Variables related to immediate effects of training on the Kohs can be seen in the r_{K2} column labeled "K1 partialled out." These variables were age (negative), sex, family size and intactness, birthplace, number of diseases (negative), Stanford-Binet IQ, WISC Performance IQ and Raven score. Variables related to continuing improvement in Kohs performance after the immediate posttest (r_{K3} with K1 and K2 partialled out) were family intactness, WISC Performance IQ, and particularly the Raven score.

Relationships between the sets of independent variables and the dependent variables showed the following results:

Age.

Age was negatively related to Stanford-Binet IQ because the adults who were in the institutions and sheltered workshops had lower IQs than the younger students who were in community EMR classes. Although the zero order correlation between age and Kohs pretest was not significant, older children and children placed later in special classes scored higher on the pretest when all other variables were held constant. Younger children seemed to have benefited immediately from training (i.e., $r_{K2.K1}$). However, the effect of age disappeared when the remaining independent variables were partialled out of the immediate retest score, and age was not related to continuing improvement after training (K3.K2.K1). The number of years in special class was not related to performance on any of the Kohs tests, but was significantly negatively related to the Stanford-Binet as evidenced by the zero order correlation.

Sex.

Boys scored higher than girls on the Stanford-Binet as shown in the zero order correlation, but not when other variables were partialled out. Boys scored higher than girls on the Kohs pretest and improved more from instruction as measured by the immediate posttest, with or without the effects of the other variables partialled out. There was no difference between boys and girls, however, in long-term effects of training on the Kohs, as evidenced by the partial correlation coefficients between sex and K3.

Race and social class.

Race was not related to the Kohs pretest or to either posttest score adjusted by previous Kohs scores. While the zero order correlation between social class and Kohs pretest was not significant, there was a negative relationship between social class and pretest score when all other variables were partialled out.

Partial r's of race and social class on immediate (K2) and delayed (K3) posttraining scores, with all other variables held constant, were not tested because of the absence of significant findings for these two variables in analyses involving specific hypotheses. These hypotheses were tested by using race, social class, sex, age at pretest, and pretest scores as independent variables in two multiple regression equations where the immediate posttest (K2) and delayed posttest (K3) were dependent variables.

The unique variance contributed by race and social class was not significant. Regression equations testing the contribution of these two variables using other combinations of independent variables also yielded no significant results.

Family size and intactness.

Family size was not related to Stanford-Binet score. Even though family size did not correlate significantly with K1, children from large families appeared to profit more from Kohs training, as shown by both partial correlation coefficients of the family size variable with K2. This relationship disappeared when long-term improvement (K3) was considered.

Children from intact families scored higher on the Stanford-Binet than children from broken homes, as shown by both the zero order and partial r. Although family intactness rating was related to both Kohs posttest scores adjusted by previous Kohs scores, none of the family intactness set of variables showed a significant relationship to any Kohs score when all other variables were partialled out.

Birthplace.

When pretest score alone was partialled out, children born in the Northeast and foreign-born children appeared to perform better immediately following training. When the unique contribution of birthplace is considered, however, children born in the Northeast benefited less from the Kohs training procedure, while foreign-born children profited more. There was no significant additional relationship between birthplace and longer term continuing effects of the Kohs training.

Number of diseases.

Children with a higher incidence of illness performed less well than healthy children on the immediate Kohs retest, as shown by the partial r with only pretest score held constant. This relationship disappeared when all other variables were partialled out.

Verbal and performance IQ.

Although the zero order correlation between WISC Verbal IQ and K1 was significant, verbal IQ as measured by the WISC did not play a part in performance on any Kohs score when either previous Kohs scores or all other variables were held constant. A high Stanford-Binet score was uniquely related to immediate effects of training on the Kohs but not to continuing effects of training over time. Performance IQ, whether measured by the WISC or Raven Progressive Matrices score, was significantly and uniquely related to initial Kohs scores and to both short and long term improvement on the Kohs.

Overall partitioning of variance on Kohs posttest.

All 33 independent variables, when entered into a stepwise multiple regression equation, predicted 66% of the variance of the immediate Kohs posttest score, with 55% of this variance accounted for by the Kohs pretest alone. The remaining 11% was predicted mainly by Stanford-Binet IQ, number of children in the family, Raven Matrices score, foreign birth, WISC Performance IQ, sex, and age of first placement in special class. All of these predictors had significant positive beta weights with the exception of age at special class placement; the beta weight for this last variable was significant and negative.

These same 33 variables, along with the immediate post-training score, accounted for 82% of the variance of the delayed posttest score. The immediate posttest predicted 76% with the other 6% accounted for mainly by the pretest, Raven, and WISC Performance scores, all of which had significant positive beta weights. Twenty-three percent of the variance in the delayed retest scores was uniquely predicted by scores immediately after training.

Discussion

Stability of Assessment.

The learning potential procedure results in a stable assessment of ability to reason in solving the block designs. The correlation of .87 between immediate posttest and delayed post-training scores indicates that performance following training yields a very stable measure.

The correlation between immediate and delayed posttraining scores, holding pretraining scores constant, indicated that 23% of the variance in the delayed posttest was uniquely predicted by training. Correlations of .953 between immediate and delayed retest (one month interval) and .866 six months after coaching have been obtained with smaller samples (Budoff & Friedman, 1964; Budoff, 1967), lending support to the finding of the present study that the distribution of block design scores remains stable after one retest. A small sample of community special class, school-age students yielded correlations of similar magnitude.

It was not possible to assess the test-retest reliability without training in this study since intervention occurred with all subjects in the sample. However, a correlation of .701 between pretest and immediate posttest scores was computed from the scores of a non-coached sample of EMR institutionalized subjects who had served as controls in the initial studies (Budoff & Friedman, 1964; Budoff, 1967).

Implications of a training-based model of assessment of ability.

Within the limits of this sample, the training procedure did not elicit systematic differences in scores from children of different racial and social class backgrounds. When continuing effects of training are considered, the Kohs procedures are not differentially affected by age or sex as well. The negative correlation of Kohs pretest scores and socio-economic status indicates that when middle class children appeared in the sample, they were likely to be organically brain damaged. Non-organically-damaged school age children who are diagnosed as educable mentally retarded come from poor and/or nonwhite populations. The most critical criterion used is the IQ score, most usually on an individually administered test of intelligence. The negative correlation could also be an artifact of the low and narrow range of socio-economic status represented by this sample.

The zero order correlations of the independent variables with the Stanford-Binet IQ scores indicated that for this sample higher scores were associated with more, rather than less, advantaged social backgrounds and school settings, and with other psychometric measures.

Scores on the pretraining administration of the Kohs block designs, which can be viewed as a measure analogous to the traditional IQ format (i.e., the child is expected to respond to the problems on the basis of what he knows or can spontaneously figure out), show a similar pattern of relationships. However, the shift to the nonverbal block designs permitted some students from poor and/or minority group backgrounds who attained low scores on the verbally biased IQ tests e.g., foreign born students, to demonstrate their ability to reason when facility in the English language was not critical.

Scores on the immediate post training administration of the block designs, when adjusted for pretraining levels and the effects of the other independent variables, indicate the power of an assessment procedure based on a training model. Greater than expected effects of training were demonstrated by children from large families, non-Northeast born children (largely Southern-born blacks), and foreign-born children. The bias in performance against the institutionalized child is not evident, and the effect of sex that remains is probably due to the more deviant functioning level of girls lilely to be included in a mentally retarded population. The relationship to Stanford-Binet scores is lower, though still significant, and Wechsler verbal IQs are no longer related to posttraining performance.

Delayed posttraining scores adjusted for pre- and immediate posttraining scores continued to be related only to the performance measures, i.e., Wechsler performance IQ and Raven Matrices scores. The patterns of "disadvantage" most clearly evident in the relationships of the demographic variables to Stanford-Binet IQ, and to a lesser extent, to the pretraining block design score are no longer evident when the effects of the independent variables are partialled out of the adjusted delayed posttraining scores.

The finding that a high performance IQ was highly positively related to performance on the Kohs after training is consistent with the learning potential theory that response to training on nonverbal reasoning problems is related to performance test skills. At the same time, the assumption underlying learning potential assessment that verbal skills are unrelated to ability demonstrated after a training opportunity on a nonverbal reasoning task, when the effects of all other variables are considered, was supported by the low partial correlation coefficients involving WISC Verbal IQ. This assumption was further buttressed by the increasingly attenuated relationship of Stanford-Binet IQ with the Kohs scores following training.

Parent and community groups are now exerting great pressure against the use of group and individual IQ tests as estimates of intelligence with minority group children. Traditional IQ tests are described as discriminatory for these children, because scores depend on verbal knowledge and styles of problem solving which may be culturally different than those available within lower class and minority group communities. The training-based model of assessment of reasoning ability, or assessment of learning potential, appears to have validity as an alternate, non-biased measure with poor, low school-achieving populations. The challenge, at present, is to translate this evidence of ability to profit from reasoning experience into more salutary formal achievements in school, in occupational training programs, or in careers.

References

Budoff, M. Learning potential among institutionalized young adult retardates. American Journal of Mental Deficiency, 1967, 72, 404-411.

Budoff, M. Learning potential: A supplementary procedure for assessing the ability to reason. Seminars in Psychiatry, 1969, 1, 278-290.

Budoff, M., & Friedman, M. "Learning potential" as an assessment approach to the adolescent mentally retarded. Journal of Consulting Psychology, 1964, 28, 434-439.

Budoff, M., Meskin, J., & Harrison, R. H. Educational test of the learning-potential hypothesis. American Journal of Mental Deficiency, 1971, 76, 159-169.

Budoff, M., & Pagell, W. Learning potential and rigidity in the adolescent mentally retarded. Journal of Abnormal Psychology, 1968, 73, 479-486.

Cohen, J. Multiple regression as a general data-analytic system. Psychological Bulletin, 1968, 70, 426-443.

Cronbach, L. J., & Furby, L. How should we measure "change"--or should we? Psychological Bulletin, 1970, 74, 68-

Folman, R., & Budoff, M. Learning potential and vocational aspirations of retarded adolescents. Exceptional Children, 1971, 38, 121-130.

Folman, R., & Budoff, M. Attitudes toward school of special and regular class adolescents. Studies in Learning Potential, 1971, 2, 32.

Harrison, R. H., & Budoff, M. Demographic, historical, and ability correlates of the Laurelton Self-Concept Scale in an EMR sample. American Journal of Mental Deficiency, 1972, 76, 460-480.

Harrison, R. H., Singer, J., Budoff, M., & Folman, R. Level of aspiration as a function of Learning Potential status in the educable mentally retarded. Psychological Reports, 1972, 30, 47-57.

Hausman, R. Unpublished doctoral dissertation, George Peabody College, 1972.

Kohs, S. C. Intelligence measurement. New York: MacMillan, 1923.

Mankinen, R. Learning potential status and verbal mediation training with EMR students. Studies in Learning Potential, 1972 2, 29.

Nie, N. H., Bent, D. H., & Hull, C. H. Statistical package for the social sciences. New York: McGraw-Hill Book Company, 1970.

Pines, A., & Budoff, M. Studies in personality correlates of learning potential status in adolescent EMRs: Reaction to frustration and self-peer evaluation. Studies in Learning Potential, 1970, 1, 16.

Raven, J. C. Coloured progressive matrices: Sets A, A_B, B. London: H. K. Lewis & Co., Ltd., 1956.

Turner, R. H. Social context of ambition: A study of high school seniors in Los Angeles. San Francisco: Chandler Publications, 1964.

Footnotes

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Table 1

Means and Standard Deviations of Continuous Variables

Used in Multiple Regression (N = 627)

Variable	Mean	Standard Deviation
Age at K1	175.1419	35.2553
Age in special class	11.2056	2.9175
Years in special class	3.9697	2.1798
Social class	2.6118	1.1411
Family intactness	3.5767	3.0896
No. of diseases (log)	0.0275	0.0950
S-B IQ	68.8341	9.4663
WISC verbal	70.9713	6.1199
WISC performance	74.8836	9.5859
Raven score	25.0032	6.1869
K1	3.0590	2.6724
K2	5.5582	3.8391
K3	5.9707	4.0237

Table 2

Pearson Product-Moment Correlation Coefficients among Selected Variables

Variable[a]	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Age at K1													
2. Years in special class	.13**												
3. Sex (1 = F, 2 = M)	-.20**	-.03											
4. Institionalized (1 = yes, 2 = no)	-.36**	-.33**	.12**										
5. Born in Northeast (1 = no, 2 = yes)	-.22**	-.10*	.04	.37**									
6. Family intactness (high = intact)	-.31**	-.31**	.13**	.92**	.36**								
7. Family size	-.05	-.03	.01	-.03	.11**	-.02							
8. S-B IQ	-.36**	-.15**	.12**	.47**	.22**	.42**	-.02						
9. WISC Verbal IQ	-.05	-.07	.11**	.13**	.08*	.10*	-.06	.40**					
10. WISC Performance IQ	-.14**	-.05	.08*	.06	.03	.06	.03	.36**	.49**				
11. Raven score	-.03	-.03	-.07	.13**	.06	.12**	.01	.25**	.12**	.28**			
12. K1	.06	-.03	.16**	.10*	.02	.08*	.04	.31**	.15**	.38**	.35**		
13. K2	-.06	-.02	.18**	.14**	.07	.15**	.15**	.37**	.15**	.40**	.40**	.74**	
14. K3	-.06	-.03	.17**	.18**	.06	.16**	.09*	.35**	.16**	.45**	.43**	.74**	.87**

[a] N = 627 for all variables except K3, where N = 409.

*$p < .05$
**$p < .01$

Table 3

Partial Correlation Coefficients of Variables Predicting Stanford-Binet IQ, K1, K2, and K3

Variable Set	Variables Included	r_{SBIQ} zero order	r_{SBIQ} all variables partialled out	r_{K1} zero order	r_{K1} all variables partialled out	r_{K2} K1 partialled out	r_{K2} all variables partialled out	r_{K3} K1 and K2 partialled out	r_{K3} all variable partiall out
Age	Age at K1	-.402**	-.205**	.058	.248**	-.160**	.039	-.033	-.075
	Age first in special class	-.150**	-.091*	.014	.110*	-.170**	-.046	.019	-.031
	Years in special class	-.154**	-.010	-.029	-.003	.004	.031	-.061	-.011
Sex (1 = female, 2 = male)		.133**	-.027	.163**	.183**	.093*	.091*	.015	.050
Race (1 = white, 2 = black)		.086	.006	.026	.019	.045	not tested	-.055	not tested
Social class (1 = low, 9 = high)		-.009	.009	-.078	-.082*	.044	not tested	.058	not tested
Family size		-.024	-.030	.041	.033	.182**	.170**	-.025	-.002
Family intactness	Institutionalized (1 = yes, 2 = no)	.499**	.207**	.099*	-.009	.104*	-.074	.083	.075
	Father in home (1 = yes, 2 = no)	-.033	.072	-.001	.033	-.078	-.028	-.073	-.071
	Mother in home (1 = yes, 2 = no)	-.057	-.007	-.020	.017	-.078	-.022	-.038	-.038

Table 3 (continued)

Variable Set	Variables Included	r_{SBIQ}		r_{K1}		r_{K2}		r_{K3}	
		zero order	all variables partialled out	zero order	all variables partialled out	K1 partialled out	all variables partialled out	K1 and K2 partialled out	all variables partialled out
	Intactness rating (1 = low, 9 = high)	.449**	.161**	.080*	.016	.129**	-.027	.116*	.076
Birthplace	Born in Northeast (1 = no, 2 = yes)	.236**	.003	.021	.003	.086*	-.084*	.007	.096
	Born in other U.S. (1 = no, 2 = yes)	.032	-.035	-.021	-.014	.000	-.023	-.081	-.040
	Foreign born (1 = no, 2 = yes)	.105*	.032	.024	.011	.169**	.148**	.070	-.093
Number of diseases		-.033	-.016	-.049	-.004	-.114*	-.053	.056	.005
Verbal IQ	Stanford-Binet IQ	---	---	.303**	.179**	.225**	.100*	.068	-.014
	WISC verbal IQ	.436**	.287**	.147**	-.076	.059	-.029	.059	-.010
Performance IQ	Raven score	.260**	.136**	.351**	.304**	.221**	.229**	.228**	.201**
	WISC performance IQ	.380**	.086*	.379**	.336**	.186**	.141**	.173**	.152**
N		535	535	627	627	627	627	409	409

*$p < .05$

**$p < .01$