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ABSTRACT

Described in this symposium report are results from three studies exploring the relationship of home environments in infancy or early childhood to school performance. All studies used the Home Observation for Measurement of the Environment (HOME) and drew their data from the files of the Houston Parent-Child Development Center, a 2-year parent/child education program for low-income Mexican-American families. The first study examined the relationship between the child's HOME scores at age 3 to his or her general school performance. The second study investigated the relationship of the child's HOME scores at age 1 to later grade retention, while the third study dealt with the relationship of HOME scores gathered at ages 1, 2, and 3 to school measures conducted in first and second grades. In the first two studies HOME scores were found to be poor predictors of grade retention and only fair predictors of school achievement test results. The third study, however, found HOME scores to be strong predictors of school performance, especially for children 2 years of age. (MP)

Early Home Environment Prediction of School Performance

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Symposium

Environmental Influence on the Development of High Risk Children

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Early Home Environment Prediction of School Performance

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This is a progress report on work we are doing in Houston on the early identification of children with learning problems and on our general interest in the relationship of early experience to later development. The research is an off-shoot of the evaluation of the Houston Parent-Child Development Center (PCDC), a two year, parent-child education program for low income Mexican-American families.

Children in the project were "at risk" in the sense that they were of very low family income and were linguistic and ethnic minorities. When we began the PCDC project in 1969, only 10% of Mexican-American children who began first grade in the Houston area completed high school. Although that figure is undoubtedly much higher today, many children still do not complete secondary school. In other respects, they were not necessarily at risk; most were of normal birth weight, etc.

The concern for the early identification of children who will later have learning problems was spurred by federal legislation in the form of the Handicapped Children's Act, Public Law 91-230. This legislation required that children with handicapping conditions be identified and provided treatment or rehabilitation. The concern included identifying children who were not at the time handicapped, but were at risk for handicapping conditions. Gallagher and Bradley (1972) and Meier (1973) writing a decade ago have stated that valid screening procedures were not at that time available. They urged further research on the question.

It seems to me that what a prudent person would do is argue that it is unlikely that we should expect measures of the home environment taken at child age one to be able to predict school performance six and seven years later. Most of what we know about developmental psychology seems to support that position. There are too many sources of influence on the child through that time period to expect predictability. Home environments change, the child's response to various opportunity structures has an effect, limitations on the child, genetic and environmental, are also at play. School performance measures are subject to many influences quite apart from those affecting the home environment. And, at every point, there is measurement error. We should argue from this that the early identification of children who will have learning problems is not possible, that effective screening is impossible. Nevertheless, we should attempt to understand the impact of these forces and attempt to improve our ability to predict later development.

Research has examined the efficacy of using socioeconomic level, parental education and other status variables, measures of personal characteristics of the child as assessed by such tests as the Brazelton, Bayley and Binet, and more recently attention has turned to considerations of characteristics of the home environment.

Most of the work on the relationship of home environment to school performance has been done with school-age or late preschool children. Marjoribanks (1979) has written a lucid and comprehensive review of this work. He found many strong relationships between home environment and school measures.

It appears that very little has been done in exploring the relationship of home environments in infancy or early childhood to school competence.

One study, by Van Doorninck, Caldwell, Wright and Frankenburg (1981) is available and is especially relevant because ti used Betty Caldwell's HOME (Caldwell and Bradley, 1976) as the measure of the home environment. I will return to this study later, but for now just say that they found HOME scores at child age 12 months to be significantly related to success or failure in school.

I will report three studies today: First, I will review the results of a causal analysis of school performance using HOME at child age 3 as well as several other measures. Second, I will describe our attempt to replicate the Van Doorninck et al. study. Third, I will present a series of comparisons of status variables and HOME scores in predicting results of several measures of school performance.

In discussing these three studies, I will describe the procedures used in each just before going into the results. However, the studies have in common that all data were drawn from the files of the Houston PCDC program evaluation. The PCDC functions with families having a one-year-old child, continuing until the child is three. Its goals are similar to those of Head Start. The program evaluation design made use of a control group assigned randomly at intake.

The families in this study were of low income, fathers were present in 90% of the households, the parental level of education averaged 7 years, all of the parents spoke Spanish and about one-third also spoke English. The mothers typically held strongly traditional family values.

Program evaluation measures were used at intake and at child ages two and three. The follow-up continues at annual intervals and will run through high school. HOME was included at ages one, two and three. A great number of other measures were used at various times. Research

assistants responsible for data collection were fluently bilingual.

Families entered the project in annual groups which we have called cohorts, each made up of from 80 to 100 families. The research discussed here includes results from five cohorts for whom HOME and school data were available.

In the first study, McGowan used PCDC data in a path analysis of the antecedents of two aspects of school performance. One was a score made up of the grade point average plus the Classroom Behavior Inventory (Schaefer, 1971) scales for Task-Orientation, Independence, and Intelligent Behavior. The second was the Iowa Test of Basic Skills Composite score. There were two stages in the causal model. The first consisted of mother's education, mother's place of origin (whether Mexico, rural Texas or Houston) and her traditional-modern orientation regarding family values. In addition, the effect of PCDC program participation was included. At the second stage, all at child age three, he included child's language (Spanish or English), a measure of intellectual stimulation provided the child by the mother based on ratings of video-taped mother-child interaction in structured tasks and free play, and finally, the HOME total score was also used. Time does not allow an explanation of the hypotheses underlying the causal model for school performance and I will be brief in summarizing the results.

Classroom performance was caused by Binet (IQ (.22) and mother stimulation (.30), but not by child language or HOME (see figures attached). Higher level school performance was also predicted by mother's higher education, mother's origin in Mexico and modern family values.

School achievement was caused by child use of English language, Binet IQ, mother intellectual stimulation, and HOME. In addition, mother's education and the program effect contributed directly to achievement test score.

Why was HOME not a cause of classroom performance when it was involved in school achievement? First, the two measures were only moderately correlated (r=.37), indicating that other variables were involved. One clue as to the nature of these variables is seen in the fact that child's language use was not a causal factor for the classroom performance measure, but was for school achievement. The classroom performance score was made up entirely of items requiring the judgment of the teacher, but the achievement test was a direct measure of child performance. It should be noted that the test was given in English and so for many children was a dual test: It assessed knowledge of English as well as of subject matter. Children who spoke no English did not take the test.

These results suggest that the predictive usefulness of HOME is increased when other variables, such as language difference, is involved in school performance are not present.

We can examine the same data set that McGowan used for his causal analysis to view the relationship between HOME subscales and the various, specific, school performance measures. For simplicity, groups and sexes have been combined. This is defensible in view of McGowan's finding that the models were equally appropriate for boys and girls and program effects were not great.

School grades were predicted only by HOME subscale 6, Variety (.25). Achievement test scores were predicted significantly by all HOME factors except subscales 2 (Acceptance) and 5 (Involvement). Subscales 3

(Organization) and 4 (Toys) were the strongest predictors with significant correlations in the .35 to .45 range.

Classroom behavior was predicted in a way similar to achievement test scores, but at generally lower levels. Subscale 3 (Organization) and 1 (Responsivity) were the best predictors. Correlations were in the low 20s.

Mother's level of education was significantly correlated with Reading and Language Achievement (r=.23 and .27).

Study number two was an attempt to replicate the Van Doorninck et al. research, using, as they did, HOMEs taken at age one. The study defined school failure of children in grades one through six as retention in grade, grades of D or F in reading or math, referral to corrective reading classes and/or recommendation for special education. They identified 24 or 50 low income children as showing "school failure". Van Doorninck et al. found that using a HOME Total score cut-off point of 30.5 resulted in a highly reliable prediction. In our study, we included children in grades one through three and defined failure as retention in grade and/or grades od D or F in reading or math. Beginning with 170 children followed in school, we determined that 146 were of cohorts for which HOME scores were available. Of these we identified 25 children as showing school failure.

We then matched the school failure children with school success children for sex, cohort and group.

A comparison of the two groups yielded no significant differences on any of the HOME factors or on the Total score. The p values ranged upwards from .49. The Total scores mean for the Failure group was 29.9 (sd=5.8) and for the Success group it was 30.5 (sd=6.5). These scores may be compared with those obtained for all 12 month HOMEs in the PCDC project. With a total number of 452, the mean was 29.2 (sd=6.8). Quite

obviously, school failure as defined by D or F grades and/or retention in grade, was not predicted by HOME. Furthermore, the cutting-point score suggested by Van Doorninck et al. was of no value with this sample.

Now the question arises as to why some high HOME score children should have failed in school and why other low HOME score children succeeded. In search of answers, I divided the school Failure and Success groups into high and low using a HOME score of 30.5 as the cut-off point. This resulted in a N of 16 Low Failure, 9 High Failure, 12 Low Success and 13 High Success children (see figure attached). I then examined for each subgroup the Bayley Mental Development Index at one year, the Stanford Binet IQ at three years, Mother's vocabulary level and child reading and arithmetic achievement scores in school.

Because the numbers are small, especially as in some instances test scores were not available, statistical tests were not done. In any case, a pattern of scores emerged that was very consistent. On the Bayley, Mother vocabulary and school achievement, the Low Failure group was lowest, followed by Low Success, High Failure and High Success. The results obtained for the Stanford Binet were different: here the progression was orderly with Low Failure and lowest and High Failure, Low Success and High Success showing increasingly higher scores. The Low Failure group had a Binet IQ of 82 and the High Success group IQ was 99.

It is worth noting that on the achievement test scores, reading and arithmetic percentiles for the High Failure group were almost as high as for those of the High Success group, both clearly within the satisfactory performance range. On the other hand, the Low Success group mean achievement scores were almost as low as those of the Low Failure group.

Two conclusions are perhaps warranted. First, it appears again, as in McGowan's study, that HOME scores are poor predictors of grades, but

fair predictors of achievement test results. Secondly, measures in children at age one year appear to be weaker predictors of school performance than measures taken later. While we have not examined the correlations of Bayley scores with school performance, we have found in another study, Binet IQs to be significantly related (in the .30 to .45 range) to various measure of school performance.

The third study made use of a larger data set because it added 1982 school data to that already in hand. This study examined the relationship of HOME scores gathered at child ages one, two and three to school measures in grades one and two. Our concern was to learn whether HOME was related to school performance and whether HOME scores added anything to prediction over and above that contributed by knowledge of child sex, whether in the intervention program or not, mother level of education and number of children in the family. We did not explore a wide range of status measures and did not use socieeconomic level because there was too little variability on this measure for this group.

The school performance criterion measures at each grade consisted of 1) the Classroom Behavior Inventory scales for Extraversion, Hostility, Intelligent Behavior and Task-Orientation. 2) Promotion of retention. 3) Grades for math, reading and a Total score based on grades in those subjects plus language and spelling. 4) Achievement test scores from the Iowa Tests of Basic Skills. Percentiles were used for Vocabulary, Reading, Arithmetic Total and Composite.

The hand-out shows correlations for the control group and for the control and program groups combined. The number of subjects differed for the various correlations; for the combined groups, the Ns ranged from about 75 to 95 and for the control group alone the Ns were typically about 40. Only significant correlations are shown.

I will only review the correlations for the combined groups, taking Grade One first.

Being a girl was associated with higher grades in Reading and Total and higher Achievement test scores. Girls were less Hostile and were more Task-Oriented. There were no significant correlations for Condition, Mother Education or Number of Children.

HOME subscales Responsivity and Acceptance and Total at one year predicted grades and Intelligent Behavior. Achievement scores for Arithmetic and Composite were also predicted by Responsivity and Acceptance.

HOME at two years offered rather scattered predictive results. Toys predicted Vocabulary and Reading achievement. Maternal Involvement predicted Reading and Total grades. The Total score predicted grades and Vocabulary achievement as well as Intelligent Behavior.

HOME at age three yielded somewhat fewer significant correlations. Achievement test scores were predicted by several factors.

Turning next to the results for the Second Grade, we see that sex predicted, at a low level, Reading grades and Achievement Composite. Mother's level of education was correlated with nearly everything except grades.

HOME at one year showed Responsivity and Involvement to be related to classroom behavior, grades and achievement test scores. Toys predicted achievement test scores and the Total score was related to achievement and classroom behavior.

The strongest predictive relationships found were for HOME at age two. Nearly all HOME subscales were related to nearly all school measures and some correlations were in the .40s. The HOME subscales, Acceptance, was the main exception to this general pattern.

HOME at age three showed fewer significant correlations, but again, nearly all of the factors were found to be predictive. Subscales 3, Organization, was related to most of the school measures.

The second part of this study asked whether HOME contributed to school prediction over and above the prediction provided by status variables. To answer the question we ran a series of multiple regressions on eight school variables, all following the same procedure. In each case, one of the various school measures was the criterion. The predictors were Sex and Condition, entered first, then mother's education and number of children. After these had been entered, the HOME factors were entered in a stepwise manner. We tested for the significance of the increase in predictability provided by HOME with F tests. Examining combined groups and the control group, for grades one and two, with three HOME ages, required 96 multiple regressions. Of these 10 (10%) were significant at the .05 level. We saw no clear pattern of relationships. Had we been able to reduce the number of variables entered in each equation by selecting on the basis of theory a few HOME factors for inclusion, the number of significant HOME predictions would have risen substantially. However, we had no theory for that selection; all of the HOME factors have to do with the learning environment of the child. Using only the HOME Total score rather than subscales did raise the number of significant HOME predictors.

To conclude, we have found that HOME is significantly related to school performance and it appears to be a slightly better predictor than the status variables included here. We grant that few of the relationships are very strong. What I find surprising, is that significant relationships exist at all. As mentioned earlier, the forces for discontinuity are great. In

addition to the usual developmental and envionrmental influences, these families were experiencing acculturation to some degree and most of the children were in the process of acquiring a second language.

And yet, we found predictability that is greater than we have found for HOME and cognitive measure relationships at ages one, two and three. In an earlier study, we found a number of significant concurrent correlations with Bayley Mental Development Index, at age one, but none at age two and few with the Stanford-Binet at age three. Predictions of two year old MDI and three year old Binet with HOME at age one were virtually nil.

We have much to learn about the home environment and its interaction with other variables in the lives of children. What does provide continuity--habit patterns in families? Values? Beliefs? Attitudes? Is it parental intelligence? Shared constructs? Or does one form of early home environment or other structure certain self-concepts which persist through time?

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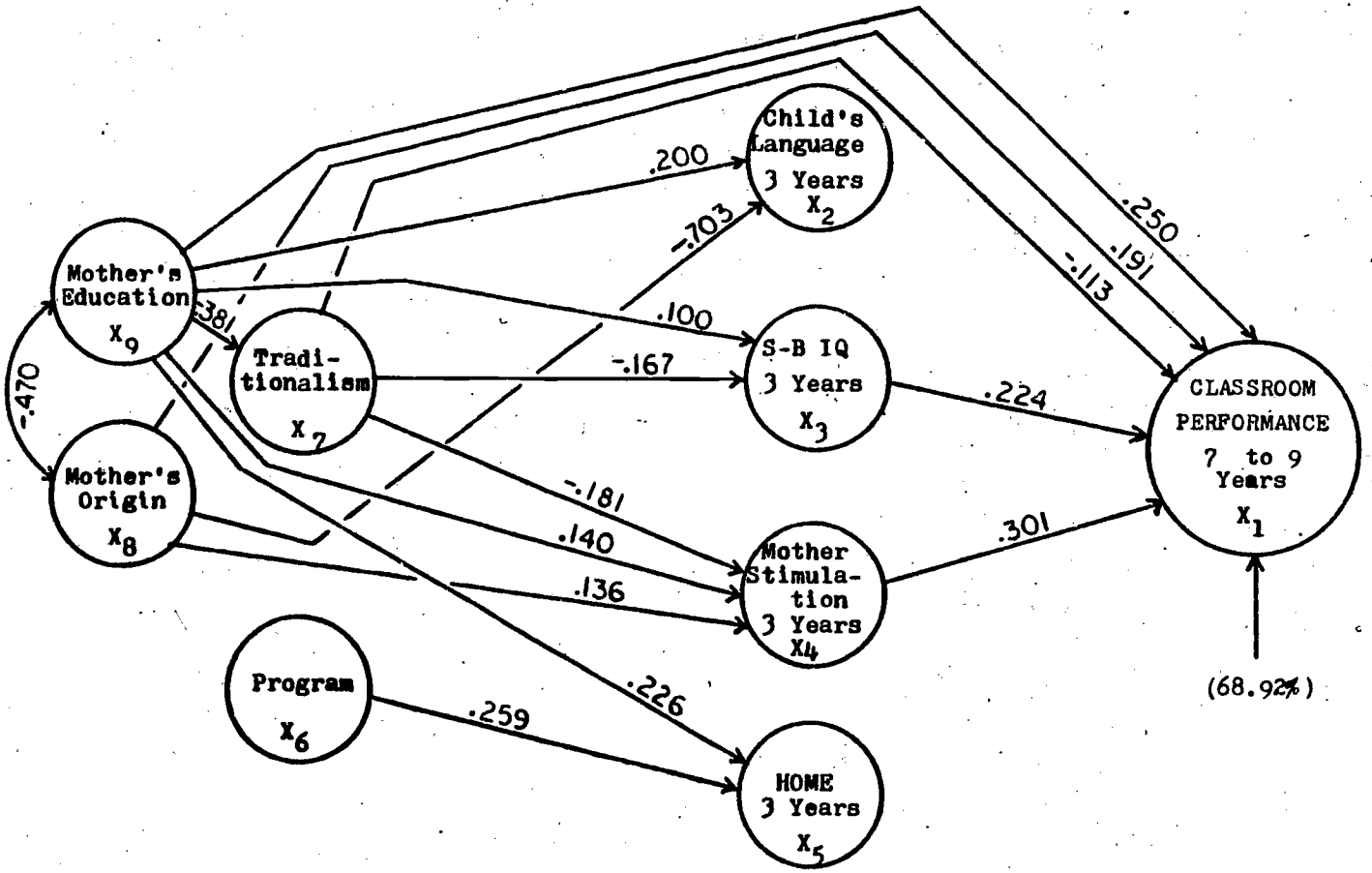
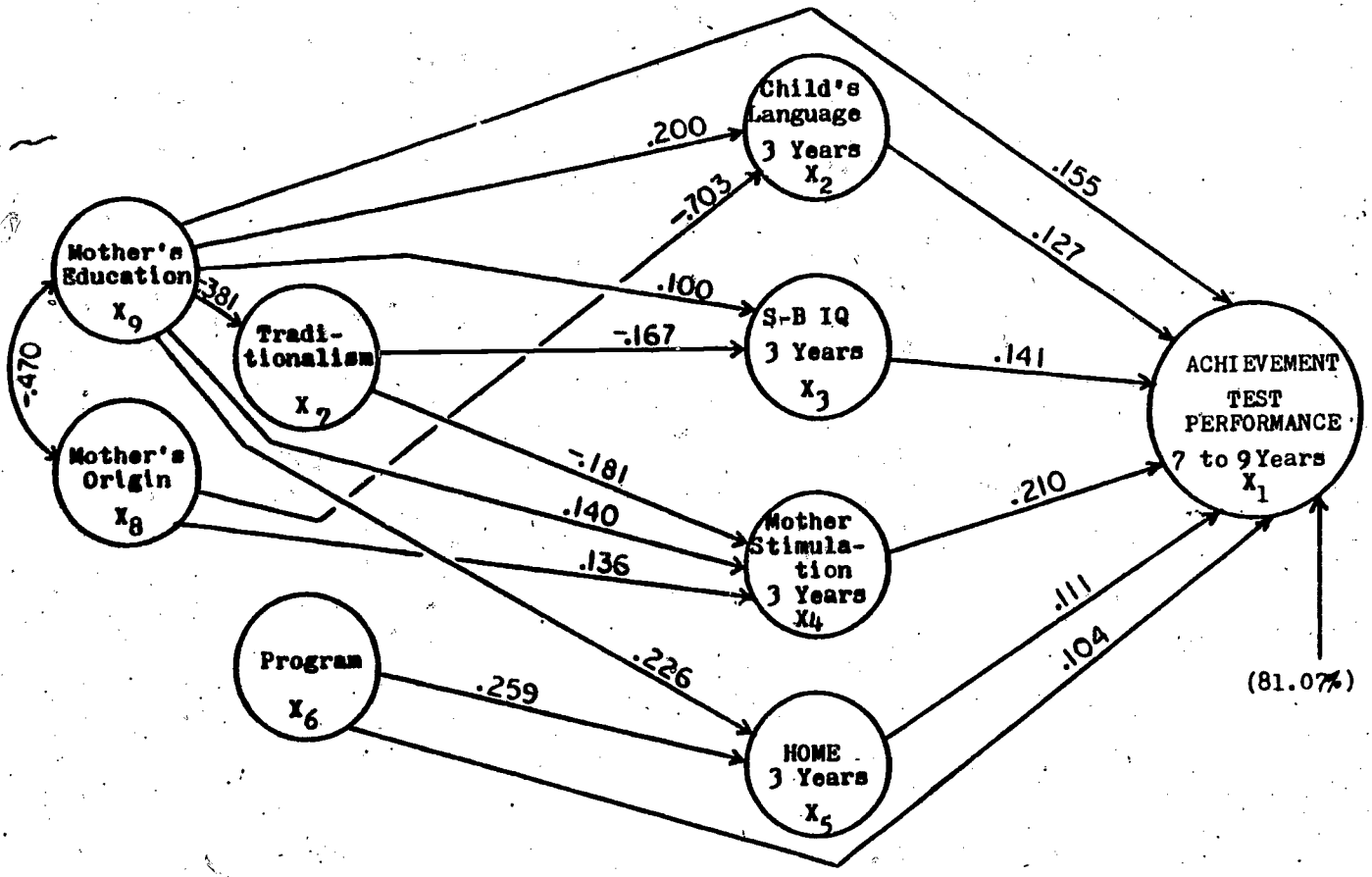
Figure 12

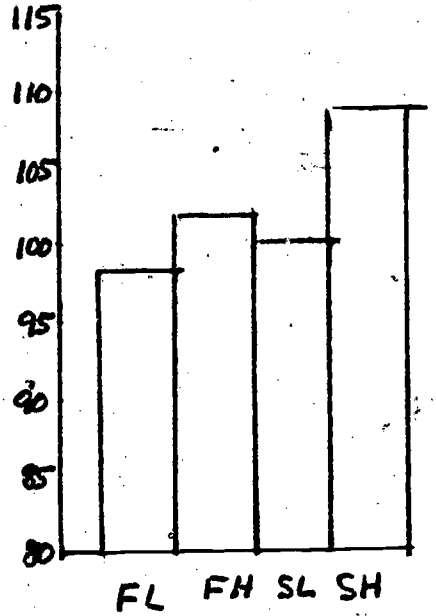
Modified Causal Model for the Development of Classroom Performance



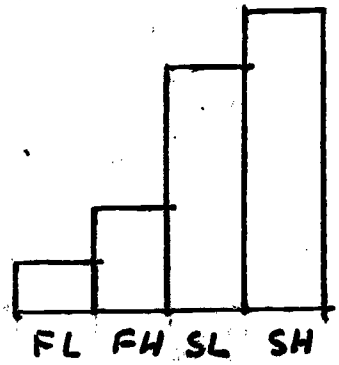
Ron McGowan - Dissertation

Figure 13
Modified Causal Model for the Development of Achievement Test Performance

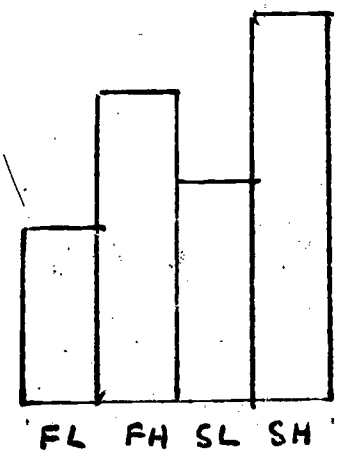




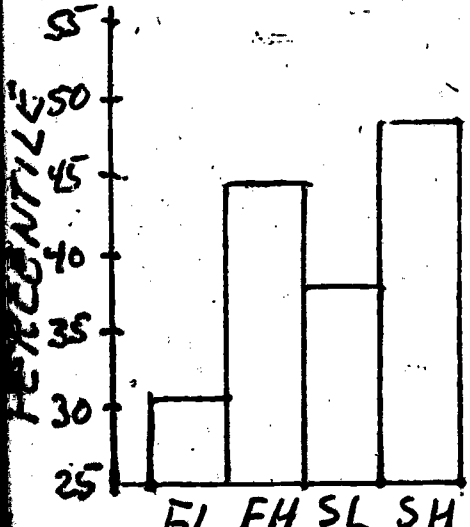
BAYLEY MDI



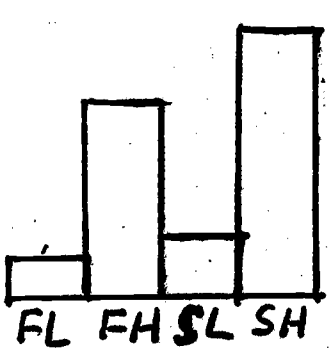
STANFORD-BINET IQ



MOTHER VOCAB



READING ACHIEVEMENT



MATH ACHIEVEMENT

FL = School Failure, Low HOME SCORE

FH = School Failure, High HOME Score

SL = School Success, Low HOME Score

SH = School Success, High HOME Score

GRADE ONE

Control

	Classroom Behavior					Grades			Achievement			
	E	H	I	T	P	GM	GR	GT	AV	AR	AA	AC
Sex		-40		33		28			33	27		
Cond												
MoEd				34		36		28	26			
#Ch	30											
HOME I												
1		-28	33	31		36	30	36				
2										45	50	43
3												
4		-28										
5												
6				-30			-34					
Total		-34										
HOME II												
1					-47							31
2												
3												
4									36	41		
5						30	32	38				
6												
Total									31	34	34	32
HOME III												
1												
2												
3										28	41	
4				37								
5												
6				41		27						
Total				40								

Combined Control and Program

	Classroom Behavior					Grades			Achievement		
	E	H	I	T	P	GM	GR	GT	AV	AR	AA
Sex		-33		21			18	19	25	20	
Cond											
MoEd											
#Ch											
HOME I											
1			25			24	21	25			26
2			28			26	19	29			30
3											
4					-22						
5											
6						23		24			
Total											
HOME II											
1			23		-30	20		22		24	28
2											
3		-22							24		
4									23	25	
5			22				25	24			
6						21					24
Total			23			24	26	28	21		
HOME III											26
1										21	
2										28	
3											
4		-25								20	
5											
6		-30				23					
Total						24		22		23	

GRADE TWO

	Control: Classroom Behavior								Grades		Achievement		Combined: Control and Program: Classroom Behavior						Grades		Achievement			
	E	H	I	T	P	GM	GR	GT	AV	AR	AA	AC	E	H	I	T	P	GM	GR	GT	AV	AR	AA	AC
Sex																			18					19
Cond															21									
MoEd			35							29	30	29		27	26		-28				26	29	26	29
# Ch										-29	-36	-30											-24	
HOME I																								
1		-36											27	-24		28			23	26		29		
2																								
3														-22										
4										38												27		25
5										33					22				25	23		28		26
6													22											
Total				38						32					25	24						33		29
HOME II																								
1													23								24		27	22
2											37												21	
3			45	30		26	33	41					25		39	25	-29	23	26	34	24	24	30	29
4			54	36	-13		45	33		46	34	43	21		46	25			22		22	29	33	33
5	29		35		-26		42	33					21		30		-23			20		22	20	22
6	35		49	44	-38	43	30	42			31	36	33		41	36	-22	30	20	30	29	35	24	39
Total	37		58	41	-41	26	47	39		33	46	41	33		43	29	-24			21	34	32	42	39
HOME III																								
1															34	20						21		
2									29							22								
3									28	32		46			22	28			21	25	31	33	26	42
4																28						25	24	25
5																								
6			28	27							32			-24	22						23		34	23
			31									31			37	29					25	27	29	32