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ABSTRACT

A longitudinal study was conducted at the Frank Porter Graham Center NC to explore the use of educational day care and related services as a mechanism for preparing socially disadvantaged children for success in later public schooling. Infant children of mothers who met a criterion score on a high risk index were randomly assigned to either an experimental group which received educational day care beginning before infants reached 3 months of age or to a control group which received paper diapers and nutritional supplements but no systematic educational day care. Four cohorts consisting of approximately 28 children each were admitted to the project between 1972 and 1977. Over the preschool years social and cognitive developmental information on all four cohorts was collected. Data on four measures appear to differ in impact on the child on a continuum ranging from distal to proximal influences. These measures are (1) education of mother at child's birth, (2) maternal IQ, (3) total score from Caldwell's Home Observation for Measurement of the Environment, and (4) laboratory observations of mother and child at play. Results of statistical analyses suggest that educational day care intervention with high risk children beginning in infancy can prevent declines in measured intelligence during early childhood, that early intervention may be one of the most important environmental determinants of intelligence in high risk children, and that parental intelligence and quality of home environments are other variables worth studying for their impact on intellectual development. (RH)

Intervening with High-Risk Families via Infant Daycare

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SRCD

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Introduction

Group daycare is a growing social institution in the United States. Its growth is a function of many and diverse influences operating on contemporary family life: the changing role of women in the paid workforce; the geographical mobility of nuclear families which often puts distance between kinship networks; and the desire to create an educational system that begins before public schooling. It is to the educational consequences of daycare that we address our comments today.

During the past decade we have been conducting a longitudinal study at the Frank Porter Graham Child Development Center designed to explore the use of educational daycare and related services as a mechanism for helping to prepare children from socially disadvantaged families cope better with the requirements for success in public school.

Today we want to summarize our finding on two issues. First, what have we found about our educational programs that pertain to broad measures of intellectual development during the first four years of life. Second, what do we know about the relative influence of some frequently measured family characteristics and educational daycare concerning intellectual development.

Method

Subjects. The children involved in this longitudinal study are all part of the Abecedarian Project at the Frank Porter Graham Child Development Center of the University of North Carolina. All were at high-risk when recruited for developmental retardation and/or school failure by virtue of the socioeconomic situation of their families. Mothers were recruited into the project before or shortly after their child's birth; in order to be eligible, mothers had to meet a criterion score on a High Risk Index (Ramey & Smith, 1977) composed of such factors as maternal IQ, mother's and father's education, contact with social services, and so forth. At the child's birth, he or she was randomly assigned either to an experimental group which received educatinal daycare beginning before 3 months or to a control group which received paper diapers and nutritional supplements but no systematic educational daycare. (Many of these control group children however attended various daycare centers at some point during the preschool period; most began between the ages of 2 and 3.)

Four cohorts were admitted to the project between 1972 and 1977. We are continuing to follow the children through age 8. The last cohort entered kindergarten this past fall. Thus for the first time our preschool sample is complete; we have all the data we can ever have on these children from 0 to 5 years. The data summarized in this paper are on all 4 cohorts.

Although each cohort consisted of approximately 28 children, 14 in each group, we have less than 112 children in these analyses for two reasons. The first is attrition. Attrition has been quite low, we have lost an average of approximately 1.5% of the sample per year. At 4 years of age we had 98 children actively enrolled in the sample. The second reason is that these analyses involve predicting from infancy across the preschool years. Any child missing a piece of data at a certain age was omitted from that analysis. Thus in the regression results to be reported we have between 91 and 95 children, evenly divided by experimental and control group.

Procedure

We have collected both social and cognitive developmental information on these children over the preschool years. Today we are going to report data on 4 measures which we characterize as differing in tneir impact on the child on a continuum from distal to proximal influences.

The first measure is the education of the mother at the child's birth. The second measure is maternal IQ obtained from a Wechsler Adult Intelligence Scale -- or the Wechsler Intelligence Scale for children if the mother was under 16, administered to the mother as part of the intake battery. In these analyses we have used the full-scale score.

The third measure is a total score from Caldwell's Home Observation for Measurement of the Environment otherwise known as the HOME. This assessment is conducted during a home visit. The HOME was administered every 12 months beginning at six months of age. We are using the total score from the assessment at 18 months.

The fourth measure is derived from laboratory observations of mother and child playing together in a room designed to look like a living room. Mothers were told that we were interested in the child's play with her and with toys. These 20 minute free-play observations took place when the child was 6, 20, 36 and 60 months old. In these analyses we are using a measure derived from behaviors coded at 20 months. When all the observations from all 4 cohorts were coded we subjected them to a principal components analysis. The first principal component, accounting for 40% of the variance, appears to be the same as the one we have perviously published involving only the first 2 cohorts (Farran & Ramey, 1980). It is a component we have labeled "Dyadic Involvement." It is a bipolar factor characterized by mutual play, and mother demonstrating toys at the positive end and mother reading, child playing alone at the negative end. In the regression analyses we used individual factor scores from these observations.

As we pursue the description of the course of development in children who are at-risk, we are coming more and more to believe that a general systems model best characterizes the developmental process (Ramey, MacPhee, & Yeates, 1982. The measures just described can be understood in terms of their place in a General Systems Model. The Model is depicted on the first page of your handout. Both maternal education and IQ are conceived as belonging in the History column, capturing their more distal effect on the child.

The HOME assessment includes a measure of the physical environment and it is affected by the economic resources of the family, but it also measures the physical and temporal organization of the home, caregiver involvement and child/caregiver interactions. Thus it is seen as pertaining to three columns in this system: History, demand characteristic and transactions.

The Dyadic Involvement factor relates to caregiver involvement and to child/caregiver interactions, the middle two columns on the chart. All the predictions in these analyses are to cognitive outcomes in the child, depicted as one of a number of possible Outcome variables on the model in Figure 1. The other factor we have taken into account in the present analyses is whether the child experienced intervention day care or not. We have shown it somewhat outside the model here but certainly involving the school row.

Placing the variables into the General Systems Model enables one to think about the extent and likely paths of their influence on the child's development. What follows is a statistical attempt to trace those paths of influence for these very important variables in the child's life.

Results

Table 1 presents the means and standard deviations for information at the child's birth and at 20 months of age on the distal and proximal variables which we have analyzed in relationship to children's intellectual performance at three assessment occasions. It will be noted from Table 1 that the average education of the mothers in the year of the child's birth was approximately 10 years, the average IQ as assessed by a full scale WAIS is approximately 84, the HOME total scores at 18 months is approximately 29, which is as anticipated a low score in relationship to other HOME scores reported in the literature with more advantaged samples (e.g. Bradley & Caldwell, in press). It is noteworthy that the mean factor scores on the dyadic involvement dimension hover near 0 for both groups. In fact an inspection of Table 1 reveals that the two groups, experimental and controls, are quite similar on each of these four measures and, in fact, statistical comparisons reveal that there are no significant differences on these predictor variables . Thus, we can assume that the process of random assignment has accomplished the initial equivalence of groups that was sought.

Table 2 presents the means, standard deviations and results of t-tests for performance of the experimental and control groups on the Stanford-Binet Intelligence Test at 24, 36, and 48 months of age. Across these three ages there is an average difference of approximately 13 IQ points in the favor of the daycare attending experimental group in comparison to the control group children who were reared in their natural ecology. It is important to note that the form of the difference between the groups resides in the low performance of the control group relative to national norms and that the experimental group is performing at about the national average on these tests. As Table 2 indicates, at each of these three assessment occasions, the group comparisons are statistically significant.

Consistent with our model presented earlier about the relationship of distal and proximal variables to IQ we have performed a series of multiple regression analyses in which we have fixed the order of entry of the variables beginning with what we think are the most distal and traditionally used measures of social status in psychological research. We then proceeded to more proximal variables that pausibly have a more direct impact on children's developmental status within our model. Therefore, for the regressions to be reported we have entered in fixed order the following variables:

1. Mother's education at the child's birth
2. Mother's IQ at the child's birth
3. The HOME total scores obtained from the 18-month assessment
4. The dyadic involvement of factor scores derived from the 20-month laboratory observation
5. The membership of the child in the experimental or control group, which was entered as a classification variable.

Table 3 reports the results from these forced regressions from information at the child's birth and at 20 months to IQ scores at 24, 36 and 48 months for our high risk sample. In Table 3 the first column of scores in each panel refers to the simple correlation between the variable labeled at the left and the child's IQ at each of the three assessment occasions. The second column, in each of the three panels, reports the cumulative multiple R derived from this forced order analysis and the third column represents the R^2 of percentage of variation accounted for in the criterion variable by the predictors. The R square like the multiple R is cumulative as one reads from the top to the bottom of each panel. The examination of Table 3 reveals several consistencies which are particularly noteworthy.

First, for this high risk sample there is no relationship at any measurement occasion between the child's IQ and the mother's educational level as assessed at birth. Thus, within this high-risk sample one of psychology's frequently reported relationships does not appear to hold. Second, at none of the three IQ assessment occasions is the dyadic involvement score obtained from the 20-month assessment significantly related to intellectual outcome. We intrepret this to mean that for this high-risk sample the variations in patterns of dyadic involvement at 20 months do not seem to be directly implicated in intellectual development and are pursuing the possibility in other analyses that dyadic involvement, at least within this sample, may be more related to varations in social outcomes than to cognitive or intellectual ones.

Three other findings are equally consistent and provide some positive information. First, the mother's IQ at the child's birth is consistently related at least at a moderate but statistically significant level to the child's intellectual status at 24, 36, and 48 months with simple correlations of .25, .31, and .44 respectively . So too is the quality of the child's home environment as assessed by the HOME at 18 months. The correlations between HOME and outcome at 24, 36, and 48 months are .34, .38 and .36 respectively, all of which are statistically significant. Finally, group membership, that is to say being in the experimental or the control group, is also correlated with outcome at a moderate but higher level than any of the other variables. The form of the analysis reveals that the correlation at the three assessment occasions are .51, .55, and .47, all of which are again statistically significant. With these findings in mind, I would like now to direct your attention to the forced order multiple regression results which are presented in a cumulative fashion going from the top to the bottom of the third column in each panel which reports the cumulative R^2 value or the cumulative percentage of variation accounted for by each of these five variables. At 24 months of age using the five predictor variables identified on the left, we are able to account for a total of 36 percent of the variation in the criterion scores at 24 months and 44 percent at 36 months and 42 percent at 48 months. An inspection of the cumulative nature or these R squares reveals that group membership is the predictor variable adding most to the percentage of variation accounted for at each of these three assessment occasions. Being approximately 2 to 3 times as large a contributor as all of the other variables combined in these equations.

Conclusions

We interpret these results to support the following conclusions about high-quality daycare for seriously disadvantaged children.

1. That systematic, educational daycare beginning in infancy can prevent declines in measured intelligence during early childhood.
2. The magnitude of positive effect of high-quality daycare on IQ is approximately 1 standard deviation in our sample. The importance of group membership in the regression analyses suggest that early intervention may be one of the most important environmental determinants of intelligence in high-risk children.
3. The other variables from our set particularly worthy of further persuit in understanding variations in early intellectual develpment are parental intelligence, and quality of home environments.

References

Farran, D. C., & Ramey, C. T. Social class differences in dyadic involvement during infancy. Child Development, 1980, 51, 254-257.

Ramey, C. T., MacPhee, D., & Yeates, K. O. Preventinv developmental retardation. A general systems model. In L. Bond & J. Joffe (Eds.), Facilitating infant and early childhood development. Hanover, NH: University Press of New England, 1982, 343-401.

Ramey, C. T., & Smith, B. Assessing the intellectual consequences of early intervention with high-risk infants. American Journal of Mental Deficiency, 1977, 81, 318-324.

Table 1

Means and Standard Deviations for Information at the Child's Birth and at 20 Months on Proximal and Distal Factors Affecting Development

	Experimental	Control
Mother's Education at child's birth	10.5 (1.7) N=52	10.0 (1.8) N=51
Mother's IQ at child's birth	84.4 (12.4) N=52	83.3 (11.0) N=51
HOME Total Score at 18 months	29.9 (5.6) N=50	38.5 (6.1) N=50
Factor Score on Dyadic Involvement 20 Months (laboratory)	.215 (1.6) N=47	-.206 (1.7) N=49

Table 2

Means and Standard Deviations of Stanford Binet Scores at Three Ages for High-Risk Experimental and Control Children

	Experimental	Control	
Stanford-Binet IQ 24	95.9	84.8	$p \leq .0001$
	(11.2)	(9.0)	
	N=51	N=48	
Stanford-Binet 36	100.7	84.3	$p \leq .0001$
	(14.0)	(13.5)	
	N=50	N=48	
Stanford-Binet 48	101.7	89.2	$p \leq .0001$
	(11.8)	(13.4)	
	N=50	N=47	

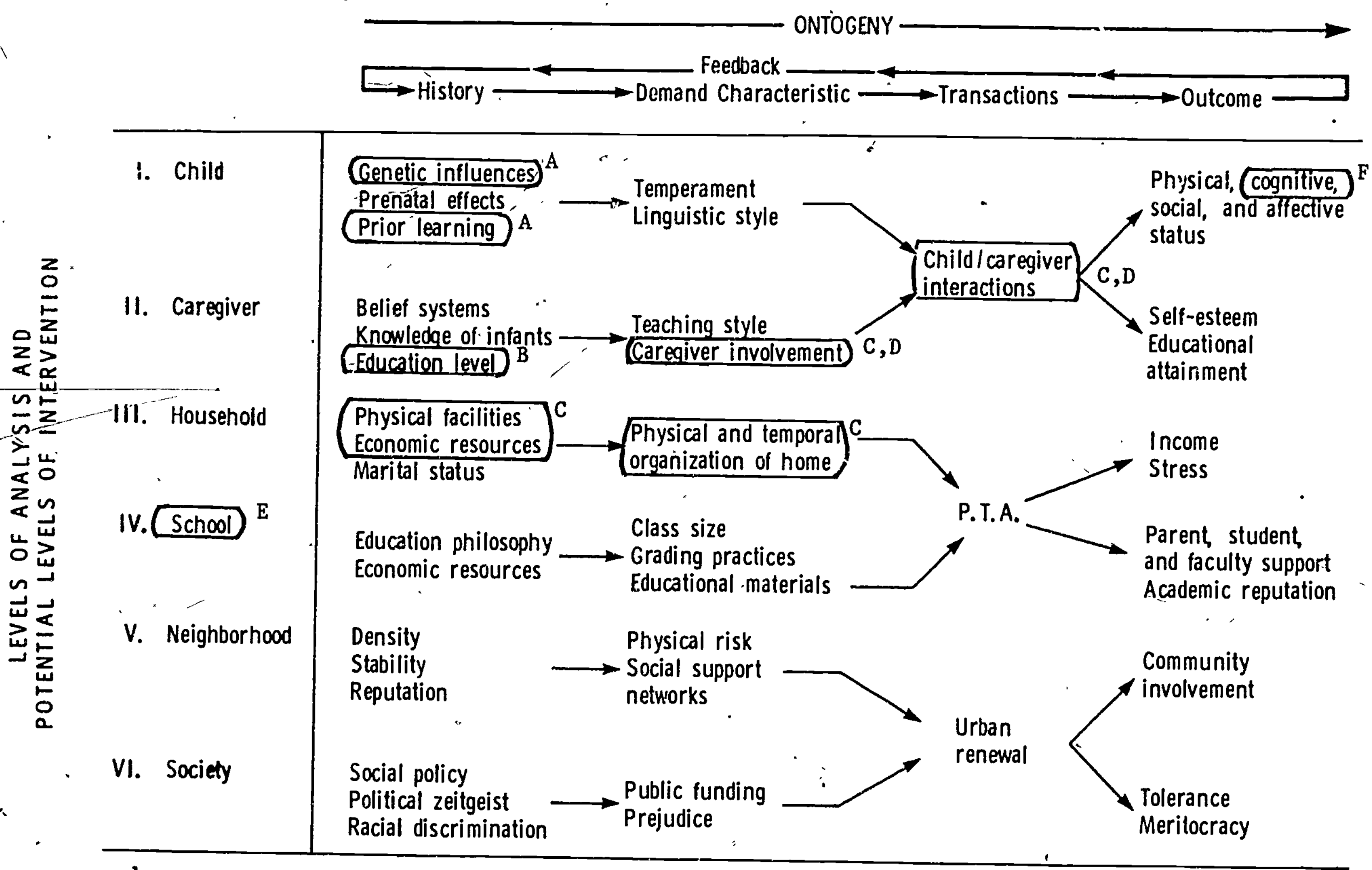
Table 3

Forced Regressions Predicting from Information at the Child's Birth and at 20 Months to IQ scores at 24, 36 and 48 Months for a High-Risk Sample

	Stanford-Binet at 24 Months			Stanford-Binet at 36 Months			Stanford-Binet at 48 Months		
	Simple R	Multiple R	R Square	Simple R	Multiple R	R Square	Simple R	Multiple R	R Square
Mother's Education at Child's Birth	.07	.07	.004	.08	.08	.006	.11	.11	.01
Mother's IQ at Child's Birth	.25*	.25	.06	.31*	.32	.10	.44*	.44	.19
HOME Total Score at 18 months	.34*	.36	.13	.38*	.41	.17	.36*	.48	.23
Dyadic Involvement at 20 Months (laboratory)	.07	.36	.13	.15	.42	.18	.09	.48	.23
Group Membership (Experimental or Control)	.51*	.60	.36	.55*	.66	.44	.47*	.65	.42

* $p < .05$

A GENERAL SYSTEMS MODEL FOR INQUIRY INTO DEVELOPMENTAL RETARDATION [1]



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[1] Flow chart is illustrative of some important variables and processes but is not construed as exhaustive.

A Maternal IQ
B Education at Child's Birth
C HOME at 18 months
D Dyadic Involvement at 20 months
E Intervention Daycare
F Stanford-Binet IQ at 24, 36 and 48 months

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