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ABSTRACT

This document reports an investigation of the relationship between maternal practices as observed in the home and the cognitive development of young children from low-income families. The purpose of the study was to determine if lower-class maternal warmth was associated with intellectual growth of the child. Fifty-two lower class mothers were observed interacting with their 4-year-old children at home. The children, involved in a compensatory preschool program, were pretested and posttested on the Stanford-Binet Intelligence Scale and the Peabody Picture Vocabulary Test. Maternal behaviors reflective of warmth were tallied and correlated with the child's IQ and teacher ratings of his behavior. The maternal warmth variable correlated significantly with initial IQ, IQ gain in preschool, and teacher rating of academic motivation. (Author/AJ)

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CHILDREARING PRACTICES AND COGNITIVE DEVELOPMENT IN LOWER-CLASS PRESCHOOL CHILDREN

Norma Radin

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One of the most critical questions facing behavioral scientists today concerns the malleable factors which facilitate cognitive growth. The issue is a critical one for the educational system is virtually the only channel of upward mobility in our technological society, and schools are inevitably related to cognitive ability. It is clear that we have not as yet learned which variables to manipulate to alter the academic achievement of low-income youngsters in a significant fashion.. Much more relevant research is badly needed if we are ever to help these children fulfull their potential, and new methodological techniques are needed as well.

Among the programs which appear to hold the most promise are those which involve intervention in the socialization process during the first few years of the child's life. There are still major gaps in the knowledge undergirding such efforts, however. Much of the information in the literature is based on questionnaire data, laboratory experiments, or on correlations between child behaviors and demographic variables which explain little about the relationships. In other instances, the findings of researchers such as Sears, Bayley, and Kagan who studied middle class or working class families, invariably white, have been applied to black families existing under the most deprived conditions. The validity of such generalizing is legitimately questioned. This study* attempted to reduce a few of the gaps in our knowledge and test some assumptions that have been made about effective childrearing practices in low-income homes. Specifically, an investi-

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gation was made of the relationship between maternal practices as observed in the home, and the cognitive development of low-income young children to determine if, in a lower-class milieu, maternal warmth was associated with intellectual growth of the child.

Much evidence suggested that a positive and significant correlation would be found although this question had not been explored directly. Investigators who observed lower-class mothers interacting with their young children in a natural situation have not studied the children's intellectual development. For example, Kamii (1965) observed middle-class and lower-class black mothers interacting with their young children at home and found that the former used praise more frequently and had a greater repertoire of influence techniques. It was suggested that these class differences were related to differential school performance but the children's intellectual ability was not assessed. Schoggen (1969) spent prolonged periods of time in lower-class, southern homes making ecological studies of the family but did not attempt to relate their findings to the intellectual development of the young children or to the school performance of their older siblings.

Other researchers who have attempted to relate maternal practices to cognitive growth have not observed the family in a natural setting. In some cases, the mother and child were brought into a laboratory and observed under controlled, but artificial conditions. For example, Hess and Shipman (1965) observed black middle-class and lower-class mothers teaching their four-year-old children new tasks designed by the experimenters. The maternal teaching style, among other variables, was recorded and related to the child's performance on intellingence tests. It was found that mothers who oriented

their children to the problem and gave feedback to their youngsters as they attempted to master the task, had children who attained the highest IQ's regardless of social class. However, Hess and Shipman did not attempt to determine whether the teaching behavior observed in the laboratory was related to more natural mother-child interactions in the home.

Other researchers such as Whiteman and Deutsch (1968) and Henderson (1966) studied childrearing practices of lower-class families to determine the antecedents of intellectual development in young children but these investigators relied almost entirely on questionnaire and interview data. Among the factors correlating with cognitive ability was conversation during dinner suggesting involvement with the child might be relevant.

In the study to be described, lower-class mothers were observed interacting with their preschool youngsters in their homes under relatively normal conditions. The children had previously taken standard intelligence tests upon entrance to preschool and were subsequently retested on the same instruments at the conclusion of the preschool program. It was hypothesized that there would be a positive and significant correlation between observed maternal warmth and intellectual development of the child upon entrance to preschool. It was further hypothesized that gain in IQ during the year would be positively and significantly correlated with warmth when teacher effect and initial IQ were controlled. The rationale for these hypotheses was that maternal warmth, such as use of praise, was reinforcing to a child, and fostered identification with the mother as the mother's behaviors themselves became reinforcing. Internalization of her ideas and

values resulted. It was assumed that identification with one female adult could be transferred to another female adult. Thus the preschool teacher would become a second target of identification, and as her values and ideas were internalized, cognitive growth would ensue.

Procedure

The sample consisted of 52 mothers and their four-year-old children enrolled in the Early Education Program of Ypsilanti, Michigan, a compensatory preschool program for 100 lower-class youngsters. There were ten teachers in the program, each with ten children in her room. The 52 families in the sample did not differ significantly from the remaining 48 in the project, as Table 1 indicates, although the sample was somewhat less deprived than the larger group. The mean mother's education in the sample was 10.4 years; the mean father's education was 9.3 years; 21% of the families had no father in the home; 13% of the families were receiving welfare assistance and 40% of the families were black. The 52 chosen for home observations were generally those for whom the most background information was available. No mother who was contacted refused to be interviewed. In the sample of 52 there were 31 white families and 21 black; 24 of the children were males and 28 females. There were 17 white females, 11 black females, 14 white males, and 10 black males.

The mothers in the study were told that the project staff hoped to learn as much as possible about the youngsters attending the preschool class, which was indeed true. For that reason, it was desirable to get detailed information about the first few years of the child's life. Time for a research assistant to interview the mother at home was requested. It was also requested that the preschool child be present so that some problem-solving tasks could be administered. The entire interview was

tape recorded, with the mother's permission, and the thirty minutes with the most mother-child interactions were scored.

The scoring procedure used was a modification of that developed by Kamii (1965). Several types of maternal behaviors were analyzed, but only one, warmth, will be discussed in this paper. Warmth was defined operationally as the mother's use of 1) reinforcement, physical or verbal; 2) consultation with the child, or asking him to share in some decision; and 3) sensivivity to the child, or anticipating his requests or feelings. All three areas were included because it was felt that warmth was not expressed merely by rewarding the child but also by acknowledging his existence as a unique human being with feelings and thoughts that should be respected. An example of reinforcement was telling the child that he was a good boy. Asking the child whether he would rather stay in the same room and play quietly, or leave the room and be free to make noise was typical of consultation. Sensitivity to the child was demonstrated by asking the child watching a sibling eat in the next room if he were hungry too. A tally was made of the number of times either reinforcement, consultation, or sensitivity to the child was manifested. The total was delineated as the score for maternal warmth, the independent variable. The analysis was made after listening carefully to the tape and reviewing the notes the interviewer had made during the visit concerning the non-verbal interactions taking place.

Four dependent variables were used: 1) IQ attained on the Stanford-Binet Intelligence Scale upon entrance to preschool in the fall of 1967; 2) IQ attained on the Peabody Picture Vocabulary Test administered at the same time; 3) gain score on the Binet after teacher effect; and initial

Binet IQ were controlled; and 4) gain score on the PPVT after teacher effect; and initial PPVT IQ were controlled. The influence of the teacher was eliminated because a wide variation among the 10 classroom was found. The mean IQ gain per teacher varied from 3 to 13 points on the Binet and from 5 to 23 points on the PPVT. To control for this variable, the mean Binet IQ gain was computed for each of the 10 teachers. A Z score for each of the 10 children in her room was then calculated by deducting the child's IQ gain from the mean room gain, and dividing this figure by the standard deviation of the gain scores for that room. The procedure was repeated for the PPVT.

The second control, that of initial IQ, was imposed when significant negative correlations were found between initial IQ and gain score for both tests. The correlation was much higher for the PPVT ($r=-.55$), but it was also significant for the Binet ($r=-.28$). The mechanism used to control the initial IQ was a linear regression equation which was computed for each test for the sample of 52. The initial IQ served as the predictor variable and the Z score as the dependent variable. A residual gain score was obtained for each child on both tests by inserting his initial IQ into the regression equations. In this way figures representing gains in IQ were available with the influence of the classroom teacher and initial IQ eliminated.

Pearson coefficeints of correlation were then computed between the independent variable, maternal warmth, and each of the four dependent variables.

In an effort to explore some possible intervening variables that might be involved in any relationship found between maternal childrearing practices and intellectual growth, the children's motivation to achieve, identification with their teacher, and classroom behavior were assessed.

These variables were measured by the Pupil Behavior Inventory (Vinter, Sarri, Vorwhaller, and Schaefer, 1966), which each teacher completed for the children in her room during the first month of school. On this instrument, the teacher is asked to rate the child on a list of observable behaviors using a five point scale. Five factor scores can be computed but for this study, only three were used: academic motivation, classroom conduct, and teacher dependence. Items typical of the first factor are "shows initiative", "alert and interested in school work". Items typical of the second factor are "influences others toward trouble making" and "disobedient". An item typical of the third was "possessive of teacher". The factor scores were correlated with the dependent and independent variables.

Another opportunity to assess the child's motivation to achieve presented itself and was used, although data were available for only 38 of the 52 children. It was learned that the psychologists administering the tests had completed the face sheet of the Binet for the 38 children and had rated their behavior while taking the test in such areas as eagerness to continue, persistence, degree to which he was challenged by hard tasks, etc. A mean rating given each child on these items was computed and correlated with the other variables.

To be certain that the sheer number of mother-child interactions was not the relevant factor being tapped, partial correlations were computed between warmth and the dependent variables controlling for the total number of observations.

Result

Table 2 presents the significant intercorrelations that were found between the independent variable, the four dependent variables, and the intervening variables which were explored. It can be seen that maternal

warmth correlated significantly and positively with initial Binet IQ, initial PPVT IQ, and with residual gain on the Binet; it also correlated significantly and positively with academic motivation and most highly with the child's motivation while taking the Binet (r=.56). There was no significant relationship between maternal warmth and residual gain on the PPVT, maternal warmth and classroom conduct or maternal warmth and teacher dependence.

To determine the nature of the relationship between motivation to achieve, maternal warmth, and IQ, all of which were significantly intercorrelated with one another, partial correlations were computed. Maternal warmth and IQ were correlated controlling for motivation while taking the Binet. In addition, maternal warmth and motivation while taking the Binet were correlated controlling for initial IQ. The same procedure was followed with academic motivation. The results appear in Table 3. It can be seen that maternal warmth and Binet IQ were no longer significantly correlated when the child's motivation while taking the Binet was controlled. On the other hand, even with Binet IQ controlled, maternal warmth and the child's motivation in the testing situation were associated. Identical results were obtained when the initial PPVT IQ was used. A different pattern emerged however when the teacher's rating of the child's academic motivation was used in the partial correlations. Here, the relationship between maternal warmth and IQ was maintained even when motivation was controlled. This was true for both the Binet and PPVT IQ's. Again the relationship between warmth and motivation was significant even with initial IQ controlled. The data suggest that motivation is one of the mediating variables between maternal warmth and cognitive development but not the only one.

Table 4 reveals the results obtained when the number of observations was controlled. The relationship between warmth and initial Binet IQ, warmth and initial PPVT, and warmth and residual Binet gain continued to remain significant.

Discussion

It appears that maternal use of reinforcement, consultation with the child, and sensitivity to his needs are antecedents of cognitive growth in lower class preschool children. Inasmuch as all three behaviors were combined into one score for maternal warmth, no assessment can be made of the relative importance of the three components. It is likely that the three are highly correlated although possibly, as children, particularly boys, get older, there may be much less use of reinforcement and increased use of consultation and anticipation of the child's needs by mothers who are delineated in this study as "warm" and "nurturing".

The data also suggest that the relationship between warmth and cognitive growth is linked with the child's developing a desire to master challenging tasks, at least in the presence of an adult. There may be two explanations for the association between warmth and motivation to achieve. It is possible that the child who has experienced reinforcement in the past when he pleased his mother will try to arouse adults' pleasure. It is highly likely that both testers and teachers respond positively to children who 'try' to succeed in academic tasks. Thus, the child who has been reinforced by his mother, anticipates, and seeks reinforcement, from other adults by pleasing them. Such behavior in and of itself would result in higher IQ on an intelligence test as Zigler and Butterfield (1969) have

demonstrated.

Another possible explanation of the linkage between maternal warmth and motivation to achieve focuses on manipulation of the environment rather than interpersonal relationships. It is possible that children who have learned that they can elicit their parent's reinforcement by specific acts they perform, have simultaneously learned that they can manipulate their environment to achieve gratification. In Rotter's (1966) terminology, they feel they have internal control over their fate. Such ability to evoke reinforcement from the environment might encourage a child to explore other aspects of his world in an effort to achieve additional pleasure. Thus, he would be more likely to be challenged by difficult tasks and to try to solve problems regardless of the presence of adults. Such behavior would not only result in a higher IQ but also, most likely, in higher scores on achievement tests. Coleman's (1966) finding that a feeling of fate control was correlated significantly with achievement tends to corroborate this view.

Two findings suggest that motivation is not the only intervening variable between maternal warmth and intellectual growth of the child: 1) There was no significant relationship between motivational factors and residual gain on the Binet in spite of the association found between gain and maternal warmth; 2) warmth and IQ were significantly related even when motivation, as assessed by the teacher, was controlled. Whether one of these other intervening variables is identification with an adult remains to be tested. The lack of relationship between teacher dependence and either warmth or intellectual measures suggests that teacher identification was not involved but the Pupil Behavior Inventory might not be an effective tool for assessing identification.

For the purposes of this paper, no differentiation was made on the basis of sex or race of the child. These issues will be discussed in another paper in preparation. However, in view of the fact that trends toward sex and race differences were found, it is important to emphasize that the total sample studied tended to have more whites than blacks, 31 vs. 21, and somewhat more girls than boys, 28 vs. 24. There were also considerably more white girls, 17, than black boys, 10. Thus, in combining sub-groups, some groups affected the total sample more than others. The differences in subgroup size were not deemed so large, however, as to preclude placing all the children into one conglomerate to gain some understanding of lower class four-year-old children in general.

In conclusion, although the sample was limited and white females overrepresented, certain trends emerged. In lower-class families maternal use of reinforcement, consultation with the child, and sensitivity to his feelings appear to be conducive to the intellectual growth of the preschool child. One major intervening variable in the process appears to be arousal of the child's motivation to achieve, possibly by affecting his desire to please adults, his desire to explore his environment, or possibly both. It appears that other intervening variables are also relevant. Further research in this area is clearly needed.

This study was too small in scope to serve as a basis for a parent education program, but the findings suggest that the observational technique utilized is a fruitful one, and likely to provide critical information for those intervening in the socialization process oflow-income families. Finally, the results indicate that maternal childrearing practices significantly affect the child's response to an educational program. These findings suggest that it would be unwise to overlook this variable, even when focusing most intensely on curriculum modification or restructuring of the public school system.

TABLE 1

DEMOGRAPHIC CHARACTERISTICS OF
TOTAL EARLY EDUCATION POPULATION
AND
SAMPLE STUDIED

Demographic Characteristic	Early Education Population (N=100)	Sample (N=52)
Mean number of years of schooling completed by mother	10.2	10.4
Mean number of years of schooling completed by father	9.6	9.3
Percent of families receiving public assistance	19%	13%
Mean number of siblings of preschool child	2.6	2.5
Mean age of mother	29.1	28.3
Mean age of child on entrance to preschool in years and months	4-5	4-6
Percent male	50%	46%
Percent black	49%	40%

TABLE 2

SIGNIFICANT CORRELATIONS AMONG INDEPENDENT VARIABLES, DEPENDENT VARIABLES, AND POSSIBLE INTERVENING VARIABLES (a)

Variables Correlated	Coefficient Correlation	t
Observed Warmth and Initial Binet IQ	.375*	2.799
Observed Warmth and Initial PPVT IQ	.432**	3.315
Observed Warmth and Residual Binet Gain	.276	1.991
Observed Warmth and Academic Motivation	.355*	2.690
Observed Warmth and Motivation While Taking Binet	.561**	4.065
Initial Binet IQ and Initial PPVT IQ	.556**	4.633
Initial Binet IQ and Academic Motivation	.262	1.882
Initial Binet IQ and Motivation While Taking Binet	.506**	3.519
Initial PPVT IQ and Academic Motivation	.301	2.190
Initial PPVT IQ and Motivation While Taking Binet	.415*	2.737
Academic Motivation and Classroom Conduct (b)	.464**	3.628
Academic Motivation and Motivation While Taking Binet	.472*	3.165
Academic Motivation and Teacher Dependence (c)	.440**	3.513
Classroom Conduct (b) and Teacher Dependence (c)	.452**	3.395

(a) N=52 in all cases except for correlations with Motivation While Taking Binet where N=38. Where N=52, 40 d.f. used; where N=38, 30 d.f.; 1-tail test used for all computations; $p < .05$ unless otherwise indicated.

(b) For Classroom Conduct, the higher the score, the more desirable the behavior.

(c) For Teacher Dependence, the higher the score, the less dependence on teacher.

* $p < .01$
** $p < .001$

TABLE 3

PARTIAL CORRELATION COEFFICIENTS
CONTROLLING FOR TOTAL
NUMBER OF OBSERVATIONS
(N=52)

Variables Correlated	Partial Correlation Coefficient Controlling for Total Number of Observations	$z\sqrt{N-4}$ (a)
Maternal Warmth and Initial PPVT IQ	.417 *	3.02
Maternal Warmth and Initial Binet IQ	.373	2.70
Maternal Warmth and Residual Binet Gain	.336	2.42

(a) Statistic recommended by Hays (1963, pp 575-576) to test significance of partial correlations; 2-tail test used with 40 d.f. $p < .05$ unless otherwise indicated.

(*) $p < .01$

TABLE 4

SIGNIFICANT PARTIAL CORRELATIONS
INVOLVING MOTIVATION AND
MATERNAL WARMTH (a)

Variables Correlated with Maternal Warmth	Controlled Variable	Partial Correlation Coefficient	z N-4 (b)
Motivation while taking Binet	Initial Binet IQ	.464*	2.92
Initial Binet IQ	Motivation while taking Binet	n.s.	
Motivation while taking Binet	Initial PPVT IQ	.463*	2.93
Initial PPVT IQ	Motivation while taking Binet	n.s.	
Academic Motivation	Initial Binet IQ	.288	1.72
Initial Binet IQ	Academic Motivation	.316*	2.27
Academic Motivation	Initial PPVT IQ	.263	1.86
Initial PPVT IQ	Academic Motivation	.368*	2.68

(a) N=38 for correlations involving motivation while taking Binet; for others, N=50; $p < .05$ unless otherwise indicated.

(b) Statistic recommended by Hays (1963, pp 575-576) to test significance of partial correlations; one-tail test used except when motivation factor is controlled. Here two-tail test used.

(*) $p < .01$

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