

An Evaluation of Efforts to Educate Mothers About Child Development in Pediatric Office Practices

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Abstract: The efforts expended by pediatricians in a variety of private practice settings to educate mothers of first-born children about child behavior and development were examined in relation to various outcome measures of mother and child functioning over a time period of one-and-a-half years.

Mothers learned more about child development in group settings than in solo practice settings, but differences between medical groups with and without nurse practitioners were not significant. Mothers receiving care from pediatricians who made at least a moderate effort to teach, learned more about child development, described more use of positive contact with their children, and felt they were helped more in their childrearing efforts than did mothers receiving

care from pediatricians who made little effort to teach. However, there were no significant differences in measures of the child's developmental status related to physician teaching input, and mothers exposed to higher levels of teaching input reported more behavioral problems with their children. The most important predictor of the child's developmental status at 18 months of age was the amount of positive contact between mother and child at one year. It is suggested that the effects of changing the frequency of well-child visits on the mothers' interaction patterns with their children and on their feelings of being supported by the physician be ascertained before making recommendations about the optimal number of such visits. (*Am J Public Health* 69:875-886, 1979.)

The value of well-child visits as they are currently conducted is being questioned.¹⁻³ Critics have pointed out that many of the nutritional and infectious disease problems that initially justified frequent visits have been solved or greatly reduced and that early recognition of congenital defects or other health problems can generally be accomplished in one or two visits in the first year, instead of the six to eight which are currently recommended. This view is supported by a recent study which found that reducing to three the number of well-child visits during the first year did not have any significant effects on the health and immunization status of the children in the study, or on the mothers' knowledge of routine child-care procedures.³ These observations have led some physicians to suggest that the frequency of routine checkups be reduced, without consideration of how this might affect other desirable outcomes such as influencing positive mother-child interactions, enhancing the child's social and cognitive development, and providing emotional support to the mother.

However, promoting the optimal development of the child through parent support, guidance, and developmental screening is also a stated goal of well-child care.⁴ New knowledge about child development has accumulated rapidly over the past 10 years, and there is a growing awareness of

the importance of the first five years of life for the social and cognitive development of the child.^{5, 6} This new knowledge could be of great benefit to new parents, who have many concerns about the behavior and development of their preschool children and frequent conflicts with them.^{7, 8} Enhanced parental understanding of their children might reduce the percentage of children entering first grade who are identified as having significant behavior or learning problems (currently, 25-30 per cent) as well as decrease the number of other children who appear to function less well than they could.⁹⁻¹¹

Within the past five years, there has been increasing evidence that early intervention programs may be able to reduce parental concerns and improve child functioning. Schaefer reviews data indicating that a child's cognitive development can be modified through early stimulation programs.¹² Johnson, et al., and O'Keefe describe recent successful intervention programs in non-medical settings.¹³⁻¹⁴

The work of Thomas, Chess and Birch indicates that many behavior problems in the preschool years are related to individual temperament characteristics of children. Parents can be taught to recognize these individual differences in their children and to modify their child-rearing patterns to best fit each type of child.¹⁵

Finally, the effectiveness of behavior modification techniques in dealing with specific behavior—such as resistance to toilet training, peer aggression, or non-participation in nursery school—has been consistently demonstrated.¹⁶⁻¹⁸ These techniques can be considered basic skills which should be taught routinely to all new parents.¹⁹⁻²¹

Because of his/her long-term contact with families having young children, the pediatrician is in a strategic spot to

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influence early child development through parent education and counseling. However, all available studies indicate that the majority of physicians spend little time during well-child visits discussing child behavior and development.²²⁻²⁶ In fact, it is this failure to develop goals for well-child visits other than a physical examination, imparting information about health and nutrition, and dispensing immunizations that has led to the current controversy. Perhaps what is needed is a restructuring of the content of well-child visits.

A number of studies suggest ways in which these visits could be made more productive.²⁷⁻³¹ For example, Gutelius showed significant gains on measures of cognitive development as well as decreases in several types of behavior problems for the children of a group of poor, unmarried women between 15 and 19 years of age who received extra support in the form of counseling and education during their pregnancies and the first three years of their children's lives.²⁷⁻²⁸

In another inner city health clinic, children found to have developmental lags on screening tests were provided direct cognitive stimulation in the home through visits by trained college student volunteers and significant gains in development were produced.²⁹ Scarr-Salapatek and Williams produced similar positive results by providing extra stimulation to premature infants in a hospital nursery and by teaching mothers to do this in the home.³⁰ Cullen found a decrease in the incidence of some behavior problems following his provision of extra counseling sessions for a sample of patients from his practice.³¹

All these approaches require considerably more time than the 10 or 15 minutes expended by the physician in a typical well-child visit. The current trend of delegating some well-child care to nurse practitioners may be a step toward making these visits more effective. One recent study found that a group of nurse practitioners did more such teaching than the average pediatrician.³² However, there is also evidence that, unless specially trained for this teaching role, the nurse practitioner will imitate the average physician and bypass this whole area.²⁴

Before changing the way well-child care is delivered, it is necessary to get some idea of the effectiveness of these visits as they are currently conducted in general pediatric practices. Some of the questions to be answered are as follows:

Is there any evidence to indicate that the time and effort spent in educating mothers about child behavior and development in well-child visits has any beneficial effect on the development of either the mother or the child? If the answer is "no" then we must decide whether to give up these more comprehensive goals of child care and reduce the frequency of visits as suggested or find more effective ways to reach them. If the answer is "yes" then the effect of cutting down the frequency of visits on these kinds of outcomes must be determined before making any widespread recommendations. Also, if the answer is "yes" we need to compare this form of parent education and counseling with other forms delivered by persons other than physicians in both medical and non-medical settings to see what methods are the most cost effective.

The idea of trying to answer some of these questions

TABLE 1—Demographic Characteristics of Study Sample

	TIME 0 N = 595	TIME 2 N = 480
	%	%
Child Sex (% Male)	51	50
Mother Age at Birth of First Child (Mean)	25 yrs.	25 yrs.
Mother Education Level		
8-11 years	4	3
High School Graduate	34	32
1-3 years College	32	33
4 years College Graduate or more	30	32
Mother Religious Preference		
Catholic	51	50
Protestant	33	33
Jewish	6	6
None or other	11	11
Father Job Classification*		
Higher executives, large proprietors and major professionals	23.3	24.8
Business managers, medium proprietors and lesser professionals	12.2	13.0
Administrative personnel, small business owners and minor professionals	14.6	14.2
Clerical, sales, technicians and little owners	16.2	15.9
Skilled manual	18.6	16.8
Machine operators and semi-skilled	11.2	10.5
Unskilled	4.0	3.6

*Hollingshead classification, reference #42.

occurred to us when a study of well-child care of nine randomly selected pediatricians in Rochester, New York revealed marked differences in the amount of effort each physician devoted to parent education and counseling.³² We reasoned that, with a larger sample of physicians, one should be able to relate various degrees of teaching input with measures of mother and child functioning. Also, since a number of private practices in Rochester use nurse practitioners, it would be possible to study how utilizing these persons in child care influence the results.

The present study was designed to explore the relationships between variations in provider input in terms of teaching new mothers about child behavior and development and various outcome measures including gains in mother knowledge about child development, mother child-rearing style, mother attitudes about her child, her feelings of being supported by the physician, and the child's behavioral and developmental characteristics.

The following specific hypotheses were tested:

1. Mothers will learn relatively more about child development if they receive their well-child care from:
 - a) physicians who spend relatively more effort on educating parents about child development, and/or
 - b) practices using nurse practitioners whose training emphasized child development.

TABLE 2—Mother and Physician Characteristics in Different Practice Settings at Time 0

Practice Types	Mother Characteristics at Time 0			Physician Characteristics at Time 0	
	Age at Birth of 1st Child mean & SD	Education Level* mean & SD	Knowledge of Child Development mean & SD	Years since Graduation from Medical School mean & SD	Mean Physician Teaching Score mean & SD
Groups with Nurse Practitioners (N = 4) 16 Physicians 6 Nurses 235 Mothers	25.4 ± 3.5	4.1 ± 1.0	32.4 ± 4.1	16.7 ± 8.2	(N = 8) 5.2 ± 2.1
Groups without Nurse Practitioners (N = 4) 12 Physicians 242 Mothers	24.8 ± 3.9	3.9 ± 1.0	32.0 ± 4.3	15.8 ± 5.2	(N = 8) 4.9 ± 1.4
Solo Practitioners (N = 7) 7 Physicians 116 Mothers	24.0 ± 3.7	3.7 ± 1.0	31.2 ± 4.0	24.7 ± 8.5	(N = 7) 3.1 ± 1.3

*Hollingshead Classification:
2 = 8-11 yrs. school, 3 = high school graduate, 4 = 1-3 years college,
5 = college graduate, 6 = advanced degree.

Significant Differences between Practice Types

Practice Types	Mother Variables
Groups with PNPs vs. Solos	Age of Mother: p < .001 Educational Level: p < .003 Knowledge at Time 0: p < .01
Groups without PNPs vs. Solos	Age of Mother: p < .05
Groups with PNPs vs. Solos Groups without PNPs vs. Solos	Physician Variables Teaching Score: p < .01 Years since Graduation: p < .05 Teaching Score: p < .05

2. Mothers with more knowledge about child development will, when compared to mothers with less knowledge,
 - a) have fewer concerns about and conflicts with their children,
 - b) feel that their children are easier to rear,
 - c) spend more time in "positive contact" with their children,
 - d) have children functioning at a more advanced level of social and cognitive development.

Methods

Design

The study was longitudinal, following a sample of mothers of first-born children during the child's first 18 months. Each mother's knowledge of child development was first tested a few days after the birth of her first child (Time 0) and again when this child was one year of age (Time 1). Information about the mother's attitudes and child-rearing styles, and her child's behavioral characteristics was also obtained at Time 1. When the child was 18 months of age (Time 2) a measure of developmental status was made. Physician teaching effort was determined at Time 0.

Population and Sample

Physicians: An effort was made to elicit the cooperation of all full-time, private-practice, fee-for-service pediatricians practicing in Rochester, New York and its suburbs (N = 44). These providers were selected because they serve a relatively homogeneous group of middle-class parents, yet vary enough in educational input and practice setting (solo, groups with nurse practitioners, groups without nurse practitioners) that differences related to these variations could be investigated. Of those eligible, two solo practitioners and five physicians in one group practice declined to participate.* Remaining were thirty-five participating physicians (80 per cent of those eligible) distributed in different practice settings as follows: four group practices with nurse practitioners (16 physicians and 6 nurses), four group practices without nurse practitioners (12 physicians), and seven solo practitioners. There was no difference between study participants and nonparticipants in the number of years since graduation from medical school, but the physicians in the solo practices had been out of medical school a longer time than the physicians in group practices (Table 2).

*One other group practice with two physicians, in a state of transition between having and not having a nurse practitioner, was not included for this reason.

Mothers and Children: The target population was English-speaking mothers and their first-born children from intact families, mothers with at least an eighth-grade education, receiving their well-child care from one of the participating pediatricians.

Five hundred ninety-five mothers meeting these requirements were recruited over a 10-month period. Only 21 (3 per cent) of the mothers invited to participate declined to do so. Demographic characteristics of the mothers are shown in Table 1, and those of the practices in Table 2. The mothers receiving care from the solo practice physicians were somewhat younger, less educated, and less knowledgeable about child development than the mothers receiving care from physicians in group practices.

Sample Maintenance: During the 18 months of the study, approximately 115 subjects (19 per cent) of the sample were lost to follow-up. Of these, a little over one-half had either moved from the area or switched to pediatricians not participating in the study, about 15 per cent dropped out of the study, and another 25 per cent indicated a willingness to participate but did not return the questionnaires, the remainder were lost for a variety of reasons including three infant deaths.

Mothers lost from the study tended to be somewhat younger and less educated than those remaining. There were no significant differences in sample losses between groups based on practice setting or teaching status.

Measures

Physician Educational Input: Because of the large number of physicians in the study and the large time commitment necessary to make direct observations of their well-child visits,³² an interview method was developed for assessing their educational input. Twenty-three of the participating physicians (each physician in solo practice and the two physicians seeing the most newborns in each group practice) were interviewed about their use of 10 specific techniques to teach new mothers about child behavior and development. These 23 physicians were providing care for approximately 80 per cent of the mothers being assessed at each time period. In the interview the use of the following educational techniques was explored:

- planned discussions about specific aspects of child development carried out at each well-child visit;
- giving educational pamphlets and materials to the mother;
- suggesting books the mother could read;
- maintaining a lending library;
- use of audio-visual materials;
- bulletin board displays in the waiting room;
- scheduling extra visits for new mothers or those with concerns or problems;
- having a call hour during which mothers are encouraged to call in with specific questions;
- conducting group teaching sessions with mothers;
- utilizing mental health professionals such as social workers or psychologist to help parents with complex problems.

To quantify the input, a scoring system was devised

based on the extent to which each technique was used on a regular basis.* Equal weighting was given to each technique. Scores for each individual technique were added together to produce a total teaching score for each physician interviewed. For those employing nurse practitioners, the scores were based on the contributions of both physician and nurse. These nurses generally alternated well-child visits with the physician.³³

Scores ranged from 1.5 to 9, with a mean of 4.4 and a standard deviation of 1.9. The distribution of scores allowed the sample to be divided roughly into thirds so that, for purposes of data analysis, physicians could be identified as having "high," "medium," or "low" teaching scores. This division resulted in eight "high" scoring physicians with an average score of 6.6, six "medium" scoring physicians with an average score of 4.2, and nine "low" scoring physicians with an average of 2.7.** Although it is theoretically possible for a physician to obtain a high score without ever talking to a mother simply by giving out pamphlets, brochures, etc., this did not happen in this sample. The correlation between scores for personal vs. impersonal teaching methods for each physician was $r = 0.52$.

Reliability and Validity: The Pearson correlation between the eight pairs of teaching scores for the physicians in group practices was $r = .86$, indicating a large degree of homogeneity in the techniques used within each group practice.

To check on the validity of the classification scheme, two mothers who were soon to take their children for a six- or nine-month well-child visit were randomly selected from the practices of each of the 16 pediatricians with either "high" or "low" teaching scores. (One "high" scoring pediatrician had moved out of the state and therefore could not be included in the validation). The 32 mothers were contacted by telephone shortly after these visits and queried about what had happened. Mothers receiving care from "high" scoring pediatricians reported the discussion of significantly more topics of child development ($p < .01$) and the use of significantly more teaching techniques ($p < .005$) than did mothers receiving care from "low" scoring pediatricians.

Mother Knowledge of Child Development: A 45-item questionnaire was developed to test the mothers' knowledge of child development. This included questions about typical stage related behavior, individual differences in temperament, cognitive stimulation and language development, and techniques for modifying behavior.*

The questionnaire was presented for comprehensibility on 40 primiparous mothers of varying educational levels, revised according to their suggestions, and tested again with a new sample of 40 primiparous and 40 multiparous mothers before being used in the study.

Reliability and Validity: The split-half reliability for the Mother Knowledge Questionnaire, corrected with the Spearman-Brown formula was .66 at Time 0 and .59 at Time 1. The correlation between scores at Time 0 and Time 1 was $r = .69$.

*Available on request to authors.

**See Appendix for a description of typical "high" and "low" scoring physicians.

To investigate the validity of the knowledge scores, the questionnaire was filled out by a group of pediatricians who were not participating in the study and by a group of developmental psychology graduate students. As expected, these 33 child development experts scored significantly higher ($\bar{X} = 39$) than the mothers ($\bar{X} = 32$; $p < .001$).

Gain in Maternal Knowledge over one year was measured by constructing a regression equation to predict Time 1 scores from those obtained at Time 0. The predicted score was then subtracted from the actual score obtained, and this difference was the outcome measure used. A negative value indicates the mother learned less than expected.

Mother Attitudes and Child Rearing Style and the Child's Behavior Problems and Patterns: This information was obtained from checklists filled out by the mother when the child was one year of age. These instruments, similar to those used in a previous study of preschool children, had been modified to take into account the age difference.^{34, 35}

For the *child behavior variables*, each mother was asked to rate how well 35 statements of child behavior described her child during the previous two weeks (very = 2, somewhat = 1, or not at all descriptive = 0). Points for different combinations of items were combined to produce the following scores for behavior problems and patterns: eating problems, sleeping problems, parent-child relationship problems, personality trait problems, Total Problem Summary Score, aggressive-resistant behavior pattern, dependent-inhibited behavior pattern, friendly-outgoing pattern.

Mother-Child Rearing Style was ascertained from another checklist on which each mother indicated on a nine-point frequency scale (0 = not at all, . . . 8 = 4 times a day or more) how often she participated in 18 different activities with her child (play together with blocks, cuddle on lap, spank or slap, etc.). Thirteen of these items describe positive types of interaction (affection and cognitive stimulation), and five items describe negative interaction (restriction and punishment). The ratings for each applicable item were added to produce a total score for Positive Contact and Negative Contact.

Mother Concerns and Other Attitudes: After rating each description on the child behavior checklist, the mother indicated whether this type of behavior was causing her any concern or leading to frequent parent-child conflicts. The total number of concerns and the total number of conflicts were tallied for each mother. Each mother also rated her perception of: 1) the child's overall development (3 = above average, . . . 1 = below average); 2) how difficult the child had been to rear (4 = very difficult, . . . 1 = easy); 3) how much help she felt she had received from her pediatrician in understanding and managing the behavior and development of her child (4 = a great deal, . . . 1 = not at all); and 4) (when applicable) how much help she had received from a pediatric nurse practitioner.

Reliability and Validity of Mother Reports of Her Own and Her Child's Behavior: Although not determined specifically for one-year old children, a prior study of childrearing with preschool children showed that reported differences in the use of "positive" and "negative" contact by mothers were significantly related to observed differences in their

homes by independent observers.^{34, 35} Mothers above average on reported use of positive contact in this study³⁵ described their children as more friendly and outgoing than mothers below average, and this too was confirmed by direct observation in the home. For the other measures of child behavior, there is less direct evidence of validity, but both Thomas, Chess and Birch³⁶ and Schaffer and Emerson³⁷ have shown that mother descriptions of child behavior obtained during interviews correlate significantly with the child's behavior obtained in the home by independent observers. Rutter, et al.,³⁸ have also confirmed the validity of mother reports on older children by independent psychiatric evaluations of the children involved.

Child Developmental Status: The children's levels of development were assessed at age 18 months with the Minnesota Child Development Inventory.³⁹ This is a paper and pencil test filled out by the child's mother who checks "yes" or "no" on an answer sheet according to whether or not a statement describes her child's current or past behavior. This test has been standardized on a sample of 796 white, middle-class children from ages 6 months to 6½ years. Scores on the MCDI correlate well with scores on the Bayley Scales of Infant Development and with psychometric evaluations.^{40, 41}

Data Analysis: Because the patient populations of each practice were not identical in socioeconomic and educational characteristics and in initial knowledge of child development (Table 2) it was necessary to control statistically for these differences by using analysis of covariance techniques. Differences were tested after partialing out the effects of mother education, mother initial level of knowledge, and a measure of socioeconomic status based on the father's job classification.⁴²

Results

Hypothesis 1a: Effects of Physician Teaching: Table 3 summarizes the results of the one way analysis of covariance used to test for significant differences on the outcome measures between physicians with high, medium, or low teaching input. Mothers whose pediatricians taught more reported more use of positive contact and more feeling of being helped in the childrearing role.

There are no significant differences, however, on the number of maternal concerns about or reported conflicts with the child, the mother's perception of how difficult the child is to rear, or the mother's perception of the child's overall functioning; measures of the child's overall developmental status were similar for all three groups.

A relationship between the amount of physician teaching input and the presence of behavior problems in the child is also apparent. The strength of these relationships are all low. After partialing out the effects of mother education, father social status, and the mother's initial level of knowledge about child development, the strongest correlation ($r = .19$) is between the physician teaching score and the mother's feeling of being helped. While this is highly significant for

TABLE 3—Relationships between Level of Physician Teaching Input and Outcome Measures of Mother and Child Functioning

OUTCOME MEASURE for MOTHER AND CHILD	Mean Scores of Outcome Measures According to Level of M.D. Input			Significance of Differences between Groups with One Way Analysis of Covariance
	Low N = 157	Med. N = 103	High N = 142	
Mother				
Gain in Knowledge	-0.52	0.32	0.46	.026
Use of Positive Contact	59.2	63.8	63.4	.028
Attitudes				
How difficult to rear	1.7	1.7	1.8	NS
Child's overall functioning	2.4	2.4	2.4	NS
Feels helped by MD	2.6	2.5	3.0	.000
# Concerns	1.1	1.2	1.4	NS
# Conflicts	0.7	0.4	0.6	NS
Child				
Behavioral Problems				
Eating	2.5	2.9	2.8	.007
Sleeping	1.6	1.3	1.7	NS
Parent-relationship	7.3	7.4	7.7	NS
Personality traits	3.8	3.8	4.6	.004
Total symptom score	15.5	16.2	17.3	.019
Behavioral Pattern				
Friendly-outgoing	8.6	8.8	8.7	NS
Agressive-resistant	2.4	2.4	2.4	NS
Dependent-inhibited	3.0	3.1	3.5	NS (.08)
Overall Development	48.4	48.7	48.0	NS

Covariants = Mother Years of Education, Mother Knowledge Time 0, Father Job Classification Time 0

this sample size ($p < .001$), it accounts for less than 5 per cent of the total variance of these measures. The other significant correlations are in the range of $r = .11$ to $r = .13$.

Hypothesis 1b: Effects of Nurse Practitioner: Tables 2 and 4 describe differences in input and output according to practice setting. Physicians combining efforts with nurse practitioners have higher teaching scores than other physicians (Table 2) but the scores are not significantly higher than that of the physicians working in groups without nurse practitioners.

Mothers receiving care from practices with nurse practitioners also have higher mean scores for gain in knowledge, report more use of positive contact with their children, and feel more supported in their childrearing role, but only the last relationship reaches a level of significance. The main differences by practice setting are those between group and solo practitioners. The only significant setting effects are that mothers receiving care from solo physicians see their child as less difficult to rear and feel less helped by their physicians than do other mothers.

Hypothesis 2: Effect on Mother Knowledge. Table 5 shows the relationships between mother level of knowledge at Time 1 and other outcome measures before and after partialing out effects of mother years of education and the father's socioeconomic status.

From this we can see that mothers with more knowledge do not have fewer concerns about or conflicts with their child nor do they describe children with fewer behavior

problems or more advanced levels of development. The only part of Hypothesis 2 to receive any support is that mothers with more knowledge report more use of positive contact with their child ($r = .11$; $p < .01$) and are more likely to describe their child as friendly and outgoing ($r = .10$; $p < .01$). Both these relationships are weak, accounting for less than 2 per cent of the total variance.

Developmental Status of the Child: Since neither physician teaching efforts nor mother knowledge level were related to the child's developmental status at Time 2, we were interested in what other variables were and their relative predictive strengths. Table 6 is a summary of a regression equation relating eight variables significantly correlated with the child's developmental status at 18 months.

The strongest predictor by far is the mother's reported use of positive contact at Time 1. Apparently what the mother actually does with her child is a good deal more important than how much she knows. The next strongest predictors are the child's sex (girls are more developmentally advanced than boys), and the mother's perception at Time 1 that the child is functioning well. The mother's religious orientation, previous childrearing experience, and a friendly-outgoing behavior pattern on the part of the child also add a small amount to the explained variance, as does even a one month difference in age at time of testing.

Mother's Use of Positive Contact: Since the use of positive contact at Time 1 is such an important predictor of the child's developmental status at Time 2, we next examined

TABLE 4—Relationships between Type of Practice Setting and Outcome Measures of Mother and Child Functioning

Outcome Measures for Mother and Child	Mean Scores of Outcome			Significance of Differences between Groups by One Way Analysis of Covariance
	Measures by Practicing Setting			
	Solo N = 97	Groups No PNP N = 201	Groups with PNP N = 204	
Mother				
Gain in Knowledge	- 0.69	0.13	0.27	NS
Use of Positive Contact	60.8	60.8	63.4	NS
Attitudes				
How difficult to rear	1.7	1.9	1.8	.04
Child's overall functioning	2.4	2.4	2.4	NS
Feels helped by practice	2.6	2.8	2.9	.05
# concerns	1.4	1.2	1.0	NS
# conflicts	0.7	0.6	0.6	NS
Child				
Behavioral Problems				
Eating	2.6	2.8	2.6	NS
Sleeping	1.7	1.6	1.6	NS
Parent-relationships	7.4	7.7	7.4	NS
Personal traits	4.0	4.4	3.9	NS
Total symptom score	15.9	17.1	16.0	NS
Behavioral Patterns				
Friendly-outgoing	8.7	8.7	8.7	NS
Aggressive-resistant	2.4	2.5	2.3	NS
Dependent-inhibited	3.1	3.4	3.1	NS
Overall Development	49.4	48.6	47.9	NS

Covariants = Mother Years of Education, Mother Knowledge at Time 0, and Father Job Classification, Time 0

the variables related to this and their relative predictive strengths. This regression equation is summarized in Table 7.

The variables were entered into the regression equation in three steps according to the following time sequences: The first step consists of all variables operating at the time of birth of the child. The second step is the physicians' teaching efforts assumed to be operating from birth to age 1, and the last step consists of the five characteristics of the mother and child at Time 1 when the mother's use of positive contact was ascertained.

From Table 7 it can be seen that about 40 per cent of the explained variance is accounted for by characteristics of the mother at the time of her child's birth. The physician's teaching efforts add a small amount, but most of the remaining explained variance is accounted for by mother and child characteristics at Time 1. The variables with the largest Beta Weights are those dealing with the mother's perception that her child is functioning well, that she is being helped by the pediatric practice in her childrearing efforts, and that her child's behavior pattern is friendly and outgoing rather than aggressive and resistant. The mother's initial knowledge of child development and her gain in knowledge over the year also provide some value for prediction.

In order to demonstrate possible causal relationships, which cannot be inferred from simple correlations alone,

these variables were subjected to path analysis based on the previous regressions. Path analysis can be conceptualized as a proposal of a plausible interpretation of the relationships between variables that is compatible with the observed data.⁴³ The model presented in Figure 1 was developed, using the common practice of deleting non-significant causal pathways and recomputing path coefficients to arrive at a reduced form of the model.

A 50 per cent random subsample (n = 239) was used to develop this model, and the remaining subsample was analyzed to examine the model for stability across subsamples. Correlation coefficients calculated from the reduced path model reproduced those from the original correlation matrix very well: no departures from the original correlations were greater than .08 correlation points. In addition, regression coefficients were replicated across subsamples.

The results of the path analysis are consistent with the findings presented earlier. Furthermore, even after the factors from Time 0 (sex, religion, experience, and occupation) have been taken into account, three factors from Time 1 (mother's perception of overall functioning, her use of positive contact, and the child's friendly-outgoing behavior) have significant impact on general development. It is impressive that the antecedent variable with the greatest impact on general development—mother use of positive contact—is open to physician influence.

TABLE 5—Correlations between Mother Knowledge of Development at Time 1 and Outcome Measures of Parent and Child Functioning (N = 503)

Outcome Measures	Pearson r		P value	
	Zero order correlations	Partial Correlations*	1	2
Mother Attitudes (Time 1)				
Number of concerns about child	.02	.02	NS	NS
Number of conflicts with child	-.02	.02	NS	NS
How difficult child is to rear (4 = difficult; 1 = easy)	.02	.06	NS	NS
Child's overall functioning (3 = above average; 1 = below average)	.01	-.04	NS	NS
How helpful MD has been (4 = a great deal; 1 = none)	-.03	-.05	NS	NS
How helpful PNP has been (4 = a great deal; 1 = none)	.08	.08	NS	NS
Mother Child Rearing Style (Time 1)				
Use of Positive Contact	.18	.11	<.001	<.01
Use of Negative Contact	-.27	-.12	<.001	<.01
Child Behavior (Time 1)				
Eating problems	-.08	-.04	NS	NS
Sleeping problems	-.03	-.01	NS	NS
Parent-relationship problems	.05	.05	NS	NS
Personality traits	.00	.05	NS	NS
Total symptoms	.01	.04	NS	NS
Aggressive-resistant pattern	-.03	.03	NS	NS
Inhibited pattern	.06	.06	NS	NS
Friendly-outgoing pattern	.14	.10	<.001	<.01
Child Development (Time 2)				
General development	-.04	-.03	NS	NS
Expressive language	-.05	-.05	NS	NS

*Correlations after partialing out values for mother education and father job classification.

TABLE 6—Summary of Regression Equation for Variables Related to Child's Developmental Status at Time 1 (N = 467)

Independent Variables	Simple r	Multiple R	R Squared	Change in R Square	Standardized Beta Weight	F Value
Mother's Use of Positive Contact	.38	.38	.15	.15	.35	68.47****
Child's Sex*	.24	.44	.19	.04	.19	22.14****
Mother's Perception of Child's Overall Functioning	.21	.46	.21	.02	.16	14.93****
Father's Occupational Classification	.04	.48	.23	.02	.12	9.09****
Mother's Religion**	.11	.50	.24	.02	.13	10.01****
Child's Age Time 2***	.12	.51	.26	.01	.12	9.61****
Child's Friendly-Outgoing Behavior Pattern	.20	.52	.27	.01	.11	6.84****
Mother's Prior Experience with Children	.09	.52	.28	.01	.08	3.98****

*male = 1, female = 2

**Catholic = 1, non-Catholic = 0

***18 or 19 months

****p < .01; overall F value for complete equation; F = 21.87, df = (8,485), p < .01

Discussion

These findings support the hypothesis that physician efforts at parent education and counseling may have positive

effects on mother functioning. Mothers are more likely to gain knowledge about child development, report more use of positive contact with their children, and feel more supported in their child-rearing roles if they receive well-child care

TABLE 7—Summary of Regression Equation for Variables Predicting Mother's Use of Positive Contact at Time 1 (N = 494)

Independent Variables	Simple r	Multiple R	R Square	RSQ Change	Standardized Beta Weights	F Value
Variables in Operation at Birth of Child (Time 0)						
Mother Years of Education	.17	.17	.03	.03	.02	0.20
Mother's Knowledge of Development (Time 0)	.17	.20	.04	.01	.09	3.04*
Mother's Religious Orientation (Catholic, Other)	-.10	.21	.04	.01	-.05	1.34
Father's Job Classification	-.16	.22	.05	.00	-.06	1.34
Mother Took Child Birth Classes	-.04	.23	.05	.00	-.05	1.63
Child Sex (Female)	.06	.23	.05	.00	.05	1.44
Mother's prior Experience with Children	.01	.24	.06	.00	.03	0.40
Physician Teaching Input (Time 0)						
Average Teaching Score per Practice (Time 0)	.13	.26	.06	.01	.07	2.55*
Mother and Child Characteristics (Time 1)						
Mother's Perception of Child's Overall Functioning	.19	.31	.10	.03	.16	13.96*
Child's Behavior: Friendly-Outgoing	.20	.34	.12	.02	.14	10.34*
Mother's Perception of being Helped by MD or Nurse	.13	.36	.13	.01	.13	8.83*
Child's Behavior: Aggressive-Resistant	-.11	.37	.14	.01	-.09	4.82*
Mother's Gain in Knowledge over 1 Year	.11	.38	.14	.01	.08	3.10*

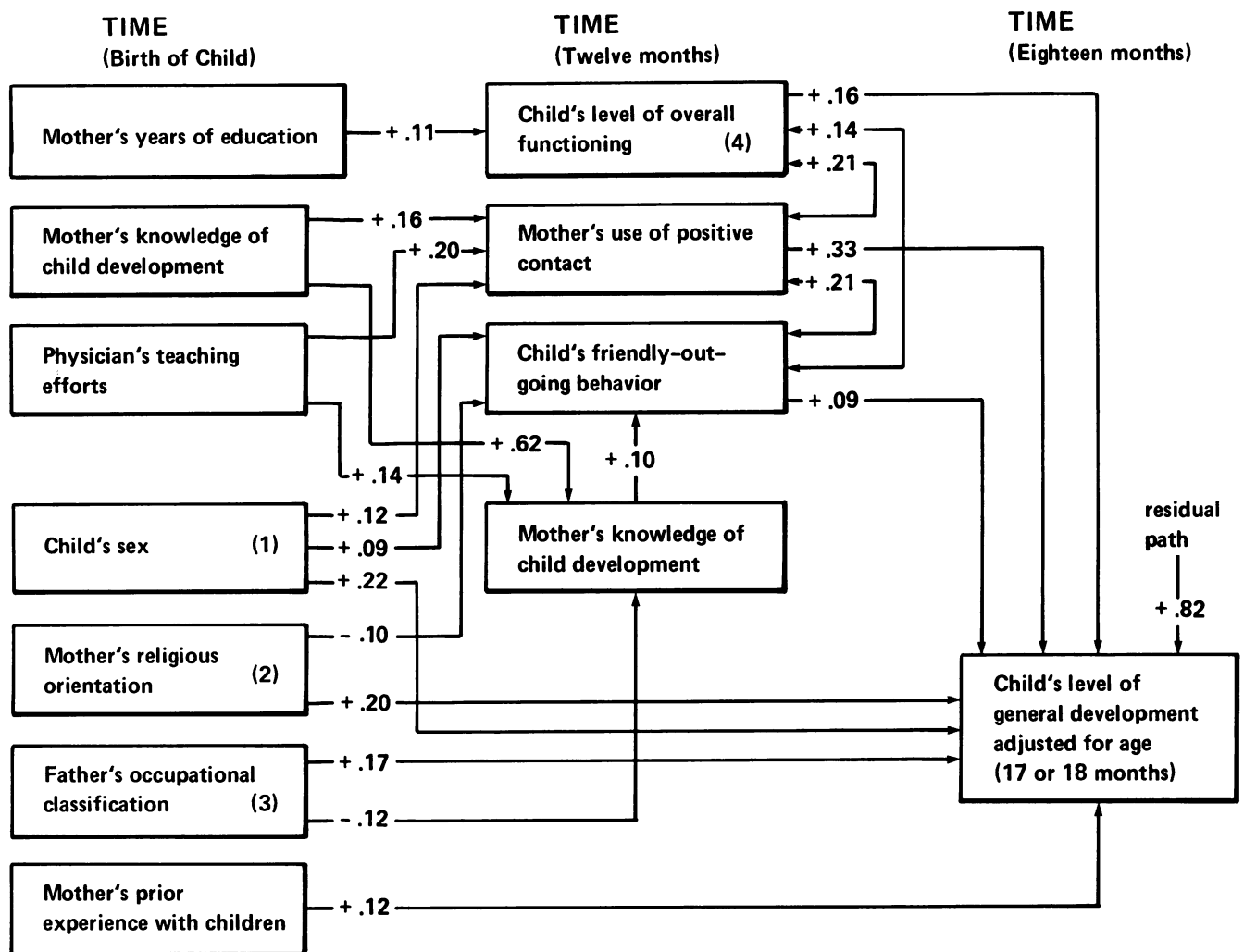
*p < .01; overall F value for complete equation: F = 6.20, df = (13,480); p < .01

from practices that make at least a moderate effort to provide guidance and counseling.

These three aspects of mother functioning are potentially important for both child and family functioning. We have already discussed the relationships between physician teaching and mother knowledge and her use of positive contact as well as the relationship between use of positive contact and the development status of the child. The importance for child development of positive early mother-child interaction has also been carefully and clearly documented in the longitudinal study of families on the island of Kauai.⁴⁴ Perhaps of even greater importance is the relationship between physician effort and the mother's feeling of support. In a recent review of the literature, Cobb summarizes data indicating that social support is an important protector against a variety of health consequences related to life stress.⁴⁵ Kempe also provides some direct evidence that social support can prevent the types of family dysfunction leading to child abuse and neglect.⁴⁶ It is possible then that the supportive aspects of well-child visits may turn out to be the most important of all in terms of the child's long-term development.

Because of this, we strongly recommend that some attempt be made to measure the effect of reduced numbers of well-child visits on the mother's use of positive contact with her child and her feeling of being supported by the physician before making any widespread recommendations for change. Not doing this will be an abandonment of the comprehensive goals of well-child care long advocated by the American Academy of Pediatrics.

On the other hand, the modest nature of the relationships with the mother outcome variables and the failure to find any direct positive relationships between physician input and the child's behavioral and developmental status indicate that there is considerable room for improvement. This later finding is not surprising when one compares the amount of time spent on well-child visits in the average physician's office (10-15 minutes every two or three months)³² with that of program reporting positive influences on child development (one of two hours a week in the child's home.)^{12-14, 27-31} Nurse practitioner visits are generally longer than physician visits, but in this study this extra time was not enough to significantly influence the child outcome measures.



All casual paths are estimated with standardized path coefficients except for the non-recursive block consisting of the set of variables overall functioning, positive contact, and friendly-outgoing behavior. Reciprocal relations between these variables are shown as correlations and do not influence other standardized path coefficients.

- (1) 1 = male, 2 = female
- (2) 1 = Catholic, 0 = Other
- (3) Hollingshead classification: Lower classification values correspond to higher status occupation
- (4) 1 = below average, 2 = average, 3 = above average

FIGURE 1—Path Diagram of Factors Leading to Child's Level of General Development at 18 Months of Age (N = 239)

What might be a more effective way to provide education and emotional support to new families? Gordon has shown that lay persons can be trained to teach mothers how to increase positive interactions with their child⁴⁷ and Kempe's work indicates that such persons can also provide significant amounts of emotional support to high risk families.⁴⁶ Home visitors could also be trained to inspect homes for safety hazards, see that children are up-to-date in their immunizations, and carry out other aspects of a comprehensive program of prevention. Perhaps the most cost-effective

solution to the well-child visit controversy would be to decrease the number of office visits with the physician and supplement them with home visits by trained lay persons.

However, if such approaches to care are to be tried, the present finding that physician teaching efforts were slightly but significantly related to child behavior problems should give us caution. Perhaps counseling makes mothers more protective, reinforcing dependent types of child behavior. Cullen has also raised a question about some negative side effects of his intervention program.³¹ It would seem impor-

tant, therefore, to perform some careful pilot studies to evaluate hazards as well as benefits before advocating widespread change.

Whatever the solution, it is time to rethink our total approach to providing preventive services to mothers and young children. If periodic well-child visits with physicians are too expensive, or not as effective as they could be in terms of providing education and emotional support, other alternatives should be explored before we retreat from our goals of comprehensive care and once again become preoccupied with only the physical aspects of child development.

REFERENCES

1. Yankauer A: Child health supervision—is it worth it? *Pediatrics*, 52:272-277, 1973.
2. Stickler GB: How necessary is the routine check up? *Clin Pediatr* 6:454, 1967.
3. Hoekelman RA: What constitutes adequate well-baby care. *Pediatrics*, 55:313-326, 1975.
4. Council on Pediatric Practice. Standards of Child Health Care. Evanston, IL. American Academy of Pediatrics, 1972.
5. Bloom BS: Stability and Change in Human Characteristics. New York: John Wiley & Sons, Inc., 1974.
6. Chamberlin RW: New knowledge in early child development: its importance for pediatricians. *Am J Dis Child*, 126:585-587, 1973.
7. Chamberlin RW: Management of preschool behavior problems. *Pediatr Clin North Am*, 21:33-47, 1974.
8. Hornberger R, Bowman J, Greenblatt Y, and Corsa L: Health supervision of young children in California. Berkeley, CA: Department of Public Health, 1960.
9. Bower EM: Early Identification of Emotionally Handicapped Children in School, (2nd Ed.) Springfield, IL., Charles C. Thomas, 1969.
10. Glidewell J, Domke H, Kanthor M: Screening in schools for behavior disorders: use of mother's reports of symptoms. *J Educ Res*, 56:508-515, 1963.
11. Cowen E, Izzo L, Miles H, et al: A preventive mental health program in the school setting: description and evaluation. *J Psychol* 56:307-356, 1963.
12. Schaefer E: Parents as educators: evidence from cross-sectional longitudinal and intervention research. *Young Children*, 27:227-239, 1972.
13. Johnson D, Lelev H, Rios L, et al: The Houston Parent-Child Development Center: a parent education program for Mexican-American families. *Am J Orthopsychiatry*, 44:121-128, 1974.
14. O'Keefe, A: Home Start: partnership with parents. *Child Today*, 2:12-16, 1973.
15. Thomas A, Chess S, Birch H: Temperament and the Behavior Disorders of Children. New York: NYU Press, 1968.
16. Allen F, Hart B, Buell J, et al: Effects of social reinforcement on isolate behavior of a nursery school child. *Child Dev*, 35:511-518, 1964.
17. Bijou S: Behavior modification in the mentally retarded. *Pediatr Clin North Am*, 15:969-987, 1968.
18. Brown P, Elliot R: Control of aggression in a nursery school class. *J Exp Child Psychol* 2:103-107, 1965.
19. Johnson CA, Katz RC: Using parents as change agents for their children: a review. *J Child Psychol Psychiatry*, 14:181-200, 1973.
20. Wahler R, Winkel G, Peterson R, Morrison D: Mothers as behavior therapists for their own children. *Behav Res Ther*, 3:113-124, 1965.
21. O'Dell S: Training parents in behavior modification: a review. *Psychol Bull*, 81:418-433, 1974.
22. Stine OC: Content and methods of health supervision by physicians in child health conferences in Baltimore. *Am J Public Health*, 52:1858-1865, 1962.
23. Starfield E, Borkowf S: Physician's recognition of complaints made by parents about their children's health. *Pediatrics*, 43:168-172, 1960.
24. Korsch BM, Negrete V, Mercer S, Freeman B: How comprehensive are well-child visits? *Am J Dis Child*, 122:484-488, 1971.
25. Blum LH: Some psychological and educational aspects of pediatric practice: a study of well-baby clinics. *Genet Psychol Monogr*, 41:3-97, 1950.
26. Mindlin R, Denson P: Medical care of urban infants: health supervision. *Am J Public Health*, 61:687-697, 1971.
27. Gutelius M, et al: Promising results from a cognitive stimulation program in infancy. *Clin Pediatr*, 11:585-593, 1972.
28. Gutelius M, Kirsch A, McDonald S, et al: Controlled study of child health supervision: behavioral results. *Pediatrics*, 60:294-304, 1977.
29. Jason L, Kimbrough C: A preventive educational program for young economically disadvantaged children. *J of Community Psychol* 2:134-139, 1974.
30. Scarr-Salapatek S, Williams M: The effects of early stimulation on low-birth weight infants. *Child Dev*, 44:94-101, 1973.
31. Cullen K: A six year controlled trial of prevention of children's behavior disorders. *J Pediatr*, 88:662-666, 1976.
32. Foye H, Chamberlin RW, Charney E: Content and emphasis of well-child visits: experienced nurse practitioners vs. pediatricians. *Am J Dis Child*, 131:794-797, 1977.
33. Charney E, Kitzman H: The child health nurse (pediatric nurse practitioner) in private practice: a controlled study. *N Eng J Med*, 28:1353-1358, 1971.
34. Chamberlin RW: Can we identify a group of children at age two who are at high risk for the development of behavior or emotional problems in kindergarten and first grade? *Pediatrics*, 59:(Supplement), 971-981, 1977.
35. Chamberlin RW: Parent use of "positive contact" in child-rearing: its relationship to child behavior patterns and other variables. *Pediatrics*, 56:768-773, 1975.
36. Thomas A, Chess S, Birch HG, et al: Behavioral Individuality in Early Childhood. New York: University Press, 1963.
37. Schaffer HR, Emerson PE: The development of Social Attachments in Infancy. Monographs of the Society for Research in Child Development, 1964, 29 (3, Serial no. 94).
38. Rutter M, Tizard J, Whitmore K: Education, Health and Behavior. London: Longman Group Limited, 1970.
39. Ireton, H. and Thwing, E. Appraising the development of a preschool child by means of standardized report prepared by the mother. *Clinical Pediatrics*, 15:875-882, 1976.
40. Colligan R: The Minnesota Child Development Inventory as an aid in the assessment of developmental disability. *J Clin Psychol* 33:162-163, 1977.
41. Szumowski E, and Chamberlin, RW: Assessing the developmental status of preschool children: A validation of the Minnesota Child Development Inventory. (Unpublished data).
42. Hollingshead A: Two Factor Index of Social Position. Privately published, New Haven, Conn. 1957.
43. Li C: Path Analysis: A Primer. Pacific Grove: The Boxwood Press, 1975.
44. Werner E, Bierman J, French F: The Children of Kauai. Honolulu: University of Hawaii Press, 1971.
45. Cobb S: Social support as a moderator of life stress. *Psychosom Med*, 38:300-314, 1976.
46. Kempe H: Approaches to preventing child abuse: the health visitor concept. *Am J Dis Child*, 130:941-947, 1976.
47. Gordon I: Stimulation via parent education. *Children*, 16:56-58, 1969.

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APPENDIX

Profile of One High-Scoring Physician

Dr. X works in a group practice with nurse practitioners. Physicians and nurses alternate in seeing a mother at well-child visits. A new mother is visited in the hospital by both Dr. X and a nurse practitioner, who may also make a home visit when the baby is one or two weeks of age. At each well-child visit, specific topics relating to child behavior and development are briefly discussed, and the mother is given a specially-prepared handout outlining what to expect from her child in the months ahead. At the six-month well-child visit the mother takes home and fills out a "temperament questionnaire." This is mailed back to the office, scored, and discussed with the mother at the nine-month visit. Books are routinely recommended, but not provided within the practice setting.

Dr. X sets aside a half-day each week for more lengthy

discussions with parents about special problems. His practice employs a social worker part-time, and a psychologist is available a half-day each week to see patients referred from the practice. The social worker also conducts group sessions in the evenings for interested parents.

The waiting room has educational material posted and child-care related material available to be ready by waiting mothers. The nurse practitioners have regular telephone call hours.

Profile of One Low-Scoring Physician

Dr. Y is in solo practice. Office visits are used to examine the child, discuss routine care, and answer any questions asked by the mother. No specific topics of child development are regularly brought up, and handouts are not used except for special problems. No books are recommended. Children with special problems are referred to appropriate specialists in the city, but no specialists are associated with the practice. There are no educational materials displayed in the waiting room, and no telephone call hour has been established.

Continuing Education Offerings in Nursing

Several continuing education workshops and conferences are being offered in nursing at various locations over the next few months. These include:

"Excellence in Education" is the theme for the Third Annual Nurse Educator Conference to be held October 14-17, 1979, at Detroit Plaza, in the Renaissance Plaza. It will focus on curriculum and program development, evaluation of curriculum, faculty and clinical work, developing centers of excellence and more. Registration fee is \$105.00 for seven programs.

"Competency-Based Education," "Self-Learning Packages" and "Values Clarifications" Workshops, with Dorothy del Bueno leading the first two, and Diane Uustal on Values will be featured this fall and winter. Choose the location best for you, or one that coincides with your vacation:

- Hotel Toronto, Oct. 29-31;
- Seattle Olympic, Nov. 14-16;
- Condado Beach Hotel in San Juan, Dec. 5-7, all in 1979; and
- Hyatt Lake Tahoe at Incline Village Ski Resort, Jan. 7-9, 1980. Registration for 2 days \$100; for 3 days \$150.

For more information write Ruby Browne, Nurse Educator, Dept. EO, 12 Lakeside Park, Wakefield, MA 01880.

Perspectives in Psychiatric Care '80, a national psychiatric nursing conference, will be held at the Fairmont Hotel in Philadelphia May 28th-31st, 1980, sponsored by *Nurse Educator* and *Perspectives in Psychiatric Care*. The conference will provide a national forum where psychiatric nursing clinicians, administrators and educators can share ideas, skills, knowledge and experience, in order to serve the psychiatric nursing community and the cause of more effective health care.

More than 1200 psychiatric mental health nurses are expected to attend this conference, representing all facets of psychiatric nursing, from private practice to institutional practice, from education to research. For more information, contact Linda W. Conrad, Nurse Educator, 12 Lakeside Park, Wakefield, MA 01880, phone: 617/245-7824.