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ABSTRACT

A study involving 55 abusive or neglecting families and 54 control families with children under 4 months to 2 1/2 years old was conducted to develop a battery of measures for identifying parents who have potential for abuse and/or neglect of children. Interviews, questionnaires, videotaped behavioral observations, and physiological responses were used to investigate variables such as parents' background, personality, and child rearing attitudes. Measures differentiated between the abusive group and controls on background, empathy, self concept as a parent, maternal or infant complications of pregnancy or newborn period, how parents handled irritating child behaviors, child rearing attitudes, parent-child communication, parent child interaction, parental support systems, and physiological response. (Author/SBH)

MEASURES TO PREDICT CHILD ABUSE*

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ABSTRACT

The purpose of the study was to develop a battery of measures with which to identify parents who have potential for abuse and/or neglect of children. The sample of 169 was composed of abusive men and women parents or parent figures matched with controls.

The variables, parents' background, personality, child rearing attitudes, social networks, antecedents to early attachment, ways of handling irritating child behaviors, and parent-child interactions, were tested by interview, questionnaire, videotaped behavioral observation and physiological responses.

Both bivariate and multivariate data analysis procedures were utilized including zero order correlations, factor analysis, path analysis, and discriminant analysis.

The measures sharply differentiated between groups on background, empathy, self concept as a parent, maternal or infant complications of pregnancy or newborn period, how parents handled irritating child behaviors, child rearing attitudes, parent-child communication, parent-child interaction, parental support systems, and physiological response. Abusive parents maintained higher heart rates and had less heart rate variability. When both high heart rate and low variability in heart rate were present, subjects' electrodermal skin response took longer to return to normal.

* This research was supported by a Maternal and Child Health (Social Security Act, Title V) Grant, MC-R 530351

INTRODUCTION

The advantages of being able to detect potential for child abuse early enough to provide preventative intervention are obvious. Many attempts have been made to develop measures for such detection. These have included interviews, questionnaires, and observation of parent-child interaction (Green 1976; Paulson et al 1975; Schneider et al 1972). It is generally accepted that abusive parents have difficulty coping with child related stresses. One would expect that such parents would exhibit physiological changes when they are stressed enough to hurt their children. Only one study was found in which physiological measurement was used to test abusive parents and that one study did not measure response to pleasant or stressful stimuli (Smith et al 1973).

The study on which this report is based was a multidisciplinary attempt to develop a battery of measures for prediction of child abuse or neglect which would utilize with the same sample, interviews, questionnaires, videotaped parent-child interaction and physiological response to child related pleasant and stressful stimuli. The professional staff was composed of sociologists, nurses, a clinical psychologist and physiologist and a social worker. Consultants from medicine, psychology, biostatistics, social work and sociology have also been very helpful.

SAMPLE

A sample of 55 abusive or neglecting families were matched with 54 control families. Study subjects, recruited from Child Protective Services' open case loads, were matched with controls on age of the child, and age, education, race and single versus couple status of the mother. Control families were selected from well child clinics and from responses to newspaper and radio appeals. There were 169 adult subjects, 109 females and 60 males. About half of the mothers had not graduated from high school; less than one fourth were high school graduates or had some college; and about five percent were college graduates. Families were selected on the basis of the child's age (early infancy-under 4 months, late infancy 6-12 months, early toddler 1-1½ years, and late toddler 2-2½ years). It had been hoped to obtain a sample with 30% Black families but only 12 Black subjects (7%) were recruited.

VARIABLES

The nine independent variables were tested in a path analysis model (See Figure 1). Path analysis assumes asymmetric causal relationships--not single causes. The paths of relationships, when considered together, permit inferences about the influence of sets of variables on the dependent variable, in this case--child abuse (Duncan 1966).

How the parent was reared as a child would be expected to influence how he(she) rears his own child, what types of discipline he uses, what types of child behaviors he finds irritating, whether he talks to the child and even his overall heart rate and electrodermal response to stresses and pleasures related to child behavior. Child rearing attitudes, the formation of which start in childhood, would be expected to influence how irritating child behaviors are handled, how the parent

interacts with the child and the physiological response to specific behaviors such as crying, soiling of diapers or laughing.

PROCEDURES

Data were collected in the home and at the University with subjects transported to the University in a leased car. In the home, subjects were interviewed about their own childhood and about current relationships with spouse or mate, with their parents and with the child. While one parent was being interviewed, the other was videotaped teaching the child two tasks, one age appropriate and one more difficult. The parent-child interaction was coded using scales developed by Barnard (Barnard et al 1974). The scales measure the parent's facilitating behavior composed of management of teaching materials, positioning of the child, sensitivity to the child's cues, and parental comfort. Also measured was the child's readiness to learn; e.g., success with task, duration and intensity of involvement.

At the University, subjects filled out a questionnaire which included child rearing attitudes, empathy scales (Mathews et al 1976), a machiavellian scale (Christie and Geis 1970) and a measure of how the parent had handled specific irritating child behaviors. Subjects were then shown the physiological laboratory, were encouraged to sit in the testing chair and were shown the electrodes or had some applied. Physiologic testing was usually done on the same day the subjects visited the laboratory, resulting in a one day University visit.

Physiological measurement included heart beat to beat intervals, continuous recording, left and right hand blood volume pulse, left and right hand electrodermal skin conductance level, left to right hand skin conductance response, skin temperature, and respiration rate. Skin conductance electrodes were applied to the palmar surfaces of the index and middle fingers of both hands and electrodes for blood volume pulse to the fourth finger of each hand. EKG electrodes were applied to the left ankle and right forearm with the ground electrode on the right ankle. A skin temperature probe was fastened to the left little finger and a respiratory belt placed around the chest. A Model R Beckman dynograph was used to record the responses.

The stimulus tapes to which subjects responded were made for the project and show mother-father-child interaction in families of the same race as the subject with a child the same age as the subject's child. Some scenes were pleasant and some stressful. Neutral stimuli (a pastel color show) were provided for collecting 15 minutes of base line data and 3 minutes each to separate the scenes.

After the physiological testing, all subjects were shown their videotapes made in the home and were asked their feelings about the project, about the stimulus tapes used for physiological testing, and how they felt during the viewing of the stimulus tapes. Each subject was paid $20 when they completed the testing.

DATA REDUCTION AND ANALYSIS

At one point in the study there were 1122 variables excluding the physiological variables. These included 800 parental child rearing attitude scale items, 155 possible ways of handling different child behaviors, 33 empathy items, 20 machiavellian items, 80 interview codes, and 24 observation codes. Through item analysis, scaling techniques, and factor analysis, these variables were reduced to 28 plus the 12 physiological indicators. Further variable reduction was effected with discriminant analysis, resulting in 17 indicators which best discriminated between abusers and non abusers.

The ways parents handled irritating child behaviors were analyzed according to the modal category of parental options used for each child behavior. Zero order correlations were computed for each independent variable with abuse as well as intercorrelations between the independent variables. Some of the data were multilevel ordinal (7 point Likert scales) and some interval level and above (physiological data) but much of the interview data was very soft, little more than dichotomous. Kendall's Tau was chosen as the measure of association because of its asymmetrical ordinal qualities plus the fact that it appears to be more consistent when used in path analysis (Plock 1974). Ordinal measures of association are generally lower than those computed from continuous data. For readers accustomed to Pearson's product moment r, Tau coefficients frequently appear weak even though statistically significant.

PATH ANALYSIS

Path analysis which consists of the mapping of paths of sets of relationships among variables, assumes both asymmetric relationships and linearity and has usually been used only with interval level data. Recent developments in causal analysis now enables adequate treatment of ordinal as well as interval level variables (Blalock 1974; Reynolds 1971; Leik 1976). The path analysis model was solved using Tau coefficients to generate beta weights, a procedure recently perfected by Leik but not yet in print.

FINDINGS

The fallacy of combining neglect, and physical, psychological and sexual abuse under one heading for prediction and planning intervention based on that prediction is shown by some of the findings. Table I shows relationships between individual variables and abuse. Abuse in the first column of Tau coefficients refers to physical abuse and neglect combined in the second column to physical abuse, and in the third column to neglect.

Results for abusive and neglecting parents were similar for some variables. Both groups were abused as children, were low in empathy, had few close friends, had been separated from their children, showed role reversal, sadistic, low boiling point, and strict disciplinarian child rearing attitudes, did not communicate with their children, and were low in facilitating behavior in the videotaped parent-child interaction.

For other variables, there were real differences between parents who inflicted abuse and those who neglected their children. Correlations,

positive or inverse, between certain variables and neglect were stronger than were the relationships of the same variables with abuse. This was true for the variables, machiavellianism, getting along with their own parents as children, self concept as a parent, antecedents to early attachment (whether pregnancy was unplanned, complications for mother or baby and/or baby kept in hospital after mother's discharge), and satisfaction with the ways child rearing disagreements were handled within the family.

Abused children were less ready to learn than were neglected children. On the physiological measures, the high heart rate, lack of variability of heart rate across scenes, and the differences in blood volume pulse for scene 1 (pleasant) and scene 2 (unpleasant), applied only to abusive parents, not neglectors. Another physiological finding was that when both high heart rate and low heart rate variability occurred (for either abusive or control groups), the electrodermal response had a longer half life; i.e. it took longer to return to normal.

Table II compares modal ways of handling irritating child behaviors for abusers, neglectors, spouses of abusers and controls. The four groups agreed on giving of affection for a child who won't stop crying or who tells the parent that he doesn't love him, on explaining why the child should not bite and hit, withholding (withhold privilege, ignore or isolate) when the child screams or yells, and doing nothing because the behavior is normal when the child soils diapers or pants.

The groups differed on how to handle the uncooperative child with spouses of abusers saying they would use physical punishment, abusers and neglectors withholding, and controls explaining to the child why he shouldn't. Only controls perceived the child's getting angry at parent as normal behavior. Controls and spouses agreed on perceiving as normal the child's embarrassing the parent, on explaining why he shouldn't break a possession of the parent, and on distracting the child who never lets the parent alone. Abusers and neglectors said they used physical punishment only when the child broke something of theirs.

When the path analysis model was solved, the R^2 was .43, $P < .001$. This means that the 17 indicators explained 43% of the influence on abuse. This is high for these kinds of data.

Prediction was however, based on abuse and neglect combined using the same indicators. Further work is being done on this. Table III shows the predictive value of the 17 indicators, (those starred * in Table I). Sensitivity, the ability to accurately predict abusers was 84% with 16% false negatives. Specificity, the ability to accurately predict non abusers was 91% with 9% false positives. The predictive value of a positive, that percentage of those predicted as abusers who were, in fact, abusers was 88%.

DISCUSSION

These findings from analyzing data from the entire sample of 169 parents are quite similar to the preliminary findings reported earlier (Disbrow et al 1977). This is reassuring from the standpoint of constructing predictive measures. The sample from this stage of the research however, represents two extremes, known abusers and neglectors matched with non abusers. Sensitivity and specificity would be expected to be high for this type of sample (Frankenburg 1973).

The investigators have now embarked on a longitudinal study with patients from an H.M.O. as subjects. The sample will be stratified on economic level and race in an attempt to get a more representative sample from the population. Families will be selected late in pregnancy and screened on measures from the developmental phase when the infant is one month old. Subjects will then be divided into high and low risk groups and followed until the target child is 2½ years old.

Four extra measures will be added, a measure of stress, a determination of the ratio of appointment versus emergency type health care visits, a chart review to look at illness and accident patterns for the children, and developmental screening at four time periods. This should provide better estimates of sensitivity, specificity, and the predictive value of a positive for the battery of measures or for two batteries, one for abuse and one for neglect.

From the standpoint of concurrent validity, a battery of measures using multiple kinds of techniques is desirable. In the pragmatic world, one would utilize only those portions of the measures that would be appropriate. There are, however, certain circumstances when the investigators feel that the entire battery might be utilized (given predictive validity at the end of the longitudinal study). These would include court cases to decide custody of children, placement of children in foster homes, or for young persons who are undecided about starting a family who might want to test their parent potential.

SUMMARY

The measures sharply differentiated between abusers and controls on background, empathy, self concept as a parent, maternal or infant complications of pregnancy or newborn period, how parents handled irritating child behaviors, child rearing attitudes, parent-child communication, parent-child interaction, parental support systems and physiological response. Abusive parents maintained a higher heart race and lower variability in heart rate across scenes. When both high heart rate and low variability in heart rate were present, subjects showed a longer electrodermal skin response half life; i.e. they took longer to return to normal.

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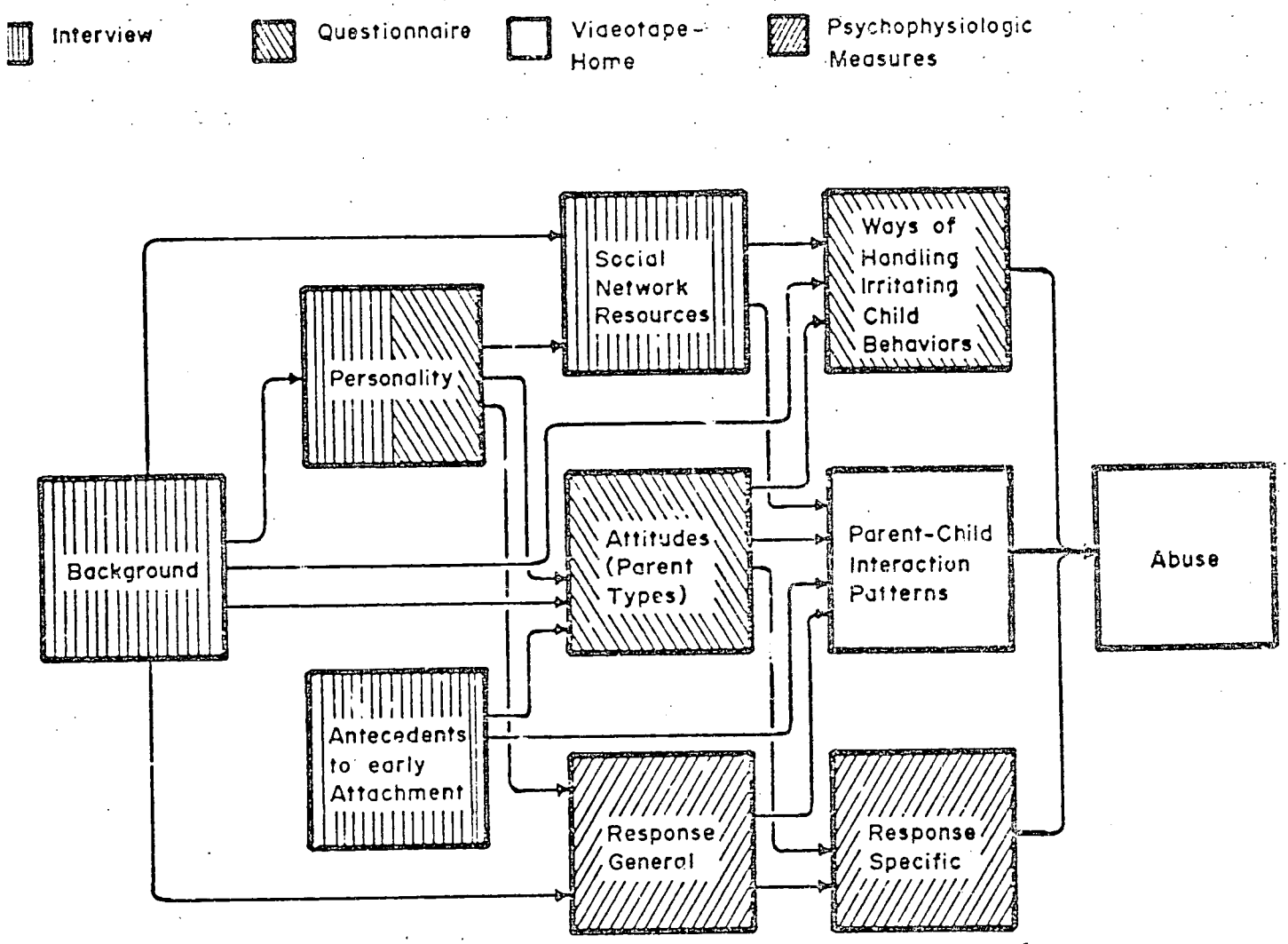

FIG. 1 Path Analysis Model Variables and Source of Data

TABLE I

TAU COEFFICIENTS REFLECTING RELATIONSHIPS BETWEEN SPECIFIC VARIABLES AND ABUSE

Major Variables and Indicators	Tau Coefficients		
	Total[a] Abuse	Physical[b] Abuse	Neglect[c]
Background			
Parent factor	-.21***	-.14*	-.24***
Ways handled as a child	.26***	.23***	.26***
Personality			
Machiavellianism	.11*	.08	.12*
Empathy	-.25***	-.23***	-.22***
Self concept as a parent	-.19***	-.13*	-.20***
Antecedents to early attachment	.21***	.15**	.23***
Social Network Resources			
Getting away from children	.25***	.29***	.17**
Close friends	-.30***	-.29***	-.31***
Current pets	.13***	.06***	.18***
Feelings about handling child rearing disagreements	-.22***	-.28***	-.15**
Parent Child Rearing Attitudes			
Role reversal	.37***	.33***	.33***
Sadistic	.22***	.22***	.18***
Low boiling point	.36***	.34***	.32***
Strict disciplinarian	.30***	.25***	.29***
Ways of Handling Irritating Child Behaviors	.44***	.42***	.38***
Parent-child Interactions			
Perceived communication between parent and child	-.31***	-.27***	-.30***
Child's readiness to learn	-.18***	-.21***	-.12***
Parent facilitating behavior	-.41***	-.40***	-.34***
General Physiological Response			
Heart rate means -all scenes	.06	.11*	.0002
Heart rate variability-all scenes	-.08	-.16**	.002
Specific Physiological Response			
Blood volume pulse-scene 1	-.10*	-.14*	-.04
Blood volume pulse-scene 2	.14**	.15**	.10

[a]N composed of 33 abusers, 34 neglectors, and 84 controls

[b]N composed of 33 abusers and 84 controls

[c]N composed of 34 neglectors and 84 controls

*$p < .05$

**$p < .01$

***$p < .001$

Table II

COMPARISON OF SUBJECTS' MODAL CATEGORIES OF WAYS OF HANDLING IRRITATING CHILD BEHAVIORS

CHILD BEHAVIORS	WAYS OF HANDLING: Physical	Verbal	Withold	Explain	Give Affection	Distract	Do Nothing It's Normal
Won't cooperate	◍		⊗●	○			
Won't stop crying					⊗●◍○		
Bites and hits				⊗●◍○			
Gets angry with me			⊗●⊗				○
Embarrasses me***			⊗●	●			◍○
Gets in my way*				●	⊗	○	
Screams or yells			⊗●◍○				
Soils diapers or pants							⊗●◍○
Breaks something of mine**	⊗●◍			◍○			
Shows he doesn't love me					⊗●◍○		
Never lets me alone			⊗●			◍○	

⊗ = Abusers
● = Neglectors
◍ = Spouses of Abusers
○ = Non Abusers

* = Spouses of Abusers - no mode
** = Spouses of Abusers - bimodal
*** = Neglectors - bimodal

TABLE III

PREDICTION RESULTS

Actual Group Membership	Predicted Group Membership					
	Abusive		Non Abusive		Total	
	N	%	N	%	N	%
Abusive	56	84	11	16	67	100%
Non Abusive	8	9	76	91	84	100%

Overall 87.4% of known cases correctly classified

$x^2 = 84.56$ $p < .001$

Predictive value of a positive = 88%

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ABSTRACT

The purpose of the study was to develop a battery of measures with which to identify parents who have potential for abuse and/or neglect of children. The sample of 169 was composed of abusive men and women parents or parent figures matched with controls.

The variables, parents' background, personality, child rearing attitudes, social networks, antecedents to early attachment, ways of handling irritating child behaviors, and parent-child interactions, were tested by interview, questionnaire, videotaped behavioral observation and physiological responses.

Both bivariate and multivariate data analysis procedures were utilized including zero order correlations, factor analysis, path analysis, and discriminant analysis.

The measures sharply differentiated between groups on background, empathy, self concept as a parent, maternal or infant complications of pregnancy or newborn period, how parents handled irritating child behaviors, child rearing attitudes, parent-child communication, parent-child interaction, parental support systems, and physiological response. Abusive parents maintained higher heart rates and had less heart rate variability. When both high heart rate and low variability in heart rate were present, subjects' electrodermal skin response took longer to return to normal.

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INTRODUCTION

The advantages of being able to detect potential for child abuse early enough to provide preventative intervention are obvious. Many attempts have been made to develop measures for such detection. These have included interviews, questionnaires, and observation of parent and child interaction (Green 1976; Paulson et al 1975; Schneider et al 19 . It is generally accepted that abusive parents have difficulty coping with child related stresses. One would expect that such parents would exhibit physiological changes when they are stressed enough to hurt their children. Only one study was found in which physiological measurement was used to test abusive parents and that one study did not measure response to pleasant or stressful stimuli (Smith et al 1973).

The study on which this report is based was a multidisciplinary attempt to develop a battery of measures for prediction of child abuse or neglect which would utilize with the same sample, interviews, questionnaires, videotaped parent-child interaction and physiological response to child related pleasant and stressful stimuli. The professional staff was composed of sociologists, nurses, a clinical psychologist and physiologist and a social worker. Consultants from medicine, psychology, biostatistics, social work and sociology have also been very helpful.

SAMPLE

A sample of 55 abusive or neglecting families were matched with 54 control families. Study subjects, recruited from Child Protective Services' open case loads, were matched with controls on age of the child, and age, education, race and single versus couple status of the mother. Control families were selected from well child clinics and from responses to newspaper and radio appeals. There were 169 adult subjects, 109 females and 60 males. About half of the mothers had not graduated from high school; less than one fourth were high school graduates or had some college; and about five percent were college graduates. Families were selected on the basis of the child's age (early infancy-under 4 months, late infancy 6-12 months, early toddler 1-1½ years, and late toddler 2-2½ years). It had been hoped to obtain a sample with 30% Black families but only 12 Black subjects (7%) were recruited.

VARIABLES

The nine independent variables were tested in a path analysis model (See Figure 1). Path analysis assumes asymmetric causal relationships--not single causes. The paths of relationships, when considered together, permit inferences about the influence of sets of variables on the dependent variable, in this case--child abuse (Duncan 1966).

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Table II compares modal ways of handling irritating child behaviors for abusers, neglectors, spouses of abusers and controls. The four groups agreed on giving of affection for a child who won't stop crying or who tells the parent that he doesn't love him, on explaining why the child should not bite and hit, withholding (withhold privilege, ignore or isolate) when the child screams or yells, and doing nothing because the behavior is normal when the child soils diapers or pants.

The groups differed on how to handle the uncooperative child with spouses of abusers saying they would use physical punishment, abusers and neglectors withholding, and controls explaining to the child why he shouldn't. Only controls perceived the child's getting angry at parent as normal behavior. Controls and spouses agreed on perceiving as normal the child's embarrassing the parent, on explaining why he shouldn't break a possession of the parent, and on distracting the child who never lets the parent alone. Abusers and neglectors said they used physical punishment only when the child broke something of theirs.

When the path analysis model was solved, the R^2 was .43, $P < .001$. This means that the 17 indicators explained 43% of the influence on abuse. This is high for these kinds of data.

Prediction was however, based on abuse and neglect combined using the same indicators. Further work is being done on this. Table III shows the predictive value of the 17 indicators, (those starred * in Table I). Sensitivity, the ability to accurately predict abusers was 84% with 16% false negatives. Specificity, the ability to accurately predict non abusers was 91% with 9% false positives. The predictive value of a positive, that percentage of those predicted as abusers who were, in fact, abusers was 88%.

DISCUSSION

These findings from analyzing data from the entire sample of 169 parents are quite similar to the preliminary findings reported earlier (Disbrow et al 1977). This is reassuring from the standpoint of constructing predictive measures. The sample from this stage of the research however, represents two extremes, known abusers and neglectors matched with non abusers. Sensitivity and specificity would be expected to be high for this type of sample (Frankenburg 1973).

The investigators have now embarked on a longitudinal study with patients from an H.M.O. as subjects. The sample will be stratified on economic level and race in an attempt to get a more representative sample from the population. Families will be selected late in pregnancy and screened on measures from the developmental phase when the infant is one month old. Subjects will then be divided into high and low risk groups and followed until the target child is 2½ years old.

Four extra measures will be added, a measure of stress, a determination of the ratio of appointment versus emergency type health care visits, a chart review to look at illness and accident patterns for the children, and developmental screening at four time periods. This should provide better estimates of sensitivity, specificity, and the predictive value of a positive for the battery of measures or for two batteries, one for abuse and one for neglect.

From the standpoint of concurrent validity, a battery of measures using multiple kinds of techniques is desirable. In the pragmatic world, one would utilize only those portions of the measures that would be appropriate. There are, however, certain circumstances when the investigators feel that the entire battery might be utilized (given predictive validity at the end of the longitudinal study). These would include court cases to decide custody of children, placement of children in foster homes, or for young persons who are undecided about starting a family who might want to test their parent potential.

SUMMARY

The measures sharply differentiated between abusers and controls on background, empathy, self concept as a parent, maternal or infant complications of pregnancy or newborn period, how parents handled irritating child behaviors, child rearing attitudes, parent-child communication, parent-child interaction, parental support systems and physiological response. Abusive parents maintained a higher heart rate and lower variability in heart rate across scenes. When both high heart rate and low variability in heart rate were present, subjects showed a longer electrodermal skin response half life; i.e. they took longer to return to normal.

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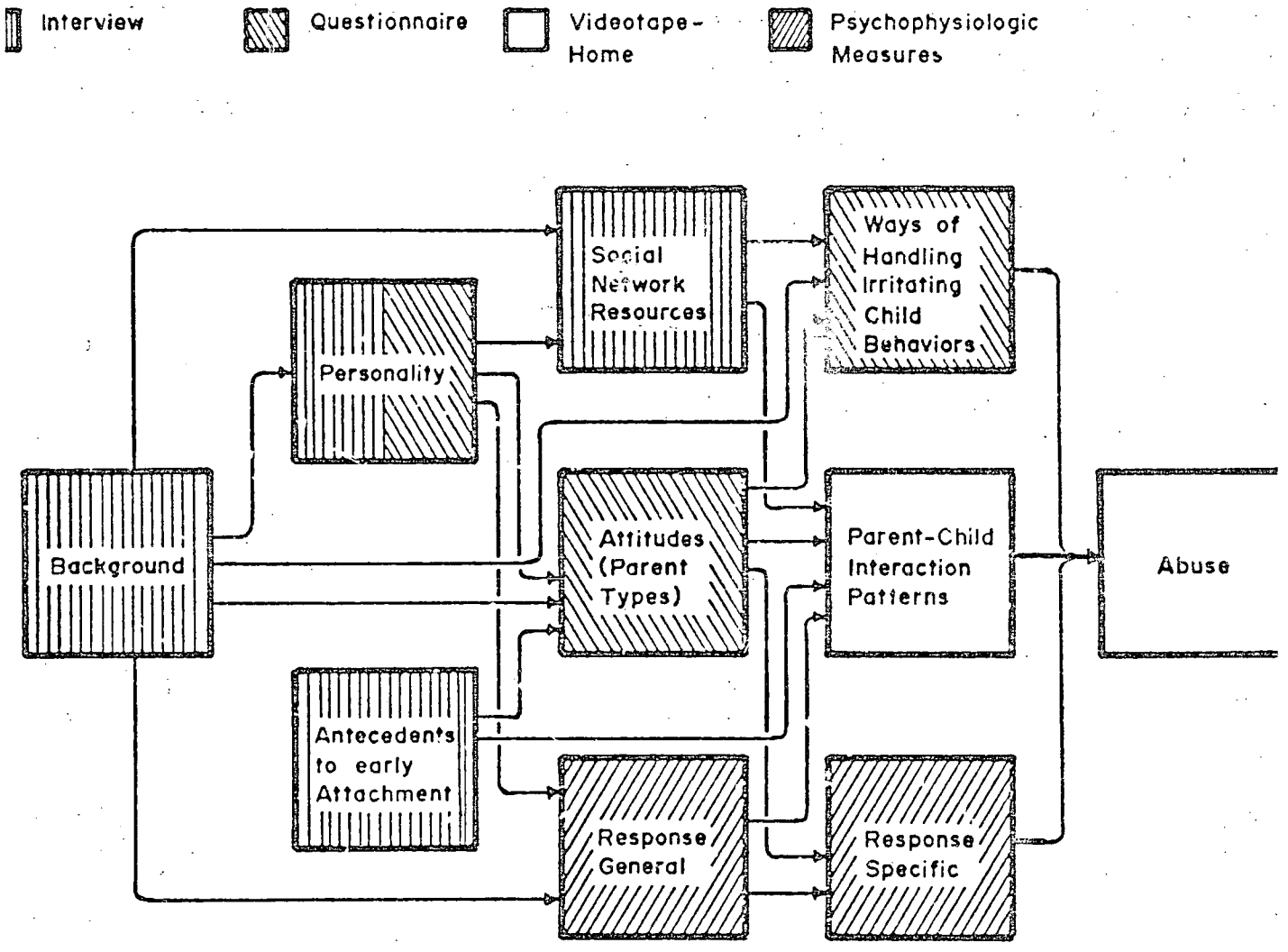

FIG. 1 Path Analysis Model Variables and Source of Data

TABLE I

TAU COEFFICIENTS REFLECTING RELATIONSHIPS BETWEEN SPECIFIC VARIABLES AND ABUSE

Major Variables and Indicators	Tau Coefficients		
	Total[a] Abuse	Physical[b] Abuse	Neglect[c]
Background			
Parent factor	-.21***	-.14*	-.24***
Ways handled as a child	.26***	.23***	.26***
Personality			
Machiavellianism	.11*	.08***	.12*
Empathy	-.25***	-.23*	-.22***
Self concept as a parent	-.19***	-.13*	-.20***
Antecedents to early attachment	.21***	.15**	.23***
Social Network Resources			
Getting away from children	.25***	.29***	.17**
Close friends	-.30***	-.29***	-.31***
Current pets	.13**	.06***	.18**
Feelings about handling child rearing disagreements	-.22***	-.28***	-.15***
Parent Child Rearing Attitudes			
Role reversal	.37***	.33***	.33***
Sadistic	.22***	.22***	.18**
Low boiling point	.36***	.34***	.32***
Strict disciplinarian	.30***	.25***	.29***
Ways of Handling Irritating Child Behaviors	.44***	.42***	.38***
Parent-child Interactions			
Perceived communication between parent and child	-.31***	-.27***	-.30***
Child's readiness to learn	-.18***	-.21***	-.12*
Parent facilitating behavior	-.41***	-.40***	-.34***
General Physiological Response			
Heart rate means -all scenes	.06	.11*	.0002
Heart rate variability-all scenes	-.03	-.16**	.002
Specific Physiological Response			
Blood volume pulse-scene 1	-.10*	-.14*	-.04
Blood volume pulse-scene 2	.14**	.15**	.10

[a]N composed of 33 abusers, 34 neglectors, and 84 controls

[b]N composed of 33 abusers and 84 controls

[c]N composed of 34 neglectors and 84 controls

*$p < .05$

**$p < .01$

***$p < .001$

Table II

COMPARISON OF SUBJECTS' MODAL CATEGORIES OF WAYS OF HANDLING IRRITATING CHILD BEHAVIORS

CHILD BEHAVIORS	WAYS OF HANDLING: Physical	Verbal	Withold	Explain	Give Affection	Distract	Do Nothing It's Normal
Won't cooperate	◍		⊗●	○			
Won't stop crying					⊗●◍○		
Bites and hits				⊗●◍○			
Gets angry with me			⊗○◍				○
Embarrasses me***			⊗●	●			◍○
Gets in my way*				●	⊗	○	
Screams or yells			⊗●◍○				
Soils diapers or pants							⊗●◍○
Breaks something of mine**	⊗●◍			◍○			
Shows he doesn't love me					⊗●◍○		
Never lets me alone			⊗●			◍○	

⊗ = Abusers
● = Neglectors
◍ = Spouses of Abusers
○ = Non Abusers

* = Spouses of Abusers - no mode
** = Spouses of Abusers - bimodal
*** = Neglectors - bimodal

TABLE III

PREDICTION RESULTS

Actual Group Membership	Predicted Group Membership					
	Abusive		Non Abusive		Total	
	N	%	N	%	N	%
Abusive	56	84	11	16	67	100%
Non Abusive	8	9	76	91	84	100%

Overall 87.4% of known cases correctly classified

$x^2 = 84.56 \quad p < .001$

Predictive value of a positive = 88%