Negative microfilm 63–4991
received from university

McGINN, Noel Francis, 1934–
PERCEPTION OF PARENTS AND BLOOD PRESSURE.

University of Michigan, Ph.D., 1963
Social Psychology

University Microfilms, Inc., Ann Arbor, Michigan

PERCEPTION OF PARENTS

AND BLOOD PRESSURE

by
Noel Francis McGinn

A dissertation submitted in partial fulfillment
of the requirements for the degree of
Doctor of Philosophy in the
University of Michigan
1962

Doctoral Committee:

Assistant Professor Robert L. Isaacson, Chairman
Doctor Caroline Hoffberg
Associate Professor Sarnoff A. Mednick
Professor Guy E. Swanson

ACKNOWLEDGMENTS

The number of persons who have contributed to my education is so large that many pages would be necessary to enumerate them. All that is possible here is a brief statement of thanks to those friends who have had an immediate and direct influence on this dissertation. Drs. Stevo Julius and Ernest Harburg deserve special comment for their unflagging devotion to research, their humor in critical situations, and their material assistance in the data collection and analysis. I have learned a great deal from them.

Each of the members of my committee aided considerably in the final stages of preparation of the thesis. Credit for the readability of the report is due to Dr. Isaacson. Dr. Swanson's thoughts on methodology served as a guiding beacon. Dr. Hoffberg gave me some valuable insights into the results. Dr. Mednick fired me with a creative enthusiasm. Each of the members of the committee contributed in ways perhaps unknown to them.

The confidence expressed by my wife, and by Gerald Ginsburg, served to motivate me to attempt to match their belief by deed.

Funds for subjects were graciously provided by Dr. Sibley

Hoobler under a Public Health Service grant, number 2578, through the National Heart Institute.

This thesis is dedicated to my father, whose high standards I hope I have been able to approximate.

TABLE OF CONTENTS

Page

ACKNOWLEDGMENTS. ii

LIST OF TABLES vii

LIST OF FIGURES. xii

Chapter

I. STATEMENT OF THE PROBLEM 1

A Review of Research on Psychological Correlates of Blood Pressure 6

Emotion-Producing Stimuli and Blood Pressure Response (S-R). 11

Verbal Stimuli in an Interview Context
Environmental Events as Pressors
Specific Emotion Producing Stimuli and Specific Response Patterns

Psychological Factors as Intervening Variables (S--O--R). 20

Reactivity as a Function of Initial Level of Blood Pressure
Psychological Factors Influencing the Stability of Blood Pressure

Are There Psychological Determinants of Blood Pressure? 35

Hypertension and Neurotic Traits
Specific Personality Differences of High and Low Blood Pressure Groups
Hostility and High Blood Pressure
The Prehypertensive Personality
Studies in Which the Prehypertensive Personality Hypothesis is Not Confirmed
Effects of Environmental Stress
Experimentally Produced Stress in Infra-Human Animals

Page

Genetic Determinants

Hypotheses Relating Parent-Child Relationships and Blood Pressure. 66

The Hypotheses of This Research 77

II. METHODS 79

Sample. 79

Initial Selection of Sample
Characteristics of Sample

Physical Measurements 83

Procedure
Definitions of Variables Used
Reliability of Blood Pressure Measurements

Psychological Measurements. 100

Procedure
Psychological Variables Used
Parent Image Factors
Reliability and Validity of the Parent Image Factors

III. RESULTS 127

Parent Image Factors and Relative Potency
Family Questionnaire Items
Multiple Correlations
Birth Order, Parent Identification and Problem Parents

IV. DISCUSSION AND IMPLICATIONS FOR FUTURE RESEARCH. 158

Average Casual and Usual Blood Pressure
Cold Pressor Reactivity
Valsalva Reactivity
Casual Lability
Resting Lability
Home Lability
Differences Between Systolic and Diastolic Measures of Blood Pressure

Page

Summary
Future Research

FOOTNOTES 180

APPENDIX A. The Family Questionnaire and Parent Image Semantic 182

APPENDIX B. Relationships between Physiological Variables. 210

APPENDIX C. Relationships between Parent Variables . 213

REFERENCES. 216

LIST OF TABLES

Table		Page
1.	Average Blood Pressures for Healthy Males of Different Body Builds Grouped by Age	7
2.	Characteristics of College Students with High, Normal and Low Blood Pressure.	29
3.	Various Traits Attributed to Persons with High Blood Pressure.	50
4.	Characteristics of the Sample.	84
5.	Distribution of Casual$_2$ Blood Pressures.	85
6.	Relationship of Various Blood Pressure Measures and Physical Characteristics.	89
7.	Relationship between Average Casual and Usual Blood Pressure Measures.	90
8.	Relationship between Various Measures of Blood Pressure Lability.	93
9.	Relationships between Average Casual and Usual Blood Pressure Measures and Physical Characteristics.	98
10.	Description of Parent Image Factors Obtained with the Concept, How My Father Treated Me When I Was a Child	108
11.	Description of Parent Image Factors Obtained with the Concept, How My Mother Treated Me When I Was a Child	110
12.	Description of Parent Image Factors Obtained with the Concept, How My Father Taught Me When I Was a Child.	112
13.	Description of Parent Image Factors Obtained with the Concept, How My Mother Taught Me When I Was a Child.	114

Table

		Page
14.	Description of Parent Image Factors Obtained with the Concept, How My Father Disciplined Me When I Was a Child.	115
15.	Description of Parent Image Factors Obtained with the Concept, How My Mother Disciplined Me When I Was a Child.	117
16.	Correlations between Parent Image Factors Potency and Warmth and Family Questionnaire Items Relating to Punishment and Affection . .	120
17.	Correlations between Responses to the Family Questionnaire Item, "How Much Time Did Your Father Spend Doing Things with His Children?" and the Parent Image Factors Inclusion and Tolerance.	121
18.	Kaiser's Coefficients of Factor Similarity for Factor Space of P5 Sample and Current Subjects	123
19.	Correlation of Average Casual Blood Pressure with Parent Image Factors.	129
20.	Correlation of Usual Blood Pressure with Parent Image Factors	131
21.	Correlation of Cold Pressor Reactivity with Parent Image Factor Scores	132
22.	Correlation of Valsalva Reactivity with Parent Image Factor Scores.	133
23.	Correlation of Casual Lability with Parent Image Factor Scores.	134
24.	Correlation of Resting Lability with Parent Image Factor Scores.	136
25.	Correlation of Home Lability with Parent Image Factor Scores.	137
26.	Correlation of Blood Pressure Measures with Family Questionnaire Items	138

Table Page

27. Results of Zero-Order Correlations Between Parent and Blood Pressure Variables, Showing Significance Level of Correlation. . . 143

28. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Average Casual Blood Pressure as the Dependent Variable. 146

29. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Usual Blood Pressure as the Dependent Variable 147

30. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Cold Pressor Reactivity as the Dependent Variable 149

31. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Valsalva Reactivity as the Dependent Variable 152

32. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Casual Lability as the Dependent Variable 153

33. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Resting Lability as the Dependent Variable 155

34. Multiple Correlation (R) and b Coefficients Using Parent Image Semantic Factors and Family Questionnaire Items as Independent Variables and Home Lability as the Dependent Variable 156

Table

Page

35. Summary of Multiple Relationships between Parent Image and Family Questionnaire Variables and Average Casual and Usual Blood Pressure 161

36. Summary of Multiple Relationships between Parent Image and Family Questionnaire Variables and Cold Pressor and Valsalva Reactivity 164

37. Summary of Multiple Relationships between Parent Image and Family Questionnaire Variables and Casual, Resting, and Home Lability 169

38. A Brief Summary of Empirical and Speculated Differences of Level and Reaction of Systolic and Diastolic Blood Pressure 173

39. Distribution of Responses of 107 Subjects Using the Concept, How My Father Treated Me When I Was a Child 204

40. Distribution of Responses of 107 Subjects Using the Concept, How My Mother Treated Me When I Was a Child. 205

41. Distribution of Responses of 107 Subjects Using the Concept, How My Father Taught Me When I Was a Child 206

42. Distribution of Responses of 107 Subjects Using the Concept, How My Mother Taught Me When I Was a Child. 207

43. Distribution of Responses of 107 Subjects Using the Concept, How My Father Disciplined Me When I Was a Child 208

44. Distribution of Responses of 107 Subjects Using the Concept, How My Mother Disciplined Me When I Was a Child 209

45. Intercorrelation Matrix of All Physiological Measures 211

Table Page

46. Intercorrelation Matrix of Family Questionnaire Items. 214

47. Intercorrelation Matrix of Parent Image Factors. 215

LIST OF FIGURES

Figure		Page
1.	Diagnostic Categories Associated with Characteristics of Parents.	73
2.	Emotional Reactions Associated with Characteristics of Parents.	75

CHAPTER I

STATEMENT OF THE PROBLEM

Since the first formulation of the mind-body problem man has been interested in knowing more about relationships between psychic and physiological phenomena. These relationships are, or should be, of particular interest to the social psychologist who studies the mechanisms by which men are influenced by other men. This thesis is an attempt to increase our knowledge of the processes by which the behaviors of others can influence the physiological states of an individual. It is an exploratory research--the reader should not expect to find a complete exposition of this complex problem--but it deals with a basic physiological process and a set of basic interpersonal relationships.

The physiological process is that of blood pressure, familiar in our everyday speech. "Watch your blood pressure," we caution an excitable friend, and it is good advice. Hypertension, a disease of high blood pressure, is a more serious health problem than cancer, tuberculosis, and poliomyelitis combined. Though it occurs with greater frequency in older people, it can afflict anyone. It can be controlled but not cured. Its persistence brings an early death. The inter-

personal relationships considered are those between parents and children, ubiquitous in the world.

The scarcity of research studying these two variables together suggests that social scientists have regarded them as an unprofitable combination for research. However, the pages that follow will make clear the fact that there are significant relationships between these two variables. Because of the virtual absence of research specifically associating parent-child relationships and characteristics of the blood pressure of the child, the task of this introduction is to demonstrate what research strategies are suggested by tangential research which has been done.

To do this, the introduction is divided into two sections. In the first, research is reviewed which shows relationships between blood pressure and various psychological variables. In the second section aspects of parent-child relationships, which research has demonstrated to be related to those same psychological variables which have been found to be related to blood pressure, are identified. A statement of hypotheses which <u>directly</u> link parent-child relationships and blood pressure is then presented. The rest of the thesis is an attempt to support these hypotheses. The general argument of the thesis is that stressful experiences encountered in childhood lead to development of high blood pressure and

high blood pressure reactivity. It is possible that this development is a direct result of the amount of stress experienced in childhood, or that high blood pressure levels and reactivity develop because of "neurotic" traits acquired because of a stressful childhood. The data in this thesis do not differentiate between these two hypotheses, but are relevant for a test of the more general hypothesis that stress in childhood is a causal antecedent of high blood pressure and blood pressure reactivity.

Probably the average reader of this thesis is familiar with either the problem area of parent-child relationships, or that of blood pressure, but not both. To facilitate the understanding of the relationships between these two problems, therefore, discussion of both areas has been simplified by avoiding technical descriptions. In some instances this occasions a lack of depth in the treatment of the variables and their relationships to each other. This is to be regretted, but it seems impossible to avoid because this research crosses two disciplines which do not enjoy frequent and pleasant communication with each other. Further, since this is exploratory research, it seems advisable to cover as many points as possible, necessitating brevity in dealing with them.

To facilitate the non-medical reader's comprehension of the literature, the technique of measuring blood pressure

which is most commonly used in medical practice is here described. It is called the auscultatory technique because the examiner employs a listening device (a stethoscope) in order to make his measurements.

To take a blood pressure reading the physician encircles the subject's upper arm (usually his left arm) with a rubber tube which can be inflated with air. The amount of air pressure in the cuff is measured by a column of mercury. Hence, blood pressure readings are usually stated in millimeters (mm) of mercury (Hg). The physician inflates the cuff so as to completely stop the flow of blood in the main, or brachial, artery of the arm. He then releases pressure in the cuff until he can hear a beating sound through his stethoscope which is applied to the artery below the cuff. The height of the mercury column at the time when he first hears the beating sound is the systolic blood pressure. The physician then releases more air from the cuff until he can no longer hear the beating sound. The height of the mercury column at that somewhat indeterminate time when the beating sound can no longer be heard is the diastolic pressure. If a person's systolic blood pressure was 130 mm Hg, and his diastolic blood pressure was 75 mm Hg, it would be written as 130/75.

It might be useful to understand a little about the

process which takes place when blood circulates through the arteries. Each beat of the heart moves a certain quantity of blood, at a certain velocity, through the arterial system of the body. This movement of blood occurs as a wave which moves down the artery away from the heart. It is the movement of waves of blood through the artery which the physician hears as a beating sound. Because the arteries have a certain resistance to movement of the blood, the heart must pump the blood under pressure. As safeguard, the pressure exerted is somewhat greater than that actually needed to move blood through the system. The highest pressure is developed at the beginning of the heart contraction, or the systole. Systolic blood pressure is a measure of the highest pressure during one heart beat. The lowest point to which blood pressure will decrease between two heart beats is called diastolic blood pressure because it occurs during the relaxation phase (or diastole) of the heart. At this point in the cycle the wave of blood has diminished so there is no beating sound. A number of neurohumoral mechanisms influence blood pressure by varying the resistance of the arteries to blood flow, the amount of blood squeezed out by the heart on each beat, the rate of the heart beat and other complicated processes.

Even though blood pressure has been measured for more than half a century, there is still not agreement on what

constitutes "normal" blood pressure. Some authorities argue that there are no "abnormal" blood pressures, since there is a tendency for blood pressure to rise with age and high values of blood pressure only represent the tails of the distribution of blood pressures (e.g., see Pickering, 1955). On the other hand, some authors have established rules as to what to consider as high or "abnormal" blood pressure (e.g., Vancura, 1950). As a practical criterion, it may be assumed that normal systolic blood pressure, taken after the subject has had a short rest, is in the range of 100 plus his age in years. The rule for diastolic is a little more than one-third less than the systolic pressure. Table 1 presents averages for large groups of subjects at different ages. It might be worth-while to point out that <u>low</u> blood pressure, even though statistically "abnormal," is healthier than normal blood pressure (according to Gubner, 1961, who notes that mortality rates at all ages rise steadily as blood pressure increases).

A REVIEW OF RESEARCH ON PSYCHOLOGICAL CORRELATES OF BLOOD PRESSURE[1]

The use of measures of blood pressure as dependent and intervening variables in psychological research has a long and exciting history, dating back before the turn of the century. In fact, it was not long after the development of techniques for measuring blood pressure that Couty and

TABLE 1

AVERAGE BLOOD PRESSURES FOR HEALTHY MALES OF DIFFERENT BODY BUILDS GROUPED BY AGE. ADAPTED FROM FISHBERG (1939, P. 212).

Age	Blood Pressure in mm Hg	
	Systolic N=150,419	Diastolic[2] N=60,733
15-19	123.5	79.5
20-24	124.2	80.5
25-29	124.5	81.5
30-34	125.1	82.3
35-39	125.3	83.3
40-44	126.4	84.0
45-49	128.2	84.7
50-54	130.2	85.9
55-59	133.5	86.8
60+	135.2	86.9

Charpentier (1877, referred to by Darrow, 1929) applied the technique to curarized dogs and discovered that the animals' blood pressure increased when they saw other dogs caressed or mistreated, or when they themselves were threatened. This must have been a very satisfying finding for those who had long maintained the existence of intimate relationships between psychological and physical processes in the organism. Blood pressure, relatively easy to measure, and obviously representative of vital physiological events, was an obvious choice for use in the study of relationships between "mind and body."

Nevertheless, psychologists do not seem to have used the measure of an individual's blood pressure to represent

"emotional" changes as much as they have used other measures, for example, the GSR. One aim of this review is to encourage a fresh look at the meaning, measures, and results of studies of blood pressure, and to suggest its utility in research on a variety of problems, with special attention to psychosomatic aspects of hypertension.

Hypertension refers to a condition of high blood pressure. A recent collection of statistics concerning causes of death places the problem of high blood pressure in sharp focus. Diseases of the cardio-vascular-renal system account for more than half of all deaths each year (Metropolitan Life Insurance Co., 1962) and death from hypertension (in which high blood pressure is a chief symptom) is an important contributor. The mortality rate for people with high blood pressure (defined by Metropolitan Insurance researchers as greater than 158 mm Hg systolic or 98 diastolic) is, for all age groups, three times greater than that of the general population (Gubner, 1961). Although there are often structural changes in the organism which lead to high blood pressure, in many instances no such organic changes can be located. Cases of high blood pressure in which structural changes cannot be located are labelled "essential" hypertension. Essential hypertension is considered a serious medical problem and, as will be seen in this review, is considered by many physicians

to have psychological as well as physical antecedents.[3]

This review is divided into three major sections. In the first are presented studies which have employed psychological or environmental variables as external stimuli associated with a temporary change in blood pressure. It is certain that in some instances the effects of these external stimuli are mediated by cognitive processes or states of the Ss, but the major attention of the research was focused on the effects of the stimuli. These studies can be described under the design of a simple S-R model.

In the second section studies are reviewed in which major attention is paid to how the effects of stimuli are mediated by cognitive processes or states. These studies could be classified under an S-O-R model in which the researcher is mainly interested in variations in the intervening and dependent variable.

In the third section the studies reviewed are all concerned with the relationship between various environmental situations, and/or the cognitive states produced by them, and levels of sustained blood pressure. These studies could be considered as falling under an O-R rubric.

The design of this review can be summarized in the following way. The first studies to be considered will be those which answer the question--Are there replicable changes in

blood pressure when Ss are presented with certain classes of external stimuli? Secondly, the question is posed--Are there characteristic ways of responding to external stimuli as a function of certain kinds of cognitive states or processes? And, the review concludes by reviewing studies which attempt to answer the question--Do various psychological states have possible causative relationships with levels of sustained blood pressure? The paper then proceeds to a discussion of the possibility that various kinds of parent-child relationships (which are thought to produce certain relatively enduring psychological states) are causally related to blood pressure characteristics.

Perhaps the first review of the literature relating psychological and physiological variables was that by Angell and Thompson (1899) which together with that of Robbins (1919) discussed various psychological variables as they related to Ss' reactions on a plethysmograph. The most comprehensive review was done in 1929 by Darrow. Recent reviews, which consider limited portions of the literature relating psychological and physiological variables, are those by Moses, Daniels, and Nickerson (1956) and Shapiro (1960). Also available is an annotated bibliography of blood pressure research from 1920 to 1950 (Koller & Katz, 1952). The present attempt is to provide a comprehensive review of that literature which

is specifically relevant to persons interested in relationships between psychological and blood pressure variables.

Emotion-Producing Stimuli and Blood Pressure Response (S--R)

Techniques for nonsurgical measurement of human arterial blood pressure were first described in 1896 by Riva Rocci (according to Bard, 1956). Given an instrument for easy and painless measurement, a variety of pressors were ingeniously conceived to produce changes in blood pressure. By "pressor" is meant any externally or internally applied stimuli expected to induce a blood pressure response. By way of introduction to the vast amount of literature in this general area, it would be useful to illustrate the variety of ideas represented in the earlier studies.

The first published research in American psychology concerned with our topic is that by Marston (1917), a Massachusetts lawyer who wanted to demonstrate the validity of measures of blood pressure change for detecting when a person was lying. His subjects (Ss) were asked to tell either the "truth" or a "lie," embellished around one or two facts supplied by the experimenter. Subjects "testified" before Marston and a "jury" of psychology graduate students. Marston periodically read the Ss' blood pressures. Subjects were successful in deceiving the jury about half the time,

while Marston was almost 100 per cent accurate in distinguishing between liars and non-liars. Subjects' introspection after the experiment was used to show that blood pressure rose when the Ss began to attempt to deceive, and declined when they told the "truth." Actually, it did not matter what the objective facts were; so long as the Ss thought they were deceiving or telling the truth their blood pressures were affected. Herbert Langfeld repeated the experiment in 1920, using two Ss, and obtained the same results.

However, a complex and sophisticated replication by Landis and Gullette (1925) failed to obtain similar results. Using the same blood pressure cuffs that Marston used to measure blood pressure, they exposed 25 Ss to 15 different stimuli, of which several should have raised blood pressures. The stimuli included: an unexpected whiff of ammonia; a firecracker ignited under the seat of S; pictures of patients with severe forms of skin diseases; pornographic (identified by the authors as French) pictures; detailed sexual case histories; placing S's hand in a bucket of live frogs and administering a mild shock; forcing S to decapitate, or watch the decapitation of, a live white rat. However, the investigators failed to obtain any significant increases in blood pressure. Why? There seem, at this late date, to be two possible reasons. First, Landis and Gullette noted that

their Ss were nervous. It is possible that Ss were sufficiently stressed at the beginning of the experiment and thus could not demonstrate further elevations of blood pressure. Second, the authors noted blood pressure variation of as large as 10 mm during one minute rest periods. This is a large variation for such a short period of time and makes one suspect that such "rest" periods may not have actually lowered the pressure to a pre-stress resting level. Landis and Wiley replicated the study in 1926, using a different technique for measuring blood pressure, and again failed to find changes in blood pressure associated with emotional stimuli. These are two studies in which such strong pressors have failed to produce rises in blood pressure.

However, in surveying the span of early and later studies, even dreams and music have been associated with changes in blood pressure. In England, MacWilliams (1923) was able to argue, based upon three cases, that blood pressure might rise even while Ss slept, and that this elevation was associated with Ss reporting (on being awakened) that they had been dreaming.

Lovell (1941) showed that blood pressure went up following a loud, unexpected sound. Steinman, Jaggi and Widmer (1955) played 33 Ss (university students) recordings of Mozart and Beethoven, and produced a decline in blood pressure.

When the Ss listened to jazz and Japanese music, blood pressure went up. The disruption of a Mozart clarinet concerto with a loud sound produced an immediate rise in blood pressure.

The literature abounds with results which indicate that blood pressure changes may be associated with many forms of psychological stimuli. One of the more common stimuli is to use an interview situation in which relevant and disturbing remarks are communicated to the subject. This form of pressor may be labeled "verbal stimuli."

Verbal Stimuli in an Interview Context

A number of researches have shown fluctuation of blood pressure during various kinds of interviews. One of the earliest blood pressure studies of this kind in American medicine is that by O'Hare (1920) in which he reported that his patients reacted to the discussion of relevant life problems with an elevation in blood pressure. Alexander (1939b) noticed that, when his patients had particularly disturbing sessions in analysis, their blood pressures were markedly elevated. Wolf, Pfeiffer, Ripley, Winter and Wolff (1948) assert that, for their patients, blood pressure went up when unpleasant life experiences were discussed and went down with "nice" conversation. Pfeiffer and Wolff (1950) demonstrated

rises in blood pressure when Ss discussed personally important topics with "threatening" significance.

Perhaps the most thorough study employing the psychiatric interview as a stimulus is that by Innes, Millar and Valentine (1959). While the S was interviewed, a number of physiological measures were taken without his awareness of the exact moment of measurement. The experimenters used simultaneous recording of the interview and the physiological measurements to permit a matching of blood pressure changes with specific content areas in the interview. A variety of Ss were employed. Contrary to the findings of other studies to be reviewed later, the experimenters found no correlations between specific kinds of interview content and blood pressure changes. There was no correlation between expressed or repressed emotion, display of anger or anxiety, and increases in blood pressure. Blood pressure did fluctuate according to interview content, but the authors were not able to establish a coding category which would fit with the blood pressure changes. There was, however, a significant relationship between the use of self-referent pronouns (I, my, etc.) and increases in blood pressure, regardless of the content of the sentence in which the pronoun appeared or the context of the discussion. There was also a correlation between the number of spoken syllables per 10 second period and

changes in blood pressure, but this may be an artifact due to changes in breathing when talking at different rates of speed. Rate of breathing affects blood pressure levels.

Innes, Millar and Valentine's Ss were both normals and neurotics, and it is possible that such a mixture obscured differences between the two groups. Their failure to create a code which would work may be viewed as a criticism of much of the work using the interview technique.

Environmental Events as Pressors

There are some more recent studies which take advantage of objective events which pose threats to the physical or psychological life of people who experience them. These stimuli are quite unlike those used in studies employing the verbal interview situation as a pressor, yet they were also selected by researchers as pressors to study blood pressure response. For example, Graham (1945) measured the blood pressure of 695 soldiers who had seen long combat in the African desert campaign in World War II and found 27 per cent showed diastolic elevations greater than 100 mm Hg for several months afterward. Ruskin, Beard and Schaffer (1948) found that the diastolic blood pressure of 56 per cent of 180 Texas City survivors was elevated to levels of 95 mm and over for about one to two weeks after the tremendous explosion there. Negro

patients, who are more prone to development of permanent high blood pressure, were more affected by the blast.

A rather unusual environment was created as a stimulus for five parachutists. Grimak (1959) hypnotized these men and had them "relive" a jump experience. Continuous blood pressure readings were taken. Blood pressures went up when "the plane took off," stayed high during the flight, went down when the Ss "jumped" and felt their chute open. Readings after Ss "hit the ground" were still higher than those taken before "takeoff."

Obviously, there are a great many stimuli which have been associated with changes in blood pressure levels. The limits of such association are apparently the ingenuity of the researcher.

Specific Emotion Producing Stimuli and Specific Response Patterns

No one has yet come up with a portable, repeatable psychological stimulus which can reliably raise blood pressure each time it is applied and for all persons. To state this problem is to assume that all organisms are built more or less in a similar biological manner so that they will show similar vascular response patterns to a given stimulus. This assumption may be attributed to Cannon (1932) who suggested that emotion was a generic term to apply to an emergency pattern of physiological changes regardless of the psychological

components, e.g., anger or fear. The first definitive study which attempted to explore physiological differences accompanying stimuli specifically designed to arouse anger and fear separately was by Ax (1953). The anger stimulus consisted of insulting behavior to the subject by a lab technician who alternately jostled, verbally insulted, and was generally nasty.

> The fear stimulus consisted of a gradual intermittent shock stimulus to the little finger which never reached an intensity sufficient to cause pain. When the subject reported the sensation, the experimenter expressed surprise, checked the equipment, pressed a key which caused sparks to jump near the subjects, then exclaimed with alarm that this was dangerous high voltage short circuit (Ax, 1953, p. 35).

The same paid volunteer subjects (of both sexes) were used in both the anger and fear situations. Fourteen physiological measures were taken, and frequency of changes, rather than amplitude, was used to measure response. Seven of the fourteen frequency measures showed significant differences between anger and fear stimuli. The number of diastolic blood pressure, heart rate, GSR, and muscle tension increases was greater for anger than for the fear condition.

Another study of the relation of various kinds of stimuli to changes in blood pressure is that by Schachter (1957). He exposed 48 Ss to situations intended to produce emotions of pain, fear, and anger in that order. For the pain experience,

Ss kept their hands in a bucket of ice water (3 degrees centigrade) for one minute. Following this, Ss were suddenly warned not to move, that the electrical equipment had failed and that they were in danger of electrocution. Finally, in the anger situation, a lab assistant insulted the Ss and accused them of being late to the experiment. The Ss were paid volunteers of both sexes; 15 of them had been subjects in Ax's experiment. Subjects responded to these stimulus conditions with a significant increase in systolic blood pressure to the Pain and Anger conditions and a significant diastolic increase to the Fear condition. These changes were measured from each S's resting level of blood pressure. It is, of course, difficult to know exactly what emotions the Ss experienced in the Schachter study, so that the fact that other experimenters have found both systolic and diastolic changes to a given stimulus cannot be properly evaluated. For example, some Ss may have been both angry and fearful toward all of the stimuli.

Another experiment, by Funkenstein, King and Drolette (1957), used frustrating tasks to induce anger. About 60 college men were instructed to perform a digit span test in their minds while the experimenter sarcastically criticized their efforts. In the second task, the Ss' attempts to speak rapidly were frustrated by a confusing feedback of sound. When they slowed down, they received an electric shock. The

Ss were interviewed afterwards, and rated as showing an "anger-out," "anxiety," or "anger-in" response. In a recent book, Buss (1961) compares the results of the three studies in terms of blood pressure changes (not using the "anger-in" group from the Funkenstein, et al., study, and using the "anxiety" group as a fear response). He asserts that, in general, these experiments support the notion that physiological emotion is apparently not as Cannon hypothesized, i.e., all the same emergency pattern. The results also indicate, that for fear (or anxiety) stimuli, at least, there may be a consistent blood pressure pattern of response: a rise in systolic pressure (and also heart rate) and a smaller increase in diastolic pressure. The results describing the blood pressure patterns accompanying anger are less consistent in these three studies. Possibly anger may differ between men and women, more than fear does. (Ax and Schachter used subjects of both sexes, Funkenstein, et al., used only college men.) Also, as suggested previously, Ax and Schachter may have aroused both fear and anger. The definition of a specific stimulus to produce a specific emotion apparently raises a great deal of problems of a psychological kind as well as physiological.

Psychological Factors as Intervening Variables (S--O--R)

In this section studies are reviewed in which psychological

variables are used as intervening variables in the research. These studies generally may be said to hold the stimulus constant, while the psychological state is differentiated, leading in turn to different responses. This seems to conform roughly to an (S) - O-R model, where emphasis is placed mostly on "individual" psychological differences. For example, the most frequently used clinical technique for assessing blood pressure reactivity is the cold pressor test. The S immerses his hand (or foot) to the wrist in crushed ice and water at a temperature of four to six degrees centigrade for at least one minute, sometimes as long as five minutes. The most accepted and standard procedure is immersion for one minute. Subjects experience various degrees of pain, but with no ill effects. Most Ss show at least a 10 mm rise in blood pressure at some time during the period in which their hand is immersed in the ice water (cf. Hines, 1940b).

While reaction time and rate of recovery may be thought by psychologists to be possible important variables with this physical pressor, most research with the cold pressor test uses amount of change from resting level as the significant variable. This is called reactivity as contrasted to the absolute blood pressure level reached.

There are several studies which seem to show that reactivity to the cold pressor test varies according to psychological

characteristics of Ss. For example, White and Gildea (1937) observed that patients with somatic symptoms of anxiety (e.g., finger twitching) showed a greater reaction to the cold pressor test than did patients without these symptoms. Malmo and Shagass (1952) compared the reactivity of various types of psychiatric patients. Subjects diagnosed as neurotic showed greater increases of blood pressure on the cold pressor than did psychotics or a control group of normals, and took longer to recover.

Other kinds of physical "stress" conditions are employed to test blood pressure reactivity. For example, Stevenson, Duncan and Wolf (1949) had Ss perform a standardized exercise, taking blood pressures before and after. Subjects who were rated by psychiatrists as "relaxed" showed less increase in blood pressure than those rated as "preoccupied" or already in therapy for anxiety symptoms. Further, like the neurotics in the Malmo and Shagass study, the anxiety patients took longer to recover to original levels of blood pressure. This study suffers from the fault of most in this field--ratings on "anxiety" were made after knowing the Ss' blood pressure reactivity.

Thurrell, Greenfield and Roessler (1961) rated psychiatric patients (none of whom were on drug therapy) on degree of "psychological responsivity" based on a fifteen minute

interview. Clinicians rated Ss on a seven-point scale: raters (2) agreed on 60 patients with a correlation of 0.74. Subjects on whom ratings differed more than one point were dropped. The sample of Ss also included thirteen volunteers from the hospital staff. Subjects rated as "hyperresponsive" showed a greater variation of blood pressure from a base line following an injection of mecholyl than did those rated "hyporesponsive." These variations involved both increases and decreases on a continuous-recording machine. Controls on sex and age do not eliminate the differences. The authors note that, despite the fact that diagnoses were not used in the rating for responsiveness, the hyporesponsive group contained only chronic schizophrenic and retarded patients. But, their sample did not include those patients who could represent the extremes of responsivity, that is, manic and stuporous patients.

Brower (1947a) measured blood pressure of 38 college Ss (sex not specified) before and after a mirror-drawing task. Before and after levels of blood pressure were compared with scores on four of the Klopfer Rorschach indices: F, Fc, Fc, and percent responses to last three cards. He found a correlation of -0.61 between diastolic blood pressure (systolic readings were not taken) after the task and per cent responses to last three cards. Klopfer (Klopfer, Ainsworth, Klopfer & Holt, 1954) calls this a measure of "emotional responsiveness." A low score means withdrawal from "reactivity to emotional

impact from the environment" (p. 374). The obtained correlation would thus be interpreted to read--Ss whose diastolic blood pressure was high after experiencing the stress of the mirror-drawing task are less emotionally responsive than those whose blood pressures were low. It should be noted that Brower did not use measures of blood pressure change. As a result, one does not know if those Ss with high post-test blood pressures were those who reacted most to the stress.

The search for psychological mediators of blood pressure reactivity is affected, of course, by findings that reactivity in parents is correlated with reactivity in children. For example, Hines (1940a) found that if both of a set of parents were "hyperreactive" (greater than 20 mm increase systolic, 15 mm diastolic) on the cold pressor test, then 95 per cent of their children would also be hyperreactive. In a sample of 18 neuropsychiatric patients and 18 medical students all with normal blood pressure Shapiro (1961) found that those with a family history of high blood pressure showed greater systolic reactions, than Ss without such a history, to: (1) an injection of saline solution; (2) another injection of saline, explained on the basis of S having behaved so as to make the first injection worthless; (3) the cold pressor test; and (4) the Stroop Color Recognition Test. Remington, Lamberth, Moser and Hoobler (1960) found that

children of hypertensive patients showed an increase of blood pressure to the cold pressor test before it actually began! Finally, Doyle and Fraser (1961) found that some children of hypertensives showed significantly greater responses to injections of noradrenaline than did Ss, matched with the first group on age and blood pressure levels, whose parents did not have high blood pressure.

Even more evidence is available for the argument that blood pressure activity may be genetically transmitted. However, a respectable alternative hypothesis, which fits the data equally well, is that hypertensive parents create conditions in the home which lead to development of high blood pressure or reactivity in their children. Apparently there has been no research on this problem, nor comprehensive research on relationships between parent-child relationships and other "psychosomatic" illnesses.

Several other examples of research lend partial support to the idea that emotional responses, which may be conditioned by early learning, may in turn mediate blood pressure reactivity. An experiment by Hokanson (1961b) provided Ss with a stressing social situation. Subjects were criticized for their performance in counting backward from 100 by threes. Hokanson correlated amount of increase in systolic and diastolic blood pressures during the criticism to scores on

several tests of manifest hostility. Subjects high in Test Hostility showed greater rises in systolic and diastolic blood pressure. Hokanson chooses to interpret this finding as support for a concept of "aggression anxiety" learned in middle class families. That is, increase in blood pressure is an index of anxiety. Of course, this is not always true, according to a number of studies, for example, Steinman, Jaggi and Widmer's 1955 study on the effects of music. Hokanson argues that Ss with high Test Hostility scores must feel anxious or guilty about expressing hostility. He relates this to the findings in another study (1961a) in which Ss who released aggression showed a greater decline in blood pressure after the experiment than did Ss who did not release aggression. Aggression was measured by the amount of effort Ss exerted in administering a shock. In the same study he showed that Ss' amount of aggression was positively correlated with amount of increase in blood pressure.

In a study using only nine Ss, Cranston, Chalmers, Taylor, Henschel and Keys (1949) combined the cold pressor test and a stressful interview. Subjects were given six to eight cold pressor tests on different occasions to establish their usual degree of reactivity. The average systolic response during this period was 16.0 mm Hg above resting levels. Unfortunately, diastolic values are not given. Subjects then

experienced an interview in which they talked about topics which the experimenters judged to be emotionally relevant for them. The interview is reported to have evoked hostility and resentment in most Ss. Immediately after the interview, Ss again took the cold pressor test. This time, the average reaction was 24.2 mm Hg. This difference is significant at the 0.01 level. The process by which an emotion such as hostility or resentment heightens the effects of pain is not clearly understood. Also, it might be that the cold pressor was merely the final stress necessary to produce an elevation of blood pressure.

Finally, Solomon, Darrow, and Blaurock (1939) interviewed psychotic patients before and after treatment (with insulin and metrazol). They reported that patients who demonstrated "resistance" in the initial interview also showed elevations of blood pressure (systolic only) when discussing "crucial ideational stimuli," usually frustrating experiences they had had prior to commitment. These same patients showed no reaction in similar discussions after they had been pronounced recovered as a result of the therapy. "Resistant" patients who did not recover continued to show blood pressure reactions in interviews, as did patients classified in the initial interview as passive and cooperative, recovered and not. Does the chemotherapy produce an incapacity for affect

for some "resistant" patients?

Reactivity as a Function of Initial Level of Blood Pressure

Because there are thought to be relationships between psychological variables and resting or average levels of blood pressure, it is reasonable to examine relationships between reactivity and psychological variables when controlling for level of blood pressure. In this case, the average level of blood pressure is taken as an index of individual differences, which are also related to anxiety (and as other studies show, may also be related to other psychological variables). At any rate, these studies show that reactivity may be a function of initial levels of blood pressure. Thacker (1940) recorded the blood pressures of 15,500 new students at the University of Illinois between 1935 and 1939. The students were between the ages of 17 and 24. He established three groups of Ss: hypertensive, with systolic greater than 150 mm Hg, 96 Ss: normal, with systolic between 114 and 138 mm, 128 Ss: and hypotensive, with systolic less than 108 mm, 56 Ss. He then compared these three groups of Ss on a number of variables, a few of which are presented in Table 2 below. He found that high blood pressure Ss took a longer time to react, reacted more on both systolic and diastolic, and took more time to recover after the cold pressor test than did Ss with lower

TABLE 2

CHARACTERISTICS OF COLLEGE STUDENTS WITH HIGH, NORMAL AND LOW BLOOD PRESSURE
(Thacker, 1940, p. 93)

Subjects	Cold Pressor Test				Mean Casual-Rest Difference	Self Report Nervous	High BP in Family?	Use of Tobacco*
	N	Time to React	Mean Rise in BP	Time to Recover				
Hypertensives systolic >150	96	Long	18/17	Long	28 mm	44%	54%	17%
Normals systolic 114-138	128	Short	10/14	Short	7 mm	12%	3%	20%
Hypotensives systolic <108	56	Medium	11/11	Long	5 mm	14%	5%	50%

NOTE: *A study by Thomas (1960) shows that smokers have lower diastolic blood pressure than nonsmokers.

blood pressures. High blood pressure Ss demonstrate more lability. Lability refers to fluctuations of blood pressure in the absence of identifiable pressors, and was operationally defined by Thacker as the difference between a "casual" office blood pressure reading and one taken after a short rest period. Reactivity to the cold pressor test and self-report of "nervousness" are related.

Although lacking in sufficient information to permit a complete evaluation, a study by Jost, Ruilmann, Hill and Gulo (1952) offers some tantalizing results. A group of 17 hypertensives and 37 normals (no information as to definition, age, recruitment) were, among other procedures, given a memory for digits test. Blood pressure measures were taken while Ss were successfully repeating the numbers (this is called stress) and when they experienced failure on the task. The hypertensive patients showed a greater rise under the stress condition than did the normals. Both groups showed a decline in blood pressure with failure on the task, although normals declined more. The authors found, as did Thacker, that hypertensives took longer to recover from the stress (see also Pfeiffer & Wolff, 1950; Steinman, Rickenbach & Gianoli, 1953). This experiment, which should be repeated under more controlled conditions, suggests that the tension of Ss was relieved when they

experienced the expected failure on the digit-span task. Either the situation was more stressful for the hypertensive Ss (vis a vis differences in personality) or they have a more responsive vascular system.

Psychological Factors Influencing the Stability of Blood Pressure

Although the dynamics are not clearly understood, it is conceivable that personality characteristics of an individual affect his blood pressure responsivity to various stimuli, or the variability of his blood pressure where no specific stimuli can be identified. Here will be discussed several studies in which psychological variables are related to lability of blood pressure. Lability is the term applied to degree of differences in consecutive blood pressure readings when no specific "cause" of the differences can be isolated.

Armstrong (1938) reported a high (0.88) correlation between clinical ratings of emotional stability and blood pressure lability. Lability was defined as a systolic reading over 134 mm Hg, or a diastolic over 90 mm. Readings were taken while Ss were under the pressure of an examination for selection into the Army Air Corps, and Armstrong assumed that this constituted a temporary elevation for all Ss. In attempting to replicate this finding Morris (1941) examined 62 nurse candidates and 17 pilot candidates. An informal

interview was used to establish Ss' emotional stability and adjustment. Blood pressures were taken during a physical examination. Data was also collected on later school performance and social behavior as rated by teachers. Morris found no correlation between vascular instability and emotional instability, either as rated from the interview or determined from the follow-up material. Therefore, he could not replicate Armstrong's findings. However, he found no relationship between his two measures of "emotional instability." And, of the 62 nurses, only 16 showed readings over 134 systolic or 90 diastolic, while 13 of the 17 pilots showed such an elevation. Finally, Morris' use of female Ss is not a replication of Armstrong's study.

Does the Armstrong-Morris lability criterion really measure temporary elevations in blood pressure, or is it distinguishing between persons with high and low blood pressure? It is to be expected that some of both Armstrong's and Morris' Ss would always have blood pressures over 134 systolic or 90 diastolic. Use of single blood pressure reading to determine variability of blood pressure is an inappropriate method.

However, this same method has been used by others. In a monumental analysis of blood pressure data, taken from records of tha Army officer corps, Levy, White, Stroud and Hillman (1944, 1945) demonstrated that there was a strong

relationship between blood pressure lability (defined by them as having any office reading over 150 mm systolic or 90 mm diastolic) and the later development of permanent high blood pressure or hypertension, and an earlier death. Either those persons with highly responsive vascular systems are more prone to develop high blood pressure, or persons who are highly sensitive to emotional stress are more likely to demonstrate blood pressure lability and later develop high blood pressure. A third alternative, less parsimonious than the others, postulates that vascular responsivity causes high blood pressure with subsequent development of the personality characteristics associated with high blood pressure. This latter hypothesis could be tested by examining the relationship among personality characteristics of persons with vascular lability as compared with those of high blood pressure persons.

As far as can be determined, this research has not been done, nor is there a pair of studies, one studying lability, the other high blood pressure, which use the same personality variables. Perhaps the best match is between a study by Ostfield and Lebovits (1960) and one by Kalis, Harris, Sokolow and Carpenter (1957). The former study compared MMPI scores of a group of 34 Ss defined as labile (as a result of observations over a six-month period) with another group of Ss, of similar age, sex and race, who had "stable" blood pressures.

The labile group had higher scores on the Hysteria, Hypochondriasis, and Psychopathic Deviate scales of the MMPI. There were no differences on the other scales. Ostfield and Lebovits state that high scores on the Hysteria scale are indicative of immaturity, suggestibility, narcissism, need for social recognition, lack of self-insight and need for others' support. High scores on Hypochondriasis are supposed to be indicative of worry about self, discouragement, pessimism, and frequent complaints about body symptoms. High scores on the Psychopathic Deviate scale indicate self concern, lack of self control, impulsiveness and adventurousness.

Kalis, Harris, Sokolow and Carpenter had Ss perform in a two-act psychodrama. Observers (who probably knew Ss' blood pressure--the point is not covered) rated Ss using a check list of interaction variables. Subjects were then divided into two groups: hypertensives, whose average blood pressure was 172/107; and normals, whose average blood pressure was 119/73. There were 12 hypertensives and 22 normals, all females. Apparently they were not matched on age and race. The observers rated the hypertensive Ss as less effective, organized and controlled. A content analysis of the verbal material used by Ss revealed that hypertensives were more assertive and had a higher tension level. Normal Ss were seen as demonstrating more poise, responsiveness, closure, plot

flexibility and overall effectiveness in the psychodrama. What the comparison of these two studies seems to indicate is that labile and hypertensive Ss are more often seen as having neurotic traits than are stable and normal Ss.

It should be pointed out here that studies in which level of blood pressure is determined by only one measure (e.g., that by Thacker) will include as high blood pressure Ss those who were high on this one reading but might have normal blood pressure on another occasion. Probably some of the "high blood pressure" Ss in the Kalis, et al., study were really "labile" by the Ostfield and Lebovits criterion.

Having reviewed studies which show that internal states of an individual are related to his vascular reaction to stimuli, research will now be reviewed which bears on the question of whether psychological variables are causally related to blood pressure.

Are There Psychological Determinants of High Blood Pressure?

Most of the research linking psychological variables and blood pressure has been done in an effort to discover the "cause" of permanent high blood pressure and hypertension. Such studies were begun on the hunch, and some evidence, that there were behavioral differences between persons with high blood pressure and those with low. For example, Alexander

(1902) was among the earliest to note differences between the blood pressures of persons committed to mental hospitals and blood pressures of the general population, with the patients tending to have higher blood pressures. A respectable body of literature dealing with relationships between psychoses and blood pressure developed and this early work has been summarized by Miller (1939). Generally, results were like those reported earlier by Hawley (1913), who reported that patients in the manic phase of the disease show elevated blood pressure; and that there is a decline with emergence from the manic period. "Stuporous" cases have very low blood pressure. Depressed patients are in the middle range. Unfortunately, in none of the early studies were there sufficient controls to separate the effects of hospitalization from the effects of the psychosis.

Hypertension and Neurotic Traits

Physicians treating hypertension early in the century commented on the varieties of social behavior associated with presence of the disease. Most of these studies show that hypertensive patients tend to have "neurotic" personality traits. In 1919 Moschowitz drew up a personality description of hypertensives based on observations made on his patients. The hypertensive was described as: overweight, sluggish, slow and ungraceful; tense and irritable; with narrow intellectual

horizons and no hobbies; sleeping badly; having lost the ability to enjoy life, even though financially successful. Moschowitz carefully avoided asserting this syndrome as the cause of high blood pressure.

Barach's presentation (1928) of his observations was more systematic and differed quite a bit from Moschowitz'. He compared his hypertensive patients to those with other diseases and noted that hypertensives had more often had infectious diseases (such as scarlet fever) in the past. He felt this indicated a constitutional organ deficiency on the part of the hypertensive. He ascribed personality differences to the illness. He found hypertensives to more often have been overnourished; of light complexion and hair, with fewer children or unmarried.

One of the early controlled studies in this area was that by Armstrong (1938). He drew a sample of 212 males, between the ages of 18 and 20 years, from applicants for flight training. Blood pressure measures were taken in a standard procedure. Armstrong then interviewed the Ss and characterized them as either (psychologically) "stable" or "unstable." Subjects were considered stable if there was no history of insanity in their family or if they exhibited "normal inhibition, emotional control and rational balance" (p. 213). The mean blood pressure in the group of 113 Ss categorized as

stable was significantly lower than that of the 99 Ss categorized as unstable. Armstrong may have known the Ss' blood pressure before categorizing them.

Other examples of this sort of research are studies by Robbins, Malmo and Shagass, and Benedict. Robbins (1948), on the basis of prolonged study of two hypertensives, was able to assert that they have chronic emotional maladjustment. Malmo and Shagass (1952) found that neurotics show greater blood pressure reactivity to the cold pressor test and take longer to recover than do normals. Hypertensives behave in the same manner. Psychotics react as do normals to the stress, but have higher resting diastolic pressure. Subjects for this study included 37 psycho-neurotics, 10 acute psychotics and 16 chronic schizophrenics from a mental hospital, and 20 night students at an urban college. These Ss no doubt differed in age and sex and these are variables also related to blood pressure levels. A final example of research associating behavior disorders with blood pressure is one by Benedict (1956). The presence of "overt nervousness" in Ss was established by use of self-reports, doctors' judgments or enrollment in psychotherapy. A sample of 106 patients who had once had normal blood pressure but now had diastolic pressures greater than 90 mm Hg was compared with a group from the same general population (Federal employees)

matched on age and sex. High blood pressure Ss had "overt nervousness" more than twice as frequently as the nonpatient controls. Some 57 per cent of the men and 79 per cent of the women had "overt nervousness" in the patient group.

From the evidence cited above there is reason to believe that there is an association between high blood pressure and possession of at least some psychological characteristics not found in people with normal or low blood pressure. There follow some studies which attempt to specify which psychological variables differentiate normals from hypertensives.

Specific Personality Differences of High and Low Blood Pressure Groups

Gold (1943) conducted intensive psychiatric interviews with 10 neurotic patients who also had high blood pressure (greater than 140/90). He found them to be characterized by strong attachments to parents, an inadequate heterosexual adjustment, and a tendency toward depression. Anxiety and inhibition of aggression were present but not dominant characteristics. No comparison group was utilized.

Cattell and Scheier (1959) report correlations between "systolic blood pressure," "diastolic blood pressure after exercise," and some of the Cattell 16 PF factors. No further description is provided of the procedure or the Ss. They claim a positive correlation between high systolic pressure

and Extraversion, A+, Q_2-, N+, M-, E+, having bigger bones, exuberance, long range goals, low confidence of skill in untried performance, more tremor in right hand. There is a positive correlation between higher diastolic pressure after exercise and B+, being thinner, smaller boned, having a higher ratio of friends to acquaintances, overestimating length of fear periods, having smaller muscles.

Hamilton (1942) examined a group of young people (sex not specified) between the ages of 16 and 23. He divided them into two groups; one of 108 Ss with systolic blood pressure less than 138 mm; and one of 102 Ss with systolic blood pressure greater than 138. Using a combination of self-ratings and ratings by two peers, Hamilton found high blood pressure Ss to be described more frequently as submissive, introverted, less self-assertive, less self-confident, slow, lethargic, and getting less enjoyment from the opposite sex.

Brower (1947a) correlated blood pressure of college students with scores on the Rorschach and MMPI. With a sample of 38 (sex not specified) Ss he found a significant negative correlation between diastolic blood pressure and FC scores on the Rorschach. FC is considered (by Brower) to be a measure of adjustment.

Using 48 Ss between the ages of 17 and 52 years, 25 of whom were females, Brower (1947b) found correlations between

diastolic blood pressure (he did not measure systolic) and the ?, Depression (D), Hypochondriasis (Hs) and Psychopathic Deviate (Pd) scales of the MMPI. No interpretations are offered in the article. The scales are described by Hathaway and McKinley as follows: "? is a tally of items put in the Cannot Say category; D measures the depth of the clinically recognized symptom, or symptom complex, depression, Hs is a measure of amount of concern about bodily functions; and Pd records the absence of deep emotional response" (1951, p. 19). The Hs and D scales are part of the "neurotic triad." However, Modell and Potter (1949) had 10 hypertensives (greater than 150 systolic or 100 diastolic) draw a human figure and found somewhat different results. From their analysis of the drawings they concluded that "hypertensives tended to depict themselves as weakened, depleted, inadequate individuals although a need for personal assertiveness was prominent in the drawing" (p. 290). Although comparisons of drawings were made between various types of patients, there was no control group of normals. This was not a blind analysis.

Hostility and High Blood Pressure

One of the most energetic "schools" of research on hypertension is that which promotes the repressed hostility hypothesis. Beginning with Alexander's (1939a) theoretical

discussion, this hypothesis asserts that hypertension develops because the prehypertensive person continually represses feelings of hostility instead of expressing them. This repressed hostility or tension is somatically expressed in increased blood pressure which, over time, leads to the permanent vascular changes associated with hypertension. Alexander's speculations were based on psychoanalysis of hypertensive patients. Saul (1939) treated seven hypertensives in analysis and concluded that the salient similarities among hypertensives are "the prominence in every case of a dominating mother . . . marked inhibition of heterosexuality, repressed hostility and being neither weak and dependent nor aggressively hostile" (p. 160).

A number of clinical observers have worked along the line of Alexander's repressed hostility hypothesis. They usually interpret the materials obtained during psychotherapy. Disregarding for a moment the question of the methods themselves, these observers could not avoid errors due to preselection of the material which they studied. It will remain an open question as to how representative of the general population of hypertensives are those in psychotherapy; it is quite likely that they are a small and selected part of the population.

A sample study in this area is one by Wolf, Pfeiffer,

Ripley, Winter and Wolff (1948), who collected diary recordings of the feelings of patients and analyzed differences between those of hypertensive patients (diastolic greater than 100 mm Hg) and non-hypertensive patients. Out of 58 hypertensives 50 fitted the following pattern (as compared with that demonstrated by normals): more square and muscular, non-thinking or prone to solve problems by action, "combat ready," presenting a facade of easy-going approach but "underneath" tense and suspicious, afraid of committing themselves, poised to strike but afraid of consequences, shy as children, married to domineering mates, having domineering mothers who were intolerant of displays of anger, eager to avoid interpersonal difficulties. It is not clear whether each patient demonstrated all of these characteristics. The authors conclude: "Our hypertensive subjects, often gentle, poised and apparently easy going, were filled with aggressive drive which was highly restrained by a need to please" (1948, p. 1058). In addition to noting that the authors did not perform a blind analysis it has been argued by Lipkin (1949) that hostility and aggression are often the result of the physician's attitude toward the patient. And these traits are probably not specific to this disease only.

Nevertheless the paper by Wolf, et al., has been much discussed and is representative of a number of papers published

by a group of excellent clinical observers who, for more than 20 years, have shared an interest in the rather complicated problem of the psychosomatic origins of hypertension.

Another approach on the same type of subjects was utilized by Gressel, Shobe, Saslow, DuBois, and Schroeder (1949). They had three groups of Ss: 50 defined as hypertensive; 49 psychoneurotic, non-hypertensive patients without somatic ailments; and 44 patients with a chronic medical or surgical disorder. The Ss were roughly matched on age, sex, race, education, habitat and occupation. Subjects were rated (not blindly) by the authors on 6 variables, each measured by a five-point scale: hysteria, anxiety, depression, obsessive-compulsiveness, non-assertiveness and impulsiveness. Hypertensive patients were significantly higher than the psychoneurotics on the obsessive-compulsive and non-assertiveness traits. The hypertensives were rated higher than the medical-surgical patients on all the traits except impulsiveness. The psychoneurotic patients were rated higher than the medical-surgical patients on hysteria, anxiety, depression and non-assertiveness. The authors feel that their findings are consistent with this sort of causal sequence:

1) S inhibits impulses to action (in situations where others would aggress);

2) thereby raising his blood pressure.

3) Such frequent inhibitions result in heightened blood pressure outlasting the inhibition period; and

4) eventually, S's blood pressure remains at a high level. He is always "ready" for stress.

Of course it still has to be proven that such a sequence of events actually exists. Shapiro (1960) has reviewed research relevant for this hypothesis and concludes that available data are inconclusive.

The most creative test of the hostility hypothesis was by Saul, Sheppard, Selby, Sachs and Master (1954). They asked 17 chronic hypertensives and 16 normal patients to report their dreams. The Ss did not know the experimental hypothesis. Over a two-month period 78 dreams were collected. These were coded by two judges ignorant of the hypothesis and ignorant of the Ss' blood pressures. There was high inter-rater agreement. Dreams of hypertensives had content rated higher in hostility than did dreams of the normal patients. However, the two groups differed in age, race, socio-economic status, and it is likely that these differences account for part of the differences in dream content, irrespective of blood pressure level. The next section of the review deals with studies which are relevant for evaluating the hypothesis that particular personality syndromes causally precede

the development of high blood pressure.

The Prehypertensive Personality

In order to successfully argue that a particular personality syndrome precedes the development of hypertension (and might therefore be causative) it is necessary to demonstrate that those who now have hypertension had the same personality before developing the disease. Or, it should be shown that persons of a given personality type are more likely to develop hypertension than are others. Because no adequate long-range studies on adults have been done, there are no data which directly test these two hypotheses. Indirect evidence is provided in the following studies. Ayman (1933) attempted to show that younger Ss with high blood pressure have the same personality characteristics as do older Ss with essential hypertension. Descriptive material was obtained in a standardized interview asking patients whether they were highstrung or calm, blushed easily or not, active physically or not, and so on. All Ss were hypertensive patients. The average age of the young group was 26 years; that of the older group was 54. Systolic pressures in the younger group were over 140 mm Hg; there were 34 Ss in this group. Systolic pressures in the older group were over 160 mm; there were 61 Ss in this group. Middle-aged control Ss had an average age of 47; these were drawn from routine checkup patients and those with venereal

diseases. Young control Ss, average age 25, came from a similar group; there were 52 of these controls. The young high blood pressure group was more similar in personality traits to the older hypertensive group than it was to the control groups. Ayman provides a description of the young high blood pressure group as follows:

> high strung individuals who either display an easy temper or are easily excited within themselves. They tend to be unusually sensitive, being hurt by little things. . . . early in their life or later they tend to blush easily, to be easily embarrassed, and to be unusually shy . . . they tend to be unusually serious and worry over trivialities (1933, p. 221).

The demonstration that young and old hypertensives have similar personalities offers support for the notion that there is a prehypertensive personality. Two important methodological considerations of this study are that Ayman knew the blood pressure of all but 20 per cent of the patients before interviewing them, and that Ss were describing themselves.

Adolescents from the Berkeley longitudinal study were the Ss for Harris' (1958) study. He found that children with high blood pressure at ages six to eight also had high blood pressure at ages fifteen to seventeen. The low blood pressure Ss (24 teen-age males and 24 females) were more frequently ectomorphic, matured earlier and were less labile in emotional responses. This parallels the findings of Armstrong (1938). In the Harris study high blood pressure Ss were described as having upwardly mobile fathers, less likely to be first born,

having more older male siblings, experiencing conflict about sexual identification (with girls being more dominating and assertive and boys timid and dependent), being overly sensitive to criticism, anxious, envious of others. These descriptions were based on a content analysis of personality summaries prepared by E. H. Erikson. Harris concludes that "the subjects with lower pressures were self-confident, optimistic and adaptable" (1958, p. 52). This article suggests that the prehypertensive personality must develop at an early age.

A study by Kalis, Harris, Sokolow and Carpenter (1957) has already been briefly discussed. Subjects participated in a psychodrama and were rated by observers. Prehypertensive Ss were defined by having any reading over 190 mm systolic or 90 mm diastolic during a six-month period. Both prehypertensive and hypertensive Ss were more frequently (than normals) rated as: emotional, guarded, grave, imprudent, intense, nervous, peculiar, prudish, resentful, restless, self-centered, sour, unsympathetic. Normals were more frequently rated as: adaptable, affectionate, considerate, cooperative, dependable, efficient, even, kind, likeable, tactful.

As the reader may see, in some studies there is a striking similarity between personality traits of "prehypertensive" subjects and those of hypertensives. On the other hand there

sometimes is quite a difference in characteristics attributed to prehypertensives and patients with high blood pressure. Also results vary when different researchers study the same type of subjects. The degree of consistency among these findings may be more quickly judged by examination of Table 3, in which major studies are summarized in tabular form.

Studies in Which the Prehypertensive Personality Hypothesis Is Not Confirmed

The repressed hostility hypothesis discussed earlier can be tested by experimentation. A study presenting ambiguous results is that by Matarazzo (1954). He had Ss, well-matched on important variables but with either high or normal blood pressure, tell stories to TAT pictures. As they were telling the stories their performance was criticized by the investigator. Pre-test indices of aggressiveness were obtained from the Rosenzweig Picture-Frustration Study and the Allport Ascendance-Submission Scale. TAT stories were coded for aggressive content before and after the criticism, which began after several stories had been told. There were no differences between high and normal blood pressure Ss on either pre- or post-test aggressiveness using these variables. However, 12 out of 40 normal Ss refused to continue telling TAT stories when criticism began while only 1 out of 40 hypertensive Ss quit. Matarazzo interprets quitting as aggressivity

TABLE 3

VARIOUS TRAITS ATTRIBUTED TO PERSONS WITH HIGH BLOOD PRESSURE

STUDY	ANXIETY	HOSTILITY
Moschowitz, 1919 observations on patients	tense	irritable
Ayman, 1933 self-rating by patients	high-strung	easy temper
Saul, 1939 psychoanalysis of patients		repressed hostility
Hamilton, 1942 self and peer ratings by normal young adults	low self-confidence	less self-assertive; angry outbursts
Gold, 1943 interviews with patients	anxiety	inhibition of aggression
Wolf, et al., 1949 self report by patients	tense	suspicious, poised to strike, afraid of consequences
Gressel, et al., 1949 psychiatric rating of patients	anxious	non-assertive
Kalis, et al., 1956 ratings while patients in psychodrama	nervous, restless	resentful, sour, unsympathetic
Harris, 1958 normal adolescents, personality summaries	anxious	sensitive to criticism

TABLE 3--Continued

BODY BUILD	RESPONSIVENESS	SEX ADJUSTMENT	PARENTS
overweight	lost ability to enjoy life		
	unusually serious		
		inhibition of heterosexuality	dominating mother
	slow, lethargic	less enjoyment from the opposite sex	
	tendency toward depression	inadequate heterosexual adjustment	strong attachment to parents
square and muscular	afraid of committing selves	married to domineering mates	domineering mothers
	depressed		
	emotional, guarded, grave	prudish	
endomorphic		conflict about sexual identification	upward mobile fathers

toward E. All of the Ss who quit were females;the sexes were equally represented among the Ss.

Neiberg (1957) gave a multiple-choice form of the Rosenzweig P-F Study before and after a criticism experience. Subjects were criticized while going through the Wisconsin Card Sort. Verbalized aggression by Ss following stress was recorded. There were no differences in post-stress aggressivity between hypertensives and normal Ss. The definition of hypertension was not presented.

Schachter (1957) exposed Ss to pain, fear and anger situations in that order and had Es rate expression of anger and fear by Ss. Subjects were 18 high blood pressure and 30 normal paid volunteers. High blood pressure was defined by readings greater than 140/90. High blood pressure Ss expressed more anger and fear; there was a positive correlation between expression of anger and blood pressure.

A study by Kaplan, Gottschalk, Magliocco, Rohorst and Ross (1961) suggests that hypertensives are more hostile than those with normal blood pressure, but that they express their hostility. Ten hypertensive patients were matched on age with ten patients with other diseases. The Ss were asked to talk for five minutes about a recent dramatic experience. Their monologues were transcribed and coded blind (using the scoring categories developed by Saul, et al., 1954). The hypertensive

Ss were coded as having significantly more hostility expressed in their monologues. (An interesting finding was that, across both kinds of patients, those taking Reserpine expressed more hostility than those not taking it.)

There are a few studies which report no differences in scores on personality tests between high and low blood pressure samples. For example, Innes, Millar, and Valentine (1959) found no significant differences between hypertensive pregnant females (average age 26), normotensive females after delivery (26), psychoneurotic females (age 32) and hypertensive females (age 53) in scores on the MMPI. One would expect to find differences just because of the physical factors of age and health, so that failure to find any differences is quite surprising. Robinson (1959) found no significant relationship between blood pressure and performance on the Maudsley Personality Inventory, and the Porteus Mazes. Not enough information is provided to allow evaluation.

Monroe, Heath, Mead, Stone and Ritter (1961) compared 12 high blood pressure schizophrenics and 12 low blood pressure schizophrenics: no behavioral differences were seen. However, they also noted that the Ss' blood pressure varied widely, and that for each S behavior at any one time seemed consistent with his blood pressure at that time. Studies using hospital populations must show that the characteristics

associated with being a hypertensive patient are unique to that disease entity. There are very few studies which attempt to demonstrate that the "hypertensive personality" is unique among other ailments suspected of being psychosomatic in origin.

Storment (1951) compared five groups of male hospital patients using the Guilford-Martin STDCR, GAMIN and OAgCo, yielding 13 factors. The groups of patients were: (1) hypertensives, defined as having blood pressure over 150 mm Hg systolic and 90 mm diastolic; (2) rheumatic heart disease; (3) coronary occlusion; (4) arteriosclerosis; and (5) non-cardiac infectious disease patients. Using group means on the test variables, there were no differences among the five groups on the 13 variables using analysis of variance.

Finally, if personality characteristics precede development of the illness and are causally associated with it, then one might expect to find different personality traits among essential hypertension patients as compared with those whose hypertension can be ascribed to some structural malfunction, such as a dysfunctional kidney. This argument has been advanced by Ostfield and Lebovits (1958), who found that 18 essential hypertension patients and 14 renal hypertension patients, matched on age, sex, race and socioeconomic status, showed no differences in group scores on the MMPI or Rorschach or in response to a stressful interview. In both groups

variability of blood pressure from week to week was positively correlated with scores on the hysteria, hypochondriasis and psychasthenia scales of the MMPI. The authors conclude that emotional factors may be responsible for temporarily raising or lowering the blood pressure, but are not involved in a permanent rise in pressure, or in producing the disease. Given earlier reported studies which show that prehypertensive Ss are similar in personality traits to hypertensive patients, this is a single but strong argument against the pre-existing hypertensive personality. It is possible that personality characteristics are a non-causal correlate of hypertension in all stages of its development and that both can be attributed to some other causal agent.

Effects of Environmental Stress

One such possible agent is environmental stress. Inadequate behavior in social situations might have disturbing consequences for some people, hence the relationship of personality measures with blood pressure. For other persons, occupational strains or other stressing events in the daily environment might occasion frequent elevation of blood pressure and lead to the development of the illness in the way suggested by Gressel, et al. Studies have already been presented which show how events in the environment can cause

temporary rises in blood pressure and how a person whose blood pressure is occasionally high is much more likely to develop hypertension than those whose blood pressure is never high. Steiglitz (1930) was perhaps the first to argue that repeated episodes of emotional tension could lead to permanent hypertension. But he had only eight cases and no control group. In 1937 Palmer performed a study with the cold pressor test and concluded that hypertension is a chronic emergency response. "Those who have definite essential hypertension usually have experienced severe and prolonged mental or nervous strain and often have suffered from insomnia, functional gastric disorder, marked exhaustion and occasionally, more or less severe nervous breakdown" (1937, p. 692).

Reiser and his colleagues (Reiser, Brust, Shapiro, Baker, Ranschoff, & Ferris, 1950; Reiser, Brust, & Ferris, 1951; Reiser, Rosenbaum, & Ferris, 1951) have attempted to link the occurrence of life-crises and the development of hypertension by intensive clinical examination of the events which preceded the onset of the illness. No particular stress seems necessary, but the authors feel these stresses usually represent threats to the patient's self-concept, such as threatened divorce from his wife, failure on the job, and so on. Since none of these studies employs a control group, it is not known if these events happen more frequently to those who develop hypertension or not. If not,

one needs to explain why these events do not affect others. It is probably the case that Reiser, et al., would admit to a constitutional predisposition to be affected by these life-stresses more than others. However, they do not explore this possibility.

After demonstrating that hypertensives are slower to recover from elevations of blood pressure caused by psychical (mental arithmetic) and physical (cold pressor) stress, Brod (1960) concludes that hypertension develops as a result of prolonged exposure to stress which weakens restoring mechanisms and produces a continual alert pattern. Unfortunately his evidence does not apply directly to his argument. Another bit of tangential evidence is that by Engel and Bickford (in press) which shows that hypertensive patients tend to respond to both mental and physical stresses with the same physiological pattern, while normal Ss physiologically discriminate between them. It is tempting to speculate that hypertension is preceded by development of stimulus generalization in which even mildly threatening stimuli produce a full alert reaction. There is, of course, no evidence at present to support this hypothesis.

Another way to collect evidence testing the environmental stress hypothesis is to examine blood pressures across cultures, predicting that cultures characterized by

highly stressful conditions of life will have more hypertensives than those cultures in which life is easier and less stressful. Shreenivas (1951) attempted to do this by taking blood pressure readings from 500 East Indians, representing all ages, castes and dietetic habits. He estimated that only 2 per cent of the population in India have blood pressures over 140 mm Hg systolic or 90 mm diastolic. In the United States the percentage is estimated to be at least 5 or 6 per cent. However, it is hard to understand why the poverty-stricken conditions of life in India are not as stressful as the more modern conditions in the United States. Shreenivas found highest blood pressure readings in graduate students aged 21-30. These readings were exceeded only by persons over 80 years of age!

Maddocks (1961a) took blood pressure readings from the entire population of some South Sea islands and failed to find an increase in blood pressure with age, while there is a marked increase after 50 years of age in a group of Ss from London, England. Platt (1948) thinks that this increase is a result of hypertension being more prominent beginning with the 50 year old group. That is, there is very little hypertension in the South Sea islands and therefore blood pressure there does not increase with age. In another study Maddocks (1961b) compared blood pressures from a sample of

121 urban East Indians with about 1000 rural Indians, all living on Fiji. An attempt was made to be representative in both samples. All age groups showed a higher mean systolic and diastolic blood pressure in the urban group than in the rural group. Maddocks admits that there are many alternative hypotheses to that of the "stress" of urban living. Further, there are more diastolic hypertensives (greater than 100 mm Hg) in the urban Indian population in Fiji than in the London population. What reason is there to believe that downtown London is less stressful than downtown Fiji?

One of the difficulties in assessing the value of such cross-cultural research is knowing exactly what constitutes stress. Marcussen (1950) discusses several cases in which symptoms of high blood pressure <u>disappeared</u> when the <u>S</u> was under an extreme environmental stress (e.g., being a prisoner-of-war of the Japanese) but reappeared upon reestablishment of a normal pattern of life. Palmer (1950) put 100 hypertensives through a standardized interview and counted the frequency with which blood pressure rose in response to various topics. There were 67 responses to discussion of blood pressure, 44 with regard to hypertension and other illnesses. Only 28 responses were tallied with respect to occupational strain and only 22 with respect to family difficulties.

If hypertension is associated with stress, then blood

pressure should go down as a result of suggestion or psychotherapy designed to reduce that stress. Ayman's (1930) therapy was to give patients eight to ten drops of dilute hydrochloric acid in water (producing a very sour drink with no medicinal properties) with instructions to take it three times per day. This "medicine" was very enthusiastically recommended by Ayman to his patients and 33 out of 40 of them responded with a relief of their symptoms. However, remission of symptoms was much more marked than actual lowering of blood pressure. Reiser, et al. (1950) were, however, able to lower blood pressures with an intensive therapy program. Wolf and Shepard (1950) encouraged patients to free expression of aggression and obtained lower blood pressure readings from patients. But Weiss, et al. (1952) report failure in altering the course of hypertension as a physical disease, once developed, even though they were able to produce changes in personality. Wyss (1955) had 14 young hypertensives in therapy and obtained a decrease in blood pressure in six cases. Neurotic symptoms were alleviated in three more without an accompanying decline in blood pressure. Finally, Tichener, Sheldon and Ross (1959) observed increases in blood pressure following participation of seven patients in group psychotherapy. None of the studies evaluating the effects of psychotherapy on blood pressure levels has been done by investigators other than those giving

the therapy. Furthermore, a control group for evaluation of the effect of resting levels and limited physical activity was not established, and it is known that the treatment, even without hospitalization, changes patients' daily routine.

Experimentally Produced Stress in Infra-Human Animals

The most effective test of the stress-produces-hypertension hypothesis would be to expose an organism to stress and see whether it develops hypertension. Selye (1943), Farris, Yeakel, and Medoff (1945) and Yeakel, Shenkin, Rothballer and McCann (1948) claim that rats exposed to loud noises (sounds produced by an air blast) at frequent intervals for a long period of time develop hypertension. Presence of the disease was evaluated both by *in vivo* measures of blood pressure and histologies after sacrifice to establish the presence of vascular lesions associated with hypertension in humans. The results of these experiments indicate that, in rats at least, it is possible to develop hypertension by chronic exposure to what humans would consider a stressing stimulus (unexpected loud noises). In the Farris, *et al.*, experiment animals were tested for "emotionality" (open field test) before and after the experiment. There were no significant changes but all of the emotional experimental animals developed hypertension while only two-thirds

of the non-emotional animals did. None of the emotional controls developed hypertension. There were 12 animals, 6 in each group.

Russian researchers have also been able to produce hypertension experimentally in animals using Pavlovian conditioning techniques, according to a review of their work by Simonson and Brozek (1959).

However, some researchers have not been able to duplicate these results. Shapiro and Horn (1955) used conditioning techniques in an attempt to produce experimental neuroses in cats. Full-blown neurotic behavior never developed, according to the authors. Neither was the blood pressure of the conditioned animals markedly above that of controls. Shapiro and Melhado (1958) exposed rats to various conditioning procedures designed to evoke "chronic anxiety." Effects on blood pressure were examined, some of the rats being in conditioning for as long as 6 months. No hypertension was produced, but there was evidence that existing vascular disease could be seriously exacerbated by the stress procedures. The Shapiro studies used a conditioning technique rather than the noxious stimuli procedures of Selye and Farris because, as Shapiro (1960) has pointed out, the latter involve long periods of extreme fatigue for the animal in addition to "psychic" effects, thus clouding the interpretation of results.

On the other hand, there is reason to suspect that Shapiro's animals never experienced the degree of stress that did the Selye and Farris animals and that this amount of stress is necessary to produce permanent high blood pressure. The stress hypothesis has yet to be adequately tested experimentally.

Genetic Determinants

In summing up evidence relevant to psychological antecedents of high blood pressure we need to examine what evidence there is to support a contention that high blood pressure is inherited. The Harris (1958) study demonstrated that blood pressure is reasonably constant from at least age 6 years and on. This would be consistent with a genetic hypothesis.

Palmer (1930) examined 3598 freshmen entering Harvard, selecting 361 cases in which systolic blood pressure was greater than 140 mm Hg. These Ss were randomly paired with 376 Ss with pressures less than 140 mm. There were no differences between the groups on family history of cardiovascular disease. However, this report was obtained from the Ss and therefore might be unreliable. Ayman (1934) measured blood pressure in 780 children from 277 sets of parents, who were also examined. There were no differences in age or sex between the high and normal blood pressure groups of children, although the high blood pressure group (defined as those with

systolic blood pressure greater than 140 mm or diastolic greater than 80) weighed, on the average, 10 pounds more. Children of families where neither parent had had high blood pressure showed an incidence of 3.1 per cent of high blood pressure. The rate was 28.2 per cent in families where one of the parents had high blood pressure and 45.5 per cent where both parents had high blood pressure. A group of 70 brothers and sisters of parents were also examined. Siblings of the parents with normal blood pressures had a rate of 37.3 per cent of blood pressures over 140 mm systolic, while the rate in siblings of the hypertensive parents was 65.3 per cent. Rates are higher in the sibling group than for children because the former group is older.

Gardner, Mountain, and Hines (1940) compared 100 hypertensives (over 160 systolic) with 100 patients selected at random on admission to clinic, roughly matched on age and sex. Sixty-seven per cent of the hypertensive group had a family history of hypertension, while only 5 per cent of the non-hypertensive group did. Shapiro (1961) found that normal blood pressure Ss (18 medical students and 18 psychoneurotics) with a family history of high blood pressure had higher blood pressure than did normals without such a history.

Morrison and Morris (1959, 1960) have attempted to test the genetic hypothesis by examination of the curve of blood

pressures of large samples plotted by age groups. It has been argued (by Pickering, 1955) that as average levels of blood pressure increase with age this means that everyone's blood pressure increases, and that an increase in blood pressure is a normal phenomenon. Hypertensive patients are merely those at the end of the continuum (by virtue of constitutional predisposition, or personality characteristics, or both) and hypertension is not a disease entity. Morrison and Morris have countered this by noting that the apparently continuous curve consists rather of two super-imposed curves, one bimodal and the other continuous. If there is a single gene for hypertension, then blood pressures of children of hypertensive parents would be bimodally distributed. Blood pressures of children of parents without hypertension would be normally distributed with few blood pressures in the hypertensive range. Superimposition of the curves, which is what happens when you plot the whole population, would produce an apparently normal curve of blood pressures. Plotting by age would show an increase with age, but this increase is a function of those persons genetically determined to be hypertensive demonstrating the effects of the disease at that age. By a detailed analysis Morrison and Morris attempt to support this assertion. Their claim rests on assumptions which are, for the time being, untestable so that the genetic hypothesis, like many others

of those dealing with hypertension, remains only partially supported.

An equally likely hypothesis, equally untested, is that which posits a genetic susceptibility to the effects of environmental stress, so that children of hypertensive parents would show a greater relative incidence of the disease, but not an absolute difference because some children may avoid extremely stressing situations. It can be speculated that certain neurotic and psychotic syndromes would be more efficient at reducing stress than others and presence of high blood pressure would be less in these conditions. Some children of parents who did not have hypertension would also develop the disease as a result of severe environmental stress or incapability of handling stress. The evidence considered in this review fits this hypothesis as well or better than those other hypotheses which have been discussed.

HYPOTHESES RELATING PARENT-CHILD RELATIONSHIPS AND BLOOD PRESSURE

It is evident from the review of the literature that the problem of determinants of blood pressure is highly complex and far from solved. However, some tantalizing leads have been suggested. The following relationships are the more widely supported in extant research:

1. Persons who show high reactivity and lability of

blood pressure are more likely to develop high blood pressure at a later date than are those who are not highly labile or reactive.

2. Both high blood pressure persons and "neurotics" react more to, and recover more slowly from, stress experiences than do low or normal blood pressure persons or those with "normal" personalities.

3. High blood pressure persons more frequently demonstrate personality characteristics considered "neurotic" than do persons with normal blood pressure.

Hyperreactivity to stress has frequently been identified as the causal mechanism for the development of high blood pressure. It is significant that "neurotic" individuals demonstrate hyperreactivity, for they are often defined as possessing inadequate "psychological" means of handling stress. These inadequate means do not resolve the stressful situation but permit it to occur again and again.

Given these facts, it is possible to formulate two general models describing the mechanism by which high blood pressure develops from one category of stress. The first model considers, by examination of his relationships with his parents, the amount of stress the person experienced when he was a child. Individuals who had a stressing childhood would be expected to demonstrate higher blood pressure and

to demonstrate overreactivity of blood pressure in stressful situations. One way this might take place is described by Malmo (1957). In a review of studies relating anxiety and behavioral arousal he cites evidence to indicate that "continuous overarousal may result in impairment of central inhibitory mechanisms. . ." that control physiological activity levels (1957, p. 286). Persons who, as children, experienced a continually threatening environment might have suffered an impairment of central inhibitory mechanisms and would demonstrate blood pressure overreactivity in a stressful situation. Because our daily environment contains stressful situations, these persons would also demonstrate higher levels of blood pressure.

A similar developmental process is described by Mowrer and Viek (1948). Their description facilitates an association of high blood pressure and overreactivity with "neurotic" characteristics. In a study on conditioned fear in rats they present the concept of "fear from a sense of helplessness." Their research shows clearly that animals which have a history of being unable to "control" painful experiences act much more frightened of a painful stimulus than animals whose history was such that they developed an expectation that the pain would be "bearable" because they could "control" it. Mowrer points out that humans, too, are less frightened of things

they feel they can anticipate (and so control) than they are of things, of equal stimulus value, which they cannot anticipate. A stressful childhood, in which the child experienced inconsistent and threatening relationships with his parents, would lead to a generalized fear from a sense of helplessness which would express itself in heightened blood pressure levels and reactivity. In this instance, neurotic characteristics would be a concomitant but not a cause of the high blood pressure.

The second model to be considered argues that a stressful childhood may or may not lead to development of neurotic characteristics, and that it is the neurotic characteristics which are the direct causal antecedent of high blood pressure levels and reactivity. This conceptualization is that employed by Funkenstein, King and Drolette.

> The importance of stress reactions has perhaps been best emphasized by an understanding of the effect of long continued, maladaptive mechanisms on the part of the organism, leading eventually to recognizable and irreversible tissue changes. . . . These maladaptive reactions are partly due to the fact that the human organism responds, not only to actual situations of danger, but to varied cues in his environment that have become for him symbols or threats of danger. . . . By seeing danger where none objectively exists, he may call forth sustained measures that are inappropriate, and that over an extended time span have a marked effect on the functioning of the body (1957, p. 2).

It is not possible for this thesis to perform a critical test of these two general models. What it does do, however,

is present data which tests the general proposition that the degree of stress experienced in childhood (vis a vis parent-child relationships) is related to level and reactivity of blood pressure. Lability of blood pressure is also considered, as an indication of reactivity to stresses which the investigator cannot identify. A further research project will be necessary to determine if the stress encountered in parent-child relationships directly affects blood pressure characteristics, or if these relationships lead to development of certain behavioral patterns which are then a basic determinant of blood pressure level and reactivity.

To facilitate this future research, this present effort is based upon an assumption that stress in parent-child relationships leads to development of "neurotic" behavior patterns and development of high blood pressure and blood pressure reactivity. The hypotheses used to guide this current research are generated from a consideration of our knowledge as to what kinds of parent-child relationships lead to "neurotic" behavior.

There is, of course, a vast literature on this problem. Rather than burden the reader with a review of this material, it is assumed that most of it is familiar to him, and a brief summary statement is presented. There are at least two major kinds of variables which have been linked to the development

of "neurotic" personality: variables defining the minimum requirements of parental behavior to assure an adequate adjustment to the world; and variables in which emphasis is placed upon the child's acceptance of social norms appropriate for his sex.

In research on the first major class of variables, it is well demonstrated that parents must provide the child with some affection, generally the more the better. This is necessary to insure the child's attention to the parents as teachers of basic ways of coping with the environment. (See, for example, Sears, Maccoby & Levin, 1957.) Complementary to affection, and somewhat independent of it, is punishment. Although too little punishment may have undesirable effects, there is generally a linear relationship between punishment and adjustment, or the lack of it (Sears, Maccoby & Levin, 1957; Ausubel, 1958). In addition to being affectionate and not punishing too often parents "should" also be consistent in their applications of rewards and punishments (Sears, Maccoby & Levin, 1957; Ausubel, 1958). The more rational their methods appear to the child, the less irritable they are, the more likely he will be well adjusted (Baldwin, Kalhorn & Breese, 1945). The less conflict between parents the better (Sears, Maccoby & Levin, 1957). And finally, the more the child is allowed to participate in activities with

the parents, the better equipped he will be to deal with his environment (Baldwin, Kalhorn & Breese, 1945; Ausubel, 1958).

For the purposes of this thesis, therefore, it is predicted that Ss who characterize their parents as demonstrating little affection, or as administering a great deal of severe physical punishment, or as excluding them from their activities, or as being inconsistent in their treatment of them, or as irritable or arbitrary in their relationships with them, or as frequently being in conflict with each other, will be more likely to have higher blood pressure, blood pressure reactivity or blood pressure lability than Ss who do not describe their parents in such a fashion.

It is considered that the S's perception of his parents, their attitudes and behavior, is a more meaningful source of information than the parents' report of how they thought about or treated their son. Ausubel argues: "the personality development of children is influenced more proximately by the attitudes they perceive than by the objective properties of the latter (as reported by parents or observers) . . ." (1958, p. 356). In this thesis it is assumed that young adult Ss can reliably describe their parents' attitudes as they perceived them when they were children.

In the second major class of variables the focus is on characteristics of parents and their relationship with the

child that facilitate his adoption of behaviors appropriate to his sex. One source of information about parent-child interaction is research on schizophrenia, a behavior syndrome in which the individual is particularly unable to function adequately in his environment. Two studies representative of an increasing wealth of good research are those by Farina (1960) and Garmezy, Clarke and Stockner (1961). They distinguish between poor premorbid schizophrenics, or those individuals who have a long history of maladaptation, good premorbid schizophrenics whose illness was precipitated by some stress in the environment, and normals. Using behavioral measures on parents, and reports of parent attitudes by patients and controls, the researchers show that poor premorbid schizophrenics, more often than good premorbids or normals, have punitive mothers who are dominant over their husbands. Good premorbids more often have harsh, dominant fathers. For both types parents are more dominant than parents of normal controls. Conflict between parents is more frequent for parents of patients, especially poor premorbid schizophrenics. The relationships can be expressed in the following diagram.

		Sources of Dominance	
		FATHER	MOTHER
Amount of	LOW	Normals	
Dominance	HIGH	Goods	Poors

Fig. 1.--Diagnostic categories associated with characteristics of parents.

(It is not clear what belongs in the empty cell. Perhaps it does not occur in reality.)

Funkenstein, King and Drolette (1957) had their Ss classified as demonstrating Anger-in (or turned against the self), Anger-out (or directing aggression toward others) or Severe Anxiety, as a reaction to a frustrating situation. Some authors (e.g., Miller & Swanson, 1960ab) regard aggression against the self as a more sophisticated and mature defensive reaction than aggression directed outward.

Subjects in the Funkenstein, et al., study also provided a description of their parents' behavior. Responses were rated to permit placement along dimensions of authority and affection. Severe Anxiety Ss more frequently described their mothers as being both the major source of affection and authority in the home. These Ss frequently had no father at home, or had a father who was ineffectual in his relationships with the mother. Mother was described as frequently angry or depressed. Anger-out Ss described mother as source of affection and father as source of authority, but saw their father as cold, harsh, and distant. Anger-in Ss reported their parents as relatively equal sources of authority and affection, and enjoyed close relations with both parents. A fourth, small, group of Ss in the Funkenstein, et al., study, who showed no emotion in the frustrating situation, more

frequently described their fathers as the source of both authority and affection. There were too few Ss who saw their father as a source of affection and mother as a source of authority to permit further analysis. The Funkenstein, King and Drolette results might be described in this sort of diagram.

		Source of Authority		
		FATHER	BOTH	MOTHER
Source of Affection	FATHER	No emotion		
	MOTHER	Anger-out	Anger-in	Severe Anxiety

Fig. 2.--Emotional reactions associated with characteristics of parents.

The similarity of these findings to those on schizophrenics is striking. In both instances, Ss with "normal" personalities more frequently described their father as being the power in the family, but as affectionate, and their mother as the major source of affection. Difficulty in relationships with father, but enjoyment of a good relationship with mother, was associated with less adequate personality development. The most severe lack of adjustment was found in Ss whose mothers were domineering and unaffectionate and whose fathers apparently played a minor role in the authority structure of the family.

Research on identification of male children with their

fathers indicates that positive identifications are more likely when father is seen as an authority in the home and as a source of reward for this child. The more the father and son interact the more likely the child is to identify with his father (Mussen & Distler, 1959). Positive identification of male children with their fathers is considered a requisite for adequate adjustment (Ausubel, 1958).

A final type of parent-child interaction leading to learning of behaviors appropriate for the child's sex is that described in research on development of conscience or internalization of parental norms. This is most likely to occur when parents do not employ physical punishment as a means of discipline and are highly accepting of the child (Miller & Swanson, 1960a). Acceptance by father is particularly important for conscience development in boys (Sears, Maccoby & Levin, 1957). Miller and Swanson and Ausubel (1958) argue that internalization of parental norms (or, as mentioned earlier, aggression toward self) is a more "functional" characteristic than is failure to internalize parental norms (and externalized aggression).

For the purposes of this thesis it is predicted that Ss who characterize their mother as more dominant than their father, who do not identify with their father, or who deny having internalized the values of their father, will be more

likely to have higher blood pressure, blood pressure reactivity or blood pressure lability than Ss who see their parents as equally dominant, who identify with their father, and who state that they accepted the values of their father.

The Hypotheses of This Research

The following is a summary statement of the hypotheses which will be tested in this research.

Subjects having high levels of blood pressure, or high reactivity of blood pressure, or high lability of blood pressure will, more frequently than Ss who do not have these characteristics, describe their parents as:

1. administering severe and frequent physical punishment;
2. not accepting them or as infrequently demonstrating affection;
3. inconsistent in their treatment of them;
4. irritable or arbitrary in their treatment of them;
5. infrequently including them in their activities; and
6. frequently disagreeing with one another.

These Ss will also more frequently:

7. report their mother as more dominant than their father;
8. identify with their mother rather than with their father; and

9. report having resisted internalization of parental values.

CHAPTER II

METHODS

This chapter contains a description of the procedures, instruments and variables used in this research.

SAMPLE

The subjects involved in this study were all males and students at the University of Michigan at the time data was collected. There has been no research specifically conducted to determine if blood pressure characteristics of students are different from non-students of the same age. However, a comparison of results obtained by Thacker (1940) and those by Fishberg (1939) indicates that there are no differences between the distribution of blood pressures among a student sample and that for the general population. It is certain that there are differences between students and non-students on variables such as income of parents, education of parents, and social class, but in this study these variables do not relate significantly to any of the dependent or independent variables (see Table 46 in Appendix C). However, a sample of middle class college students provides a limited range of individual characteristics.

Initial Selection of Sample

At the beginning of their first semester in the University of Michigan all new students are required to take a physical examination provided by the University's Health Service. In the beginning of the fall semester of 1961 approximately one-fifth (or about 800) of the male students taking the ordinary physical examination also had their blood pressure taken. This measurement (to be referred to as $\underline{\text{Casual}}_1$) was taken by one of four physicians and a trained medical assistant. All of the readings were taken by the standard auscultatory method in the sitting position. Each physician used a different blood pressure cuff. Age, systolic and diastolic blood pressure, and campus addresses were recorded along with the students' names. The top six per cent and the bottom six per cent of the distribution of systolic blood pressure readings (greater than 142 mm Hg and less than 109 mm Hg respectively) were selected for recruitment as subjects. There were 50 students in each of the two groups.

About four weeks later each student in the sample was mailed a regular Health Service consultation card, inviting him to come to the Health Service at his earliest possible convenience for a consultation. Of the 100 students in the sample 90 came to the Health Service. The other ten were contacted by telephone and six more came in. Only four students

refused to cooperate at all.

Students came to the Health Service in groups of from two to six persons. There, they were met by Dr. Stevo Julius, a physician connected with the Hypertension Unit of the University Medical Center; Dr. Ernest Harburg, a recent graduate of the Doctoral Program in Social Psychology; and myself. Dr. Julius explained to the student our desire to have him participate in the research. He was told that this was to be a study of blood pressure, and that he had been selected into the sample because he had either abnormally high or abnormally low blood pressure. All students were told what their blood pressure was, but that in itself this one reading was not an indicator of pathology. Dr. Julius added that the University Medical Center would like to give them a free medical examination to make certain no pathology was involved. Of the 96 students who received this invitation, five refused the physical examination on the grounds that they knew all about their blood pressure.

Having agreed to the free physical examination students were then invited (by either Dr. Harburg or myself) to also participate in a psychological study being conducted in conjunction with the blood pressure study. It was explained that this joint research would be of great aid in helping older persons for whom blood pressure is a serious problem.

Some seven more students refused to participate in the psychological aspects of the research, even though all Ss were to be paid $5 for three hours of their time. Thus, of the original 100 Ss, 84 agreed to cooperate in both phases of the research project. Subjects were scheduled for a physical examination at a later date and given details as to time and place of the psychological phase of the research.

Of the 84 students who had agreed to participate, 71 actually completed both phases. To increase the size of the sample, another 20 students from the original pool of 800 were invited to participate in the research. This required changing the selection points to greater than 139 mm Hg, and less than 110 mm Hg, systolic blood pressure. Of the 20 new students 12 completed both phases of the research, bringing the total number of Ss, from the original pool of 800, to 83.

It is not known to what extent self-selection affects the conclusions to be obtained from this research. That there is no great physiological difference between participating and non-participating selected Ss is partially indicated by the fact that the mean systolic blood pressures of the two groups are quite similar. The mean systolic blood pressure of the 37 non-participating Ss was 123.8 mm Hg, with a standard deviation of 18.1. That of the 83 participating Ss from the original pool was 127.1 mm Hg, with a standard

deviation of 16.9. It is possible, however, that the two groups differ on the psychological variables.

To increase size of sample further, letters were sent to the 91 Ss involved in the research done by Harburg (1962). These Ss were offered $4 for submitting to a physical examination lasting 1½ hours. Forty of the 91 Ss replied to the mailed invitation--time did not permit the use of more than 24 of them. The addition of these 24 Ss (who will be referred to as the P5 sample) increased the total number of Ss to 107.

Characteristics of Sample

Table 4 presents some of the characteristics of the Ss in this study. Table 5 presents the distribution of systolic and diastolic $Casual_2$ (the second casual measure on the Ss, to be described below) readings. The distribution of $Casual_2$ systolic measures approaches a normal distribution instead of the dichotomous distribution one would expect from the initial sampling procedures. This is because of: (1) the addition of 24 Ss whose blood pressures were mainly in the normal range; and (2) regression toward the mean of the second blood pressure reading taken.

PHYSICAL MEASUREMENTS

Procedure

The procedure for taking the physical measurements differed only slightly for the 83 Ss from the original pool

TABLE 4

CHARACTERISTICS OF THE SAMPLE

AGE	
16-17	8%
18-19	53%
20-21	24%
22-23	10%
24-25	4%
26+	1%

CLASS STANDING	
Freshman	61%
Sophomore	15%
Junior	10%
Graduate, professional	14%

SUBJECTIVE SOCIAL CLASS	As a Child	Now
Lower upper	6%	16%
Upper middle	39%	56%
Lower middle	36%	23%
Upper working	18%	3%
Lower working	1%	1%

EDUCATION OF PARENTS	Father	Mother
Grade school or less	7%	4%
High school or less	33%	40%
Attended college	19%	29%
Completed college	23%	25%
Post-graduate degree	18%	2%

RURAL-URBAN RESIDENCE AND SIZE OF COMMUNITY	
2500 or less	15%
2500 to 9999	10%
10,000 to 49,999	16%
50,000 to 150,000	11%
150,000 and over	28%
Metropolitan suburb	20%

PARENTS BORN IN UNITED STATES	
Father	81%
Mother	93%

RELIGION	FATHER	MOTHER
Nonaffiliated	6%	1%
Protestant	66%	64%
Jewish	14%	14%
Catholic	14%	21%

REAL PARENTS LIVING TOGETHER NOW	
Yes	93%
No, father deceased	5%
No, divorced or separated	2%

TABLE 5

DISTRIBUTION OF CASUAL$_2$ BLOOD PRESSURES. N = 107.

Systolic		Diastolic	
91-100	2%	36-42	3%
101-110	24%	43-49	2%
111-120	23%	50-56	6%
121-130	14%	57-63	24%
131-140	12%	64-70	25%
141-150	16%	71-77	15%
151-160	7%	78-84	18%
161-170	2%	85-91	6%
171-180	1%	92-98	2%

of 800 as compared to that for the 24 Ss from the P5 sample. What follows is a description of the procedure followed for the group of 83 Ss.

1) Upon arriving at the physician's office for his appointment, S was seated in a chair and a blood pressure reading was taken using the standard auscultatory method. All readings on all Ss were taken by the same person using the same blood pressure cuff. This reading will be referred to as Casual$_2$.

2) The subject was then asked to give some general information about his health and that of his family, particularly with regard to incidents of high blood pressure among his relatives.

3) Upon completing this brief form S then removed all of his clothing except underwear and reclined in a hospital

bed in the examination room underneath a sheet and a blanket. Also at this point, EKG recordings were obtained from the Ss. These recordings will be analyzed separately from the data in this thesis.

4) Immediately after lying down a blood pressure reading was taken and four more measures were taken every five minutes until 20 minutes had elapsed. The reading taken at the end of the 20 minute period is referred to as the Resting measure. Systolic resting blood pressures average 5.5 mm lower than the systolic $Casual_2$ measures, indicating that most Ss relaxed somewhat under these conditions.

5) After the Resting measure, blood pressures were read at one minute intervals for five minutes. Then, the physician placed S's hand in a bucket filled with chipped ice and water. The temperature of the ice water mixture was about 2 degrees Centigrade. The subject's hand remained submerged to the wrist in the ice water for one minute. Blood pressure readings were taken 30 and 60 seconds after immersion and one minute after removal of the hand from the ice water. The highest of these three readings is referred to as Cold Pressor Reactivity and is expressed in mm rise of blood pressure as compared to that taken immediately before immersion. No Ss showed a decline in blood pressure as a result of the cold pressor test and most showed an increase.

6) The subject then rested for another five minute period; blood pressure readings were taken every minute. At the end of this period he was shown a mercury column to which was attached a rubber tube. He was instructed to blow into the tube so as to sustain the mercury in the column at 40 mm elevation for 30 seconds. A diastolic reading was taken while S was blowing into the tube. Systolic and diastolic readings were taken immediately after he stopped blowing. These latter two readings are referred to as Valsalva Reactivity. They are expressed as mm increase in blood pressure as compared to the reading taken immediately before S started blowing. All Ss showed a diastolic increase during blowing but some Ss' blood pressure returned to pre-blowing levels immediately after they ceased blowing.

7) The subject rested for 5 more minutes, while blood pressure readings were taken at one-minute intervals. Then, the EKG leads were disconnected and he was instructed to stand by the side of the bed. Immediately after standing his blood pressure was taken. This test is called the Orthostatic Load test. These data are not considered pertinent to the research as Orthostatic Load reactions are a function of body size. This step was eliminated in the procedure for the 24 Ss from the P5 sample.

8) Height, arm girth and weight measures were taken.

9) Subjects in the sample of 83 Ss were then instructed in the technique of self-determination of blood pressure. The physician gave S a brief description of the general procedure involved in the use of the self-determination cuff and asked him to take several readings. If the measurements approximated those taken earlier by the physician he was asked to take six measurements over the next two days, one each at breakfast, lunch and immediately before retiring each day. Useful data were obtained from 71 Ss. Table 6 presents a comparison of Casual, Resting and Median Home blood pressure measurements and supports the conclusion that the self-determination technique provides trustworthy data.[1]

Definitions of Variables Used

a. Because, as will be discussed later, blood pressure is a variable physical characteristic, it was considered advisable to average the casual blood pressure readings to obtain a more reliable estimate of level of blood pressure under the conditions usually observed by the physician in practice. The Average Casual blood pressure readings which will be used are an arithmetic average of the $Casual_1$ and $Casual_2$ readings. The systolic casual readings correlated 0.62; the diastolic casual readings correlated 0.40. The lower "reliability" of the diastolic casual measure is consistent with studies reviewed which note that diastolic blood

pressure is more sensitive to environmental conditions than is systolic blood pressure.

b. The Resting and Median Home blood pressure readings were averaged to produce the Usual blood pressure. It was

TABLE 6

RELATIONSHIP OF VARIOUS BLOOD PRESSURE MEASURES AND PHYSICAL CHARACTERISTICS. N = 71.

VARIABLE	MEAN	SD	SYSTOLIC				DIASTOLIC			
			CAS_1	CAS_2	REST	HOME	CAS_1	CAS_2	REST	HOME
Systolic										
$Casual_1$	121.9	24.2								
$Casual_2$	128.3	13.9	.62							
Resting	122.1	12.6	.68	.77						
Median Home	126.0	11.2	.65	.52	.63					
Diastolic										
$Casual_1$	70.8	13.6	.57	.38	.37	.18				
$Casual_2$	64.8	14.6	.26	-.07	-.06	.09	.40			
Resting	60.6	9.6	.18	-.07	.04	.12	.36	.31		
Median Home	71.4	10.2	.28	.02	.03	.20	.35	.21	.42	
Arm Girth	29.4	2.8	.27	.44	.41	.48	-.02	-.12	-.09	.08
Weight	165.1	26.6	.49	.60	.54	.66	.22	.04	-.01	.18
Overweight	+16.3	17.9	.46	.48	.46	.62	.07	-.07	.02	.09

considered that the conditions of measurement for the two readings in the average were fairly similar, and that the average of the two readings would be a fair estimate of level of blood pressure when it is not being observed by a physician. The

relationship between the Systolic Average Casual and Usual blood pressure readings is, as shown in Table 7, quite high and there is no difference between means. The correlation between the diastolic measures is 0.35, significant but small.

TABLE 7

RELATIONSHIP BETWEEN AVERAGE CASUAL AND USUAL BLOOD PRESSURE MEASURES. N = 71.

VARIABLE		MEAN	SD	AVG. CASUAL		USUAL	
				SYST.	DIAS	SYST.	DIAS
AVG. CASUAL	Systolic	125.2	18.9				
	Diastolic	68.2	11.8	.38			
USUAL	Systolic	123.6	11.6	.83	.18		
	Diastolic	66.1	8.0	.12	.35	.18	

The N for the Usual measures is 71, for the Average Casual measures it is 83; the 24 Ss from the P5 sample did not have a $Casual_1$ reading nor did they take home readings.

c. The Cold Pressor Reactivity and Valsalva Reactivity measures have been described earlier. Scores on these variables were obtained on all 107 Ss. The relationship between the reactivity measures and the other blood pressure variables can be seen in Table 45 in Appendix B. Except for a relationship between Systolic Valsalva Reactivity and Systolic Average Casual and Usual blood pressures, reactivity measures are

unrelated to any of the other variables. The Valsalva-Casual-Usual relationship is probably a function of body size. Persons with larger lung capacities (and therefore large bodies) generally react more to the Valsalva task. The Valsalva test is included to provide a comparison between a reactivity measure generally considered to be unrelated to psychological variables (Valsalva) and one which has been related to a wide range of psychological variables (Cold Pressor).

d. The Casual Lability measure is operationally defined as the difference between the $Casual_1$ and $Casual_2$ readings. It can be considered as a crude index of the variability of blood pressure over time. It is a crude index because: (1) for most Ss these readings were at least two months apart; (2) they were taken in different locations; (3) and they were taken by different physicians and with different cuffs. While the measurement procedure reduced systematic error of measurement, it probably greatly increased random error. Therefore, the Casual Lability measure is not expected to be highly informative, but it does offer some information about variability of blood pressure. Scores on this variable were obtained for 83 Ss.

e. A more reliable, but conservative, measure of blood pressure variability was computed by taking the difference between the highest and lowest of the five measures read while S was lying down. This is the Resting Lability variable.

Variability was represented by range rather than standard deviation because an empirical test showed no differences between them and the former is easier to compute. Scores on this variable were obtained from all 107 Ss.

f. For the 71 Ss who had Home blood pressure measures, the difference between the highest and lowest of the six readings was taken as the Home Lability variable. The relationships between Average Casual, Usual, reactivity and lability measures are presented in Table 45 in Appendix B. Except for a relationship between Systolic Average Casual and Diastolic Casual Lability, and Diastolic Average Casual and Systolic Casual Lability, no significant relationships exist. Table 8 permits a comparison of the three measures of lability. They are seen to be independent of each other. This is to be expected as the conditions at time of measurement were quite different. It is, however, reassuring that the mean variability under Resting is less than that under the Home conditions, since the conditions to which Ss were exposed were much more constant in the Resting phase of the physical examination.

Attention should be paid to the diastolic measures of reactivity and lability because, as was noted earlier, heightened diastolic blood pressure is usually considered as prognostic of development of hypertension.

TABLE 8

RELATIONSHIP BETWEEN VARIOUS MEASURES OF BLOOD PRESSURE LABILITY. N = 83.

VARIABLE	MEAN	SD	CASUAL LAB		RESTING LAB		HOME LAB	
			SYST	DIAS	SYST	DIAS	SYST	DIAS
Systolic CASUAL LABILITY	16.3	11.5						
Diastolic	13.7	9.5	-.05					
Systolic RESTING LABILITY	9.0	4.3	.01	-.10				
Diastolic	9.9	5.4	.17	.13	.32			
Systolic HOME LABILITY	16.8	7.9	.03	.00	-.06	.02		
Diastolic	15.8	8.0	-.11	.15	.05	.17	.36	

g. Weight measures are expressed in pounds, Arm Girth in centimeters. Height and age were used to compute an ideal weight for S, which compared to his actual weight yields a variable called Overweight. Overweight is an expression of the number of pounds that S differs from that weight considered to be ideal for his age and height. The range of this variable is from 35 pounds less than ideal weight to 50 pounds more. Scores for this measure were obtained on all 107 Ss.

Reliability of Blood Pressure Measurements

1. Persistent level of blood pressure. The determination of the reliability of blood pressure is a difficult

problem because blood pressure is supposed to vary as the conditions at time of measurement vary. We have seen, in the studies reviewed, that blood pressure is sensitive to a wide range of environmental stimuli, including thinking about certain things or anticipating a blood pressure measurement. What criteria could be established to determine if blood pressure readings are reliable? The following might serve:

1) a demonstration that differences in readings are not a function of measurement error, that is, a result of some deficiency in the measurement technique;

2) a demonstration that, under relatively constant conditions, variability of readings is lower than when conditions are not constant; and

3) a demonstration that there are systematic and logical relationships between blood pressure measures and other physical characteristics.

Blood pressure readings involving the auscultatory method are subject to a variety of sources of systematic and random measurement error. The physician must adjust the cuff so that it is snug without being tight. He must so place the cuff that the ear piece of his stethoscope is directly over the artery and in the same position for all Ss. The physician must record the height of the mercury column (or degree of deflection of the pressure needle on

more modern cuffs) at the exact moment that he hears the beat of the heart reappear in order to measure systolic pressure accurately. It is more difficult to make accurate diastolic recordings because as pressure on the artery is released, there is often a rushing noise just as the beat fades.

One technique to determine the accuracy of the indirect, or auscultatory, method of recording blood pressures is the intra-arterial, or direct, method. This involves insertion of a hypodermic needle directly into the artery so that the blood directly elevates a mercury column. This presents problems also. Air bubbles in the equipment, sluggishness of recording devices (blood pressure varies slightly from beat to beat of the heart), slight displacement of the needle in the artery all contribute to errors of measurement. A study comparing direct and indirect methods of blood pressure measurement found that the <u>indirect</u> method underestimated (as compared to the direct method) systolic blood pressure in 61 of 100 cases, was identical in 3, and overestimated in 36 of the cases (Berliner, Fujiy, Ho Lee, Yildiz and Garnier, 1960). Similar results were obtained for the diastolic readings, except that the indirect method <u>overe</u>stimated more frequently than underestimated. It is possible that the higher systolic and lower diastolic readings obtained with the direct method were a result of the stress of having a needle inserted in

the patients' arms. For the systolic readings the methods agreed within 10 mm of 55 per cent of the cases and within 20 mm in 83 per cent of the cases. For the diastolic readings there was agreement within 10 mm for 68 per cent of the cases and within 20 mm for 89 per cent of the cases. Berliner, et al., conclude: "The discrepancies were minor in most instances. . . . The auscultatory method of blood pressure determination, if practiced carefully, is a reliable clinical method" (1960, p. 127). Blood pressure measurements in this study were taken with the greatest possible effort to avoid the sources of error of measurement noted above. Many and frequent readings tended to insure the accuracy of measurements.

We have already seen that blood pressure variability was less under the Resting conditions than at home or between the two Casual measures. Because variability was less under the relatively constant conditions of resting, there is some reason to believe that the measurements are reliable.

The relationship between Systolic Average Casual and Usual measures and Arm Girth and Weight is presented in Table 9. It is seen that Arm Girth and Weight correlate significantly for the systolic measure (but insignificantly for the diastolic measure, as shown in Table 45 in Appendix B). The systolic blood pressure can be considered as an index (but not a direct measure) of the amount of blood moved with

each beat of the heart. The larger the body, the more blood which must be moved with each beat. It is reasonable to expect a relationship between body size (weight) and systolic blood pressure. The diastolic measure can be considered as an index (but again not a direct measure) of the resistance of the arterial system to flow of blood. There is no reason to expect that this would be correlated with weight. The assertion that there is no weight-diastolic correlation because of unreliability is contradicted by the significant (albeit small) correlation between the two diastolic measures. Finding these expected relationships supports an assumption that blood pressure measurements are reliable, even though blood pressure is not stable.

The relationship between systolic blood pressure and arm girth raises another problem. It could be argued that the thickness of a person's arm would <u>determine</u> the magnitude of the blood pressure reading, since in order to stop the flow of blood in the artery the arm must be compressed. It would take more pressure in the cuff to stop the blood flow in a person with a thick arm than a person with a thin arm. That systolic blood pressure is <u>not</u> an artifact of arm girth, however, may be seen by examination of the correlations in Table 9. The relationship of arm girth to systolic blood pressure disappears when controlling on body weight. That

TABLE 9

RELATIONSHIPS BETWEEN AVERAGE CASUAL AND USUAL BLOOD PRESSURE MEASURES AND PHYSICAL CHARACTERISTICS. N = 71.

VARIABLE	BODY WEIGHT	ARM GIRTH
Arm Girth	.73	
Systolic Average Casual	.59	.40
Systolic Usual	.63	.42

PARTIAL CORRELATIONS*

$r_{\text{Systolic Average Casual-Body Weight-Arm Girth}} = 0.48$

$r_{\text{Systolic Average Casual-Arm Girth-Body Weight}} = 0.07$

$r_{\text{Systolic Average Casual-Systolic Usual - Body Weight}} = 0.71$

*To be read, e.g., as "the correlation between Systolic Average Casual blood pressure and Body Weight controlling on Arm Girth."

blood pressure is not completely determined by weight is also demonstrated. The two systolic measures still relate highly to each other even when effects of weight are partialled out.

In summary, the argument has been presented that measures of the level of blood pressure used in this study are reliable (even though they are admitted to be variable) by showing: (1) that the auscultatory method produces essentially the same results as the intra-arterial method; (2) that controlling conditions at time of measurement of blood pressure

lowers its variability; and (3) that systolic measures correlate with other variables in a reasonable and expected way. The most meaningful test of the reliability of blood pressure measurements would involve repeated measurements under exactly identical conditions at time of measurement. At best this can only be approximated. Further, no attempts to so test the reliability of blood pressure measurements are reported in the literature. It is hoped that the procedures followed in this research reduced systematic and random sources of error.

2. Variability of blood pressure. If criteria for the reliability of measures of persistent levels of blood pressure are difficult to establish, the conceptual problem of reliability of lability measures is even more difficult, as witnessed by the absence of research on this problem. It is assumed that the use of five readings as a basis for the computation of Resting Lability and six measures to compute Home Lability reduces random error.

The determination of reliability of reactivity measures is less troublesome. There are several studies of reliability of the cold pressor test. An example is that by Windesheim, Roth and Hines (1955). A group of 60 normal Ss and 65 hypertensives were given three cold pressor tests 15 minutes apart. The measurements were repeated one to five months later. Mean data are presented in the report and show very little variation.

The authors comment that individual consistency of response was high. An example of tests of the reliability of the Valsalva test is that by Rushmer (1947), who considers it to be a "satisfactory" technique as a result of his findings.

In summary, there is some evidence to support an assumption that blood pressure measures approach a degree of reliability which permits their use in research involving prediction of group blood pressure responses to other variables. Systolic and diastolic measures of level of blood pressure are fairly reliable. Measures of reactivity seem to be highly reliable. There has been no research to establish adequate criteria for evaluation of the reliability of measures of lability.

PSYCHOLOGICAL MEASUREMENTS

Procedure

All sessions with Ss were held in a large auditorium on the University of Michigan campus. On entering the auditorium Ss were invited to sit in alternate seats. When they were all seated, the Es (Dr. Ernest Harburg and myself) introduced themselves as members of the Department of Social Psychology of the University of Michigan. The subjects were told that the general purposes of the study would be revealed to them at the end of their last session, that they would be

given some written feedback as soon as data were analyzed, and that they could obtain information on their individual performance if they so desired. They were informed that the instruments to be used in the research had been developed over a two year period and that they differed sharply from usual psychological tests because they had been designed to provide the S with a rewarding experience. That good rapport was established is indicated by the absence of missing information on the questionnaires, and by the unsolicited report of Ss after the sessions that they had enjoyed the experience thoroughly.

Subjects were tested for two hours. The order of presentation of the various instruments was as follows:

1) Coping instrument. This is an adaptation of the semantic differential technique (Osgood, Suci & Tannenbaum, 1957) to provide self-descriptions of how S would behave when placed in a situation of interpersonal conflict. The instrument and its application are discussed in detail in Harburg (1962) and McLeod (1962). Total time for this instrument was about 35 minutes.

2) When Ss finished the first instrument they were given a short period in which to relax and then Harburg introduced the Family Questionnaire. A copy of the Questionnaire is contained in Appendix A. Total time for the Family Questionnaire was about 45 minutes.

3) When Ss finished the Family Questionnaire they again took a short rest and were then given Form B of the Cattell 16 PF test (Cattell, 1957). All except one or two Ss finished the battery of instruments within the scheduled two-hour period. At that time Ss were scheduled for a further one-hour session to be held four weeks later.

4) Subjects returned for a one-hour session in which they engaged in a discussion of their attitudes (as determined in the previous session) with a fellow S who held sharply different views. The purpose of this discussion, and later remeasurement of their attitudes, was to determine the response of Ss to an actual interpersonal conflict situation. The results of this study are being analyzed by McLeod (1962). The procedures for the 24 Ss from the P5 sample differed only in that the Cattell 16 PF test was given in a completely different session. Since the administration of this test followed that of the Family Questionnaire, the two procedures are, for the purpose of this research, considered to be similar enough to warrant pooling of data.

Psychological Variables from the Family Questionnaire

The N for all psychological variables is 107. From the wealth of information obtained from the Family Questionnaire the following variables are considered in this research.

a. Measures of social class, and social mobility. Subjects were asked to indicate what social class grouping they considered their family to belong to when they were a child (defined as the period from birth to age 14 years) and at the present time. The self-assignment of Ss to social class groupings is presented in Table 4. The difference between the two rankings serves as a crude index of social mobility for the family. The subjects' perception of their father's concern for social mobility was determined by a direct question.

b. Birth order. Subjects were asked to describe their birth order in their family. There were 11 only children, 49 first born, and 47 born second or later.

c. A series of questions were designed to determine which parent was dominant in the family. These questions were combined to yield a Dominant Parent Index. Of the 107 Ss, 66 rated their father dominant, 26 rated their mother dominant, and 15 rated mother and father as equally dominant. Included in this series was an item asking frequency of disagreement between parents "about things regarding the family." Forty of the 107 Ss reported their parents as disagreeing occasionally or frequently.

d. Both the frequency and intensity with which parents punished (physical discipline) was reported by Ss. As previous

studies have found, punishment in middle class families is more frequently administered by mothers than by fathers, but fathers punish more vigorously than do mothers.

e. Subjects stated the degree to which they were satisfied with the amount of affection received from each parent, and the amount of affection parents demonstrated toward them. For both the punishment and affection questions there is an only slight relationship between behaviors attributed to fathers and those attributed to mothers. There is no relationship between responses to the punishment questions and those to the affection questions.

f. Subjects were asked, "As a child, did you feel either parent was a 'problem parent' for you. . . ?" Twenty-nine of the Ss responded in the affirmative, with 18 of these stating that their fathers were problems, four indicating their mothers; seven Ss felt that both parents constituted a problem for them.

g. Parent identification information was obtained with the question, "When you were a child, which parent in general possessed skills or traits you most admired and wanted to learn for yourself?" (Italics in original.) Of the 107 Ss 21 listed a trait of their mother's that they wanted to emulate, and three responded that neither of their parents possessed a trait they wanted to emulate.

Five of the Ss listed a trait of both their parents and the rest listed a trait of their father.

h. Father time with children. In two questions Ss were asked to recall the amount of time that their father spent with them. One question asked whether father's job kept him away from home, the other asked directly how much time father spent doing things with his children.

These constitute the major characteristics of parents, as obtained in the Family Questionnaire. These will be related to blood pressure and reactivity and lability measures. An intercorrelation matrix of relevant Family Questionnaire items is presented in Table 46 in Appendix C.

Parent Image Factors

The Family Questionnaire was followed by a semantic differential designed to measure aspects of parent-child interaction. This version of the semantic differential will be referred to as the Parent Image Semantic. It employed six multiword concepts; a copy of the semantic is presented in Appendix A. The concepts were:

How My Father Treated Me When I Was A Child
How My Mother Treated Me When I Was A Child
How My Father Taught Me When I Was A Child
How My Mother Taught Me When I Was A Child
How My Father Disciplined Me When I Was A Child
How My Mother Disciplined Me When I Was A Child

Scales were chosen to represent what were considered

significant aspects of parent-child relationships, with an especial emphasis on representing dimensions of punishment and affection. The advantages of the semantic differential technique, as opposed to typical questionnaire items are (according to Osgood, et al., 1957) that it provides much more data in far less time (for example, a typical S makes six responses per minute), can tap dimensions which are not available through direct questions, and renders data which can be treated as meeting the assumptions of interval scales.

When we[2] began our development of the Parent Image Semantic by a review of research on dimensions of parent-child interactions we were persuaded that work up to that time had not systematically covered all the important dimensions of interaction. We felt that, by trying a variety of scales and concepts, we could discover basic dimensions and their relative importance. This required use of factor analysis, so that having an instrument which met the assumptions necessary for use of this statistic was considered a requisite. Since we wanted Ss to indicate the present meaning of events which had occurred many years in the past, we felt it necessary to clarify for the S the events to which we wanted him to respond. The typical use of the semantic employs single word concepts such as "Mother." This allows a subject to employ a wide variety of meanings, which might change in the

course of taking the instrument, and about which the investigator has no knowledge. Will S rate his present mother, mother as he remembers her, an ideal mother, the verb "to mother," or what? Use of a concept such as "How My Mother Treated Me When I Was A Child" would, we felt, enable Ss to respond to a fairly well-defined set of events. At the same time we felt some dissatisfaction with single word scales, such as "good-bad," "hot-cold," "slow-fast," because we had seen that Ss had difficulty in applying these to some concepts and did not use them consistently. We therefore determined to use only those scales to which the typical S could respond with ease. We found that Ss could easily respond to scales such as:

insensitive to my feelings--sensitive to my feelings

often did things together with me--rarely did things together with me.

Subjects told us that they felt that they could be more accurate in making judgments using scales such as these. We have yet to encounter an S who has not reported that the Parent Image Semantic was both a meaningful, yet easy, task for him to do. Applications of the Parent Image Semantic to date include theses by Harburg (1962) and McLeod (1962).

Tables 10-15 present a description of the factors obtained on 83 Ss[3] in this research. A simple structure Varimax rotation was used, extracting as many factors as necessary

TABLE 10

DESCRIPTION OF PARENT IMAGE FACTORS OBTAINED WITH THE CONCEPT, HOW MY FATHER TREATED ME WHEN I WAS A CHILD. N = 83.*

Factor Name & Reliability	Salient Scales	Reliability	Factor Loading	% Var. Acctd For**	
				Total	Common
	cold-warm	.60	-.53		
	tense-relaxed	.56	-.54		
	awkwardly-skillfully	.71	-.90		
	insensitive to my feelings-sensitive to my feelings	.49	.69		
SUPPORT r_{tt}=0.77	unjustly-justly	.69	-.69	40.5%	60.0%
	inconsistent-consistent	.85	.75		
	discouraged me-encouraged me	.69	-.45		
	distant-close	.66	-.55		
	stern-mild	.31	.74	14.6%	21.7%
POTENCY r_{tt}=0.55	hard-soft	.77	.76		
	severe-lenient	.46	-.87		
	with ridicule-with praise	.71	.80		
	usually critical of me-usually praised me	.27	.83	5.2%	7.7%
	indifferent-concerned	.16	-.85	4.6%	6.9%
			TOTAL	67.5%	100.0%

*A negative sign for the factor loading indicates that the scale appeared in a reverse direction on S's form. That is, scales were presented "warm-cold," "relaxed-tense," and so on. See Appendix A for the semantic form.

**Columns do not always add up to Total because residual factors which had no "salient" loadings are not presented.

to account for 95 per cent of the common variance. Each concept was analyzed separately to obtain a maximum number of factors. In each analysis about half of the total variance is accounted for, which is consistent with Osgood's results with single-word concepts and scales. The criteria for selection of a scale into a factor were that it have a factor loading over 0.40 and not have any higher factor loadings on other scales. Thus, no scale appears on more than one factor. All the factors obtained are presented in the tables. Only factors with at least three scales will be used in the analysis to follow, with the exception of the Potency factor on the concept, "How My Father Taught Me When I Was A Child" (see Table 12). This factor correlates highly (greater than 0.90) with the other Father Potency factors.

The assignment of names to factors is an arbitrary process. The names selected are discussed below and presented in the tables. Factor scores for each factor were computed by unit weighting of the scales loading significantly on the factor. The intercorrelation matrix of the factors is Table 47 in Appendix C. It will be noted that there are factors from the same matrix (e.g., Father Taught Inclusion and Irritability) which are significantly related even though a simple structure solution was applied. Since only highly loaded scales have been used in building the factor scores, this

TABLE 11

DESCRIPTION OF PARENT IMAGE FACTORS OBTAINED WITH THE CONCEPT, HOW MY MOTHER TREATED ME WHEN I WAS A CHILD. N = 83.

Factor Name & Relia-bility	Salient Scales	Relia-bility	Factor Loading	% Var. Acctd for	
				Total	Common
	awkwardly-skillfully	.87	-.78		
JUSTICE	insensitive to my feelings-sensitive to my feelings	.36	.62	38.5%	60.1%
r_{tt}=0.79	unjustly-justly	.63	-.69		
	inconsistent-consistent	.52	.74		
	stern-mild	.53	.81		
POTENCY	hard-soft	.69	.77	11.7%	18.2%
r_{tt}=0.76	severe-lenient	.69	-.81		
	with punishment-with reason	.36	.46		
	cold-warm	.81	-.86		
	with ridicule-with praise	.41	.67		
AFFEC-TION	discouraged me-encouraged me	.63	-.69		
r_{tt}=0.64	indifferent-concerned	.03	-.44	8.7%	13.7%
	usually critical of me-usually praised me	.51	.54		
	distant-close	.73	-.82		
			TOTAL	64.0%	100.0%

is not unexpected. It is reassuring that such "unwanted" correlations are relatively low in magnitude.

The three Father Potency factors correlate highly (greater than 0.90) as do the three Mother Potency factors. There is no relationship between scores on the Father Potency factors and scores on the Mother Potency factors. Factor scores on the three Father Potency factors have been combined (by simple addition) to make one Father Potency index. The same procedure was followed for Mother Potency. Relationships between other factors are not as high and seem conceptually unique, therefore they have not been combined.

The factors for Father which will be used in the analysis are:

1) Potency--Father is described as stern, hard and severe, or mild, soft and lenient.

2) Support--These scales seem to describe a relationship which varies along a dimension of security created by Father. It is only mildly related to Father Potency.

3) Inclusion--This is one of the clearer factors, apparently describing the extent to which father and son were involved in joint activities. There is no relationship with Potency, a strong relationship with Support.

4) Irritability--This is defined by the scale "easy to irritate him--difficult to irritate him." It is fairly

TABLE 12

DESCRIPTION OF PARENT IMAGE FACTORS OBTAINED WITH THE CONCEPT, HOW MY FATHER TAUGHT ME WHEN I WAS A CHILD. N = 83.

Factor Name	Salient Scales	Factor Loading	% Var. Acctd for	
			Total	Common
INCLUSION	he rarely discussed things with me-he often discussed things with me	-.62	41.2%	66.8%
	awkward in teaching me new things-skillful in teaching me new things	-.66		
	rarely did things together with me-often did things together with me	-.72		
	basically he did not understand me-basically he understood me	-.73		
POTENCY	stern-mild	.67	10.7%	16.8%
	hard-soft	-.78		
IRRITABILITY	easy to irritate him-difficult to irritate him	.83	5.1%	7.9%
	in a tense way-in a relaxed way	.68		
	impatient with me-patient with me	.78		
	usually criticized my conduct-usually praised my conduct	.47		
	acted as if he was always right-was willing to admit his mistakes	.63	3.7%	5.7%
	displeased him when I acted on my own-pleased him when I acted on my own	-.55		
	critical of my mistakes-supported my mistakes	-.50	2.5%	2.8%
		TOTAL	63.2%	100.0%

strongly related to Potency, Support and Inclusion.

5) Intropunitiveness--This factor seems to be a report by S of how he reacted to Father's discipline. The scales seem to represent a dimension of degree of internalization of Father's demands for behavioral conformity. It is also related to the other factors, though its relationship with Potency is slight.

6) Demand Style--This is so labeled because the scales suggest a continuum of rationality-irrationality in Father's demands for behavioral conformity. It has no relationship with Potency but it does correlate with the other factors.

The Mother factors which will be used are:

1) Potency--This contains almost identical scales as Father Potency but scores on this factor are unrelated to scores on the Father Potency factor. Mothers are generally seen as milder, softer and more lenient than Fathers, though there are some striking exceptions.

2) Affection--This is close to the Father Support factor but the security of the environment provided by Mother seems based on love, while that given by Father is based upon consistency of his behavior. This is one of the few Mother factors which correlates with a corresponding factor for Father. It is more strongly related to Mother Potency than Father Support is to Father Potency.

TABLE 13

DESCRIPTION OF PARENT IMAGE FACTORS OBTAINED WITH THE CONCEPT, HOW MY MOTHER TAUGHT ME WHEN I WAS A CHILD. N = 83.

Factor Name	Salient Scales	Factor Loading	% Var. Acctd for	
			Total	Common
TOLERANCE FOR INDEPENDENCE	she rarely discussed things with me-she often discussed things with me	-.47	32.1%	66.2%
	disagreeing with her was discouraged-disagreeing with her was encouraged	.52		
	easy to irritate her-difficult to irritate her	.48		
	in a tense way-in a relaxed way	.61		
	acted as if she was always right-was willing to admit her mistakes	.50		
	displeased her when I acted on my own-pleased her when I acted on my own	-.68		
POTENCY	stern-mild	.71	8.2%	16.9%
	hard-soft	-.86		
	impatient with me-patient with me	.58		
	rarely did things together with me-often did things together with me	-.54	4.5%	9.3%
	usually criticized my conduct-usually praised my conduct	.59		
	awkward in teaching me new things-skillful in teaching me new things	-.62	3.8%	7.6%
	basically she did not understand me-basically she understood me	-.53		
		TOTAL	48.6%	100.0%

TABLE 14

DESCRIPTION OF PARENT IMAGE FACTORS OBTAINED WITH THE CONCEPT, HOW MY FATHER DISCIPLINED ME WHEN I WAS A CHILD. N = 83.

Factor Name & Reliability	Salient Scales	Reliability	Factor Loading	% Var. Acctd for Total	% Var. Acctd for Common
POTENCY r_{tt}=0.75	often punished me-rarely punished me	.78	.59	33.2%	57.8%
	hard-soft	.47	.77		
	severe-lenient	.70	-.88		
	stern-mild	.52	-.85		
	strict-permissive	.60	.71		
INTRO-PUNITIVENESS r_{tt}=0.76	made me feel resentment-made me feel guilty	.47	-.81	13.0%	22.5%
	made unreasonable demands-made reasonable demands	.76	-.75		
	I blamed him for punishing me-I blamed myself when punished	.75	-.61		
DEMAND STYLE r_{tt}=0.52	rarely explained why he punished me-always explained why he punished me	.49	-.67	5.5%	9.6%
	usually ordered me-usually persuaded me	.48	-.54		
	got angry when punishing me-stayed calm when punishing me	.41	.62	3.2%	5.8%
	easy to irritate him-hard to irritate him	.74	.44		
	I resisted him-I yielded to him	.60	.44		
	often, I wanted to run away-I always wanted to be with my family	.69	.54		
			TOTAL	57.5%	100.0%

3) Justice--This is the consistency dimension on the Father Support factor, but is obtained as a separate factor for Mother. Its defining scales are "just-unjust," and "consistent-inconsistent." It has a moderate correlation with the Mother Affection factor (0.49), which suggests that young adult males are somewhat able to distinguish between consistent and affectionate mothers.

4) Tolerance--This factor seems to represent the degree to which S reports his mother as allowing or encouraging him to engage in independent behaviors. It is unrelated to Potency, moderately related to Affection, and strongly related to Justice.

5) Intropunitiveness--This factor is almost identical with its counterpart for Father and is moderately correlated with the Father factor. It is assumed to be measuring a characteristic of S rather than of his parents.

6) Irritability--This contains essentially the same scales as does the Father Irritability factor but the two are unrelated.

In addition to these factors a comparison was made on the degree of Potency attributed to Mother as compared with Father. Of the 107 Ss, 15 rated their mother as more potent (more stern, hard, severe) than their father. This index will be referred to as Relative Potency.

TABLE 15

DESCRIPTION OF PARENT IMAGE FACTORS OBTAINED WITH THE CONCEPT, HOW MY MOTHER DISCIPLINED ME WHEN I WAS A CHILD. N = 83.

Factor Name & Reliability	Salient Scales	Reliability	Factor Loading	% Var. Acctd for Total	% Var. Acctd for Common
INTRO-PUNITIVENESS r_{tt}=0.66	rarely explained why she punished me-always explained why she punished me	.45	-.49	29.4%	53.1%
	made me feel resentment-made me feel guilty	.55	-.90		
	made unreasonable demands-made reasonable demands	.40	-.68		
	I resisted her-I yielded to her	.36	.45		
	I blamed her for punishing me-I blamed myself when punished	.49	-.81		
POTENCY r_{tt}=0.79	often punished me-rarely punished me	.76	.45	15.3%	27.7%
	hard-soft	.46	.84		
	severe-lenient	.67	-.81		
	stern-mild	.74	-.82		
	strict-permissive	.48	.65		
IRRITABILITY r_{tt}=0.48	got angry when punishing me-stayed calm when punishing me	.37	.41	4.4%	8.0%
	easy to irritate her-hard to irritate her	.56	.69		
	often, I wanted to run away-I always wanted to be with my family	.53	.41		
			TOTAL	55.2%	100.0%

Reliability and Validity of the Parent Image Factors

Reliability. Twenty-six of the 107 Ss took the Parent Image Semantic twice. For 24 Ss (those from the P5 sample) the second administration occurred more than 11 months after the first. The other two Ss, from the sample of 83, took their physical examination six months after taking the psychological examination, and were given the Parent Image Semantic again when taking the physical. None of these 26 Ss could recall when or where they had taken the Parent Image Semantic, though it seemed vaguely familiar to them. It seems reasonable to assume that this re-testing constituted a new experience for them and that they did not recall their original responses. Four of the original six concepts were used:

How My Father Treated Me When I Was A Child
How My Mother Treated Me When I Was A Child
How My Father Disciplined Me When I Was A Child
How My Mother Disciplined Me When I Was A Child

Correlations were computed between Ss' original responses and those obtained with the four-concept form. Scale-for-scale retest correlations are presented in Tables 10-11 and 14-15. The range of correlations is from 0.03 to 0.87, with a median correlation of 0.58. A median correlation of this magnitude can be considered impressive, given the long time span between testings and the fact that the use of 7-point scales reduced the likelihood of obtaining very high

correlations.

Factor scores for the 26 Ss were computed for the factors obtained in the initial analysis and correlated with the factor scores computed on the basis of their first testing. These coefficients are also presented in Tables 10-11 and 14-15. For the 11 factors on which test-retest information was available, only one has a reliability coefficient of less than 0.50. Most of the reliabilities range about 0.70.

Validity. How can one assess the validity of an instrument that purports to measure the perqeptions of an S? Ausubel argues that we should not attempt to validate instruments like the Parent Image Semantic by comparing scores on it with those from some "objective" criterion.

> Correspondence to objective stimulus reality is not a relevant criterion of validity since perceptual instruments only purport to measure perceptions, not the stimuli that evoke them. But since no genuinely independent measure of the actual content of perception can ever be obtained, the best available criterion of validity is test reliability measured by stability over successive administrations. . . (1957, pp. 155-156)

If the test-retest correlations presented above are read as validity coefficients they are impressive.

Three other ways of estimating the validity of the Parent Image Semantic factors are: (1) to examine the relationship between scores on factors and those on other kinds of test items which should measure similar dimensions; (2) to

compare the similarity of the dimensions obtained from this particular sample with those obtained from factor analysis of responses to the Parent Image Semantic by another sample; and (3) to compare the similarity of the factors obtained in this study with other studies examining parent-child relationships using different techniques of observation.

Tables 16 and 17 present the correlations between some of the Parent Image Semantic factors and Family Questionnaire items which seem similar. In Table 16 it can be seen that the

TABLE 16

CORRELATIONS BETWEEN PARENT IMAGE FACTORS POTENCY AND WARMTH AND FAMILY QUESTIONNAIRE ITEMS* RELATING TO PUNISHMENT AND AFFECTION. N = 107.

Parent Image Factor	Physical Punishment				Affection			
	Frequency		Intensity		Satisfaction		Amount	
	Father	Mother	Father	Mother	Father	Mother	Father	Mother
Avg. Father Potency	.52	.15	.41	.05	.18	.02	.20	.05
Avg. Mother Potency	.01	.39	.21	.34	.04	.25	-.09	.36
Father Support	-.07	.04	-.14	.05	.52	.20	.55	.26
Mother Affection	.01	-.11	-.21	-.24	.12	.48	.21	.66

*The questionnaire items are, respectively:
"How frequently did he or she punish you physically? (Check for each parent.)" [6-point scale]
"How hard were you ever hit? (Regardless of how often.)" [6-point scale]
"When you were a child, how did you feel toward each parent as a source of affection?" [6-point scale]
"How did your parents show their feelings to you, when you were a child? (Check for each parent.)" [7-point scale].

Average Father Potency Factor correlates highly only with Father Punishment items; it correlates at a low level with Mother Punishment and Father and Mother Affection items. The corollary is true for the Average Mother Potency factor. On the other hand, the Father Support and Mother Affection factors correlate only with the Mother and Father Affection items and not with the Punishment items.

Table 17 shows that the Father Inclusion factor is highly related to the Father Time With Children item. Not presented in the tables is a correlation of 0.49 between Relative Potency (from the Parent Image Semantic) and Parent Dominance. These correlations tend to support an assumption that the Parent Image Semantic is measuring dimensions similar to those thought to be measured using different techniques.

TABLE 17

CORRELATIONS BETWEEN RESPONSES TO THE FAMILY QUESTIONNAIRE ITEM, "HOW MUCH TIME DID YOUR FATHER SPEND DOING THINGS WITH HIS CHILDREN?" [5-POINT SCALE] AND THE PARENT IMAGE FACTORS INCLUSION AND TOLERANCE. N = 107.

	Father Inclusion	Mother Tolerance	Income
Father Time with Children	.48	.02	-.05

As mentioned earlier, the Parent Image Semantic was used by Harburg (1962). The Ss in Harburg's sample had almost identical characteristics with those in this sample of Ss.

We might expect, therefore, that the factors obtained on his sample would be quite similar to those obtained in the present case. Demonstration of this fact would be further support for the "reliability" of the Parent Image Semantic in terms of its ability to reproduce similar factor structures given similar populations. Table 18 presents the factor similarity coefficients between factors obtained on Harburg's Ss (P5 sample) and Ss tested for this thesis. The factor similarity coefficients were computed according to the statistic developed by Kaiser (1962). Kaiser does not indicate what is to be considered as a significant similarity coefficient, but it can be seen that most of the coefficients are in the range of 0.80 or higher. It seems reasonable to conclude that the two factor analyses produced highly similar factor structures, and that the Parent Image Semantic produces "reproducible" factors.

The third criterion offered to estimate the validity of the Parent Image Semantic was that the factors it generates be compared with those obtained in other studies of parent-child relationships using other techniques of observation. Three such studies are those by Sewell, Mussen and Harris (1955), Milton (1958) and Schaeffer (1961; also Droppleman & Schaeffer, 1961).

The study by Sewell, et al., involved interviewing 162

TABLE 18

KAISER'S COEFFICIENTS OF FACTOR SIMILARITY FOR FACTOR SPACE OF PS SAMPLE AND CURRENT SUBJECTS*

Concept	Factor Name	Coefficient of Similarity
How My Father Treated Me...	Support	0.72
	Potency	0.99
How My Mother Treated Me...	Justice	0.95
	Affection	0.66
	Potency	0.99
How My Father Taught Me...	Inclusion	0.99
	Irritability	0.97
	Potency	0.96
How My Mother Taught Me...	Tol. for Indep.	0.86
	Potency	0.91
How My Father Disciplined Me...	Intropunitiveness	0.46
	Demand Style	0.91
	Potency	0.98
How My Mother Disciplined Me...	Intropunitiveness	0.89
	Irritability	0.32
	Potency	0.98

*(Kaiser, 1962)

Wisconsin mothers of five- and six-year-old rural children, asking about 38 child training practices. An oblique rotation was used to analyze the data. Sewell, et al., report:

> . . . child training variables may be grouped into clusters of: 1) practices which are generally considered to reflect permissiveness in early feeding situations; 2) permissive toilet training practices; 3) practices involving much activity of parents with child; 4) non-punitive treatment of behaviors; 5) practices making for early independence; 6) practices reflecting the casual attitudes of parents in

> a number of situations; and 7) non-insistent reactions on the part of the parents" (1955, p. 148).

The age of Ss in this study did not make questions about toilet training practices and early feeding feasible, but the other five factors obtained by Sewell, et al., sound very similar to those obtained in this study. The variable listed third seems similar to the Inclusion factor; the fourth sounds like the Potency factors; the fifth like the Tolerance for Independence factor; and the sixth and seventh like the Irritability factors.

Milton factor analyzed the data obtained by Sears, Maccoby and Levin (1957) in their study of middle-class New England mothers. There were 44 variables which yielded seven poorly defined factors. One of them represented the dimension of husband-wife relationships, which was not tapped in this study. The other four factors which were reasonably easy to interpret were: "strictness or nonpermissiveness of parental behavior. . . . warmth of mother-child relationship. . . . responsible child-training orientation [refers to demands that child be responsible]. . . . aggressiveness and punitiveness [permissiveness for child's aggressiveness toward other children and use of physical means to disdipline child]. . . ." (1958, pp. 388-390). These dimensions seem, respectively, to be similar to those of Potency, Support and

Affection, Tolerance for Independence, and Potency. Milton did not interpret the other two factors obtained.

The Schaeffer and Droppleman research involved obtaining measures of parents' attitudes about child-rearing and then writing the dimensions obtained from the parents into a rating scale to be filled out by children. They report that 50 per cent of the total variance in their factor analysis of the parental attitude data was accounted for by factors labeled "love-hostility" and "autonomy-control." Factor analysis of rating scales filled out by a sample of 81 delinquent boys and 165 middle class boys and girls from a parochial school (both groups were in the 12-18 years age range) produced four factors. "Love-hostility," which sounds like the Affection and Support factors obtained in this study, emerged again. The "autonomy-control" dimension divided into three independent components: "Psychological Control," which seems most similar to the Intropunitiveness factors; "Physical Control," which sounds like the Potency factors; and "Extreme Autonomy," which Schaeffer and Droppleman report is difficult to understand. Two other studies which produce factors which sound like those obtained in this study are those by Roff (1949), who analyzed some of the data from the Fels Parent Behavior project, and Dreger and Sweetland (1960).

In summary, the data for the validity of the Parent

Image Semantic as an instrument to measure the perceptions which children have of how their parents treated them are: (1) it produces scores which can be obtained on a retest, suggesting that these perceptions are relatively stable; (2) it generates the same dimensions across similar groups of people, another kind of "reproducibility"; (3) it produces scores which correlate moderately well with scores on other kinds of observations thought to be measuring the same dimensions; and (4) it generates dimensions which seem to be similar to those found by other investigators using different methods of observation of parent-child relationships.

CHAPTER III

RESULTS

All the data relevant to the exploratory hypotheses are presented in the tables that follow. The analyses of these data consist of Pearson product moment correlations between the various independent variables of perception of treatment by parents and the blood pressure variables, multiple correlations which allow a determination of which combinations of independent variables account for the largest portion of variance of the dependent variables, and means and standard deviations of the blood pressure variables for groups of Ss differentiated by birth order, identification with father or mother, and reporting whether parents were a problem for them.

Parent Image Factors and Relative Potency

Tables 19 through 25 present the correlations between the 14 blood pressure variables and the 13 variables obtained from the Parent Image Semantic. The description of the scales constituting each of the Parent Image factors was presented in Tables 10 through 15 of Chapter II. The 12 Parent Image factors were scored so that high scores would be obtained when Ss marked the socially desirable end of the scales, and

so low scores would be obtained when the socially undesirable end was marked. Thus, for the Potency factor, S was given a high score if he described his father or mother as mild, soft, lenient; he received a low score if the parent was described as stern, hard, severe. Scoring was similar for the other factors. According to the predictions made at the end of Chapter I, all of the correlations between the 12 Parent Image factors and the blood pressure variables should be negative. The Relative Potency Index was scored so that high scores would be obtained when S ranked his mother as more stern, hard, and severe than he rated his father. According to the predictions, correlations between Relative Potency and the blood pressure variables should be positive. As there are 26 correlations in each of the seven tables, we might expect to obtain at least one correlation per table significant at the 5% level, or about nine altogether.

Table 19 presents the correlations between the systolic and diastolic Average Casual blood pressure measures and the Parent Image factor scores. Only one of the correlations is significant at the 5 per cent level; there is a positive, significant relationship between Father Potency and Systolic Average Casual blood pressure. Subjects who described their father as mild, soft and lenient tend to have higher blood pressure than do Ss who described their father as stern, hard

TABLE 19

CORRELATION OF AVERAGE CASUAL BLOOD PRESSURE WITH PARENT IMAGE FACTORS. N = 83

PARENT IMAGE FACTORS	AVERAGE CASUAL BLOOD PRESSURE	
	Systolic	Diastolic
Father		
Potency	.23*	.15
Support	-.07	-.01
Inclusion	-.18	-.08
Irritability	-.04	-.06
Intropunitiveness	.01	-.03
Demand Style	.02	.06
Mother		
Potency	.10	.13
Affection	.06	-.10
Justice	.11	.08
Tolerance for Indep.	.01	-.08
Irritability	.16	.03
Intropunitiveness	.11	-.04
Relative Potency	.12	.03

$p < .05$

and severe. This is contrary to the prediction that high blood pressure is associated with harsh and punitive parents.

Table 20 presents correlations between the systolic and diastolic Usual blood pressure measures and Parent Image factor scores. One correlation is significant, that between Systolic Usual blood pressure and Mother Irritability. Subjects who described their mother as hard to irritate tend to have higher Systolic Usual blood pressure than do Ss who

described their mother as easy to irritate. This is contrary to the hypothesis that sons of irritable mothers have high blood pressure. Of the 52 correlations in Tables 19 and 20, only 19 are in the predicted direction.

Table 21 presents the correlations between Cold Pressor Reactivity and Parent Image factor scores. The Cold Pressor Reactivity score is a measure of how much Ss' blood pressure increased from resting level after immersion of their hand in ice water. There is a significant negative (predicted direction) correlation between Father Inclusion and Diastolic Cold Pressor Reactivity. Subjects who reported that their father rarely spent time doing things together with them react more to the Cold Pressor test than do Ss who recall that their father did things together with them frequently. Most of the Mother factors predict significantly to Cold Pressor Reactivity. In summary, these correlations are read: Ss who had large diastolic blood pressure increases on the Cold Pressor test tend to be those who perceived their mothers as stern, hard and severe; as cold, insensitive; as unjust and inconsistent; as discouraging independent activity; and as making S feel resentment instead of guilt when punished.

Systolic Cold Pressor Reactivity is predicted by the Mother Potency, Affection and Intropunitiveness factors. All of these correlations are also in the predicted direction.

TABLE 20

CORRELATION OF USUAL BLOOD PRESSURE WITH PARENT IMAGE FACTORS. N = 71

PARENT IMAGE FACTORS	USUAL BLOOD PRESSURE	
	Systolic	Diastolic
Father		
Potency	.18	.06
Support	-.05	-.16
Inclusion	-.15	-.11
Irritability	.03	-.11
Intropunitiveness	.04	-.18
Demand Style	.05	.04
Mother		
Potency	.14	.12
Affection	.08	.12
Justice	.05	.00
Toldrance for Indep.	.03	.02
Irritability	.22*	.04
Intropunitiveness	.08	.06
Relative Potency	.05	-.03

*$p < .05$

Diastolic Cold Pressor Reactivity is significantly related to the Relative Potency index. Subjects who had a large diastolic reaction to the Cold Pressor test tend to be those who perceived their mother as more stern, hard and severe than they perceived their father. Of the 26 correlations in Table 21 three are not in the predicted direction; these three are not significant.

As is seen in Table 22 none of the Parent Image factors

TABLE 21

CORRELATION OF COLD PRESSOR REACTIVITY WITH PARENT IMAGE FACTOR SCORES. N = 107.

PARENT IMAGE FACTORS	COLD PRESSOR REACTIVITY	
	Systolic	Diastolic
Father		
Potency	-.04	-.02
Support	-.05	-.07
Inclusion	-.06	-.23*
Irritability	.00	-.01
Intropunitiveness	-.12	-.07
Demand Style	.12	.04
Mother		
Potency	-.18*	-.32**
Affection	-.21*	-.24*
Justice	-.17	-.22*
Tolerance for Indep.	-.06	-.22*
Irritability	-.01	-.08
Intropunitiveness	-.21*	-.24*
Relative Potency	.10	.22*

*$p < .05$
**$p < .01$

related significantly to Valsalva Reactivity. This is as was predicted because, as stated in Chapter II, there is no evidence in the literature that response to the Valsalva test is in any way related to psychological factors.

Only one of the Parent Image factors relates significantly to Casual Lability (Table 23). Subjects who reported their mothers as encouraging independent activity tend to have larger Diastolic Casual Lability scores (that is, tend

TABLE 22

CORRELATION OF VALSALVA REACTIVITY WITH PARENT IMAGE FACTOR SCORES. N = 107.

PARENT IMAGE FACTORS	VALSALVA REACTIVITY	
	Systolic	Diastolic
Father		
Potency	.01	.00
Support	-.07	.00
Inclusion	-.01	.03
Irritability	-.04	.03
Intropunitiveness	-.04	.12
Demand Style	-.01	.07
Mother		
Potency	.10	.08
Affection	.02	.03
Justice	-.03	.07
Tolerance for Indep.	-.15	-.07
Irritability	-.05	.04
Intropunitiveness	-.13	.02
Relative Potency	-.07	-.06

to have greater differences between two consecutive diastolic casual blood pressure readings) than do Ss who reported their mothers as discouraging independent activity. This is contrary to the hypothesis that Ss who perceive their parents as restricting independent activity have higher blood pressure lability.

The relationship between Mother Irritability and Systolic Resting Lability (Table 24) is also contrary to that predicted. Subjects who reported their mother as hard to irritate show a greater discrepancy of systolic blood pressure

TABLE 23

CORRELATION OF CASUAL LABILITY WITH PARENT IMAGE FACTOR SCORES. N = 83.

PARENT IMAGE FACTORS	CASUAL LABILITY	
	Systolic	Diastolic
Father		
Potency	-.10	.04
Support	-.06	-.20
Inclusion	-.04	-.13
Irritability	.00	-.11
Intropunitiveness	.06	-.15
Demand Style	-.02	-.08
Mother		
Potency	-.14	.19
Affection	-.10	.07
Justice	-.09	.08
Tolerance for Indep.	.01	.25*
Irritability	.02	.20
Intropunitiveness	.06	.05
Relative Potency	.02	-.10

*$p < .05$

readings during a 20 minute period than do Ss who described their mother as easy to irritate.

Table 25 presents the relationships between Home Lability and the Parent Image factor scores. There are two significant relationships, both in the predicted direction. Subjects who described their father and their mother as stern, hard, and severe tend to have larger differences between consecutive systolic blood pressure readings taken at home than

do Ss who described their parents as mild, soft and lenient.

Of the 182 correlations presented in Tables 19 through 25, 87 are in the predicted direction. Sixteen of the correlations are significant; about nine of this magnitude would be expected by chance.

Family Questionnaire Items

Table 26 presents the correlations between the 14 blood pressure variables and items from the Family Questionnaire which meet the assumptions necessary for use of the correlation statistic. Except where noted, signs of the correlations have been presented so that positive correlations will be in the direction of the prediction and negative correlations contrary to the predicted relationship.

None of the Family Questionnaire items relate significantly to either Systolic or Diastolic Average Casual blood pressure. However, Systolic Usual blood pressure correlates significantly with the item Intensity of Physical Punishment by Father (Intensity Physical Punishment). Subjects who reported that their father administered painful punishment tend to have lower Systolic Usual blood pressures than do Ss who reported that their father never punished them physically or was quite mild in his administration of punishment. This is contrary to the prediction that Ss who report that their

TABLE 24

CORRELATION OF RESTING LABILITY WITH PARENT IMAGE FACTOR SCORES. N = 107.

PARENT IMAGE FACTORS	RESTING LABILITY	
	Systolic	Diastolic
Father		
Potency	.02	.05
Support	-.09	.01
Inclusion	-.08	-.02
Irritability	-.15	.00
Intropunitiveness	-.08	-.10
Demand Style	.03	-.08
Mother		
Potency	.13	.10
Affection	.10	.08
Justice	.00	.02
Tolerance for Indep.	.10	-.03
Irritability	.21*	.04
Intropunitiveness	.04	-.17
Relative Potency	-.08	-.03

*$p < .05$

parents punished severely have higher blood pressures.

Systolic Usual blood pressure is also related to degree of Social Mobility of Father. This score was obtained by comparing Ss' rating of their social class membership when they were a child to their perception of social class membership at the present time. The correlation indicates that Ss who felt that they and their family had gone up the social ladder tend to have lower Systolic Usual blood pressures than do Ss

TABLE 25

CORRELATION OF HOME LABILITY WITH PARENT IMAGE FACTORS. N = 72.

PARENT IMAGE FACTORS	HOME LABILITY	
	Systolic	Diastolic
Father		
Potency	-.27*	-.03
Support	.03	.17
Inclusion	.09	.00
Irritability	-.01	.14
Intropunitiveness	-.01	.08
Demand Style	-.08	.03
Mother		
Potency	-.23*	-.11
Affection	-.10	-.09
Justice	-.13	.00
Tolerance for Indep.	-.17	-.09
Irritability	.08	-.07
Intropunitiveness	-.07	-.14
Relative Potency	-.05	.01

*$p < .05$

who felt that they had not moved up in social class. No prediction was made for this relationship, but it is opposite to that obtained by Harris (1958), who reports that adolescent Ss with high blood pressure have upward mobile fathers. Diastolic Usual blood pressure scores correlate significantly with the frequency of physical punishment administered by father, but in a negative direction. Subjects who reported that their father never punished physically tend to have higher Diastolic

TABLE 26

CORRELATION OF BLOOD PRESSURE MEASURES WITH FAMILY QUESTIONNAIRE ITEMS

FAMILY QUESTIONNAIRE ITEMS		AVG CASUAL		USUAL		COLD PRESSOR	
		Syst	Dias	Syst	Dias	Syst	Dias
Frequency Physical Punishment	FATHER	-.16	-.12	-.19	-.24*	.12	.09
	MOTHER	-.02	-.10	-.13	-.13	.16	.34**
Intensity Physical Punishment	FATHER	-.18	-.08	-.26*	-.08	-.13	-.01
	MOTHER	-.11	-.14	-.16	-.03	-.07	.07
Amount Affection Demonstrated	FATHER	.04	-.10	.15	-.20	-.03	.05
	MOTHER	-.12	-.10	.03	-.02	-.21*	-.18
Dominant Parent (low score = father)		.02	.03	.07	.07	.18	.22*
Frequency of Parental Disagreement		-.05	.03	-.06	.01	.12	.07
Social Mobility of Father (change in subjective social class)		-.08	-.01	-.28*	.05	-.03	.01
Father Concern with Mobility		-.11	-.05	.05	-.08	-.04	.02
Amount of Time Father Spent with Children		-.08	.02	.00	-.07	.08	.01
		N = 83		N = 71		N = 107	

*$p < .05$

**$p < .01$

TABLE 26--Continued

VALSALVA		CAS LABILITY		REST LABILITY		HOME LABILITY	
Syst	Dias	Syst	Dias	Syst	Dias	Syst	Dias
-.03	-.14	.20	.08	.02	.05	.15	.14
-.15	-.19*	.13	-.15	-.14	.14	.02	.10
-.02	-.13	.22*	.04	-.04	.01	.23*	.17
.01	.10	.01	-.01	-.12	-.06	.19	.10
-.01	-.02	.02	-.21*	.00	.01	.11	.17
-.08	-.08	-.12	-.06	.02	.05	-.04	-.09
.00	-.08	.06	-.16	.03	.04	.11	.09
.05	-.10	-.04	-.06	.11	.18	-.04	-.06
-.12	-.30**	.20*	.09	.07	.26**	-.05	-.15
.05	-.17	-.08	-.05	-.07	-.16	.10	-.15
-.08	.07	-.07	-.22*	.00	-.01	.13	.18
N = 107		N = 83		N = 107		N = 71	

Usual blood pressures than do Ss who reported that their father punished frequently. As was found with the Parent Image factors, most of the Family Questionnaire items correlate with Average Casual and Usual blood pressure in a direction opposite to that predicted.

Systolic Cold Pressor Reactivity correlates significantly with the amount of affection Ss felt was demonstrated by their mother. Subjects who reported that their mother showed dislike for them tend to have a larger systolic reaction to the Cold Pressor test than do Ss who felt that their mother often demonstrated affection for them. Diastolic Cold Pressor Reactivity correlates significantly with frequency of physical punishment by mother (Ss reporting frequent punishment tend to have higher reactivity scores) and to the Dominant Parent Index. Subjects who reported that their mother more frequently won arguments in the home than did their father tend to have higher Diastolic Cold Pressor Reactivity scores than Ss who perceived their father as dominant.

Diastolic Valsalva Reactivity is related to frequency of physical punishment by mother (high frequency of punishment=low reactivity) and by perceived Social Mobility (high Social Mobility=low reactivity). These correlations are contrary to prediction in that it was felt that the Valsalva Reactivity test would be unrelated to any psychological

variables. Of the 48 correlations between perception of parent variables and Valsalva Reactivity these are the only two that are significant.

Casual Lability scores correlate significantly, and in the predicted direction, with intensity of physical punishment by father, Social Mobility, demonstration of affection by father, and amount of time father spent with children. Large differences between consecutive systolic Casual measures of blood pressure are associated with perception of father as administering painful punishment, and perception of change in social class status. Large differences between diastolic casual measures are associated with the perception that father spent little or no time with his children, and that he seldom demonstrated affection for them.

Diastolic Resting Lability scores correlate significantly with perception of social mobility. Subjects who perceived an increase in the social status of their family tend to have greater discrepancies between consecutive diastolic readings of blood pressure taken during rest than Ss who did not perceive an increase in social status.

The degree of difference between highest and lowest systolic readings taken at home (Systolic Home Lability) is related to perception of intensity of physical punishment by father. Subjects who reported that their father administered

painful punishment tend to have larger differences than do Ss who reported their father as never punishing or administering mild punishment.

Table 27 is a summary of all the significant correlations between the Parent Image factors, Family Questionnaire items and blood pressure variables, excluding Valsalva Reactivity. The entries in the cells of the table indicate the significance level of the obtained correlations. The sign attached to this number indicates whether the correlation was in the predicted direction (+) or in the opposite direction (-).

Multiple Correlations

To determine the relationship of the Parent Image factors and Family Questionnaire items with the blood pressure variables when the former are considered as acting together, multiple correlations were computed using the Parent Image factors and Family Questionnaire items as independent variables, and each blood pressure variable as the dependent variable. The results of these multiple correlations are presented in Tables 28 through 34.

In the tables, each independent variable is presented in the order in which it entered the multiple correlation equation. The first variable entered in each of the correlation equations has a zero-order (i.e., non-multiple or simple) correlation with the dependent variable with a p value of at

TABLE 27

RESULTS OF ZERO-ORDER CORRELATIONS BETWEEN PARENT AND BLOOD PRESSURE VARIABLES, SHOWING SIGNIFICANCE LEVEL OF CORRELATION. POSITIVE SIGN INDICATES AGREEMENT WITH PREDICTION

	Avg Casual		Usual		Cold Pressor		Cas. Lability		Rest. Lability		Home Lability	
	Sys	Dias	Sys	Dias	Sys	Dias	Sys	Dias	Sys	Dias	Sys	Dias
Father Pot.	+.05										+.05	
Father Inclu.						+.05						
Mother Pot.					+.05	+.01					+.05	
Mother Affect.					+.05	+.05						
Mother Just.						+.05						
Mother Tol.Ind.						+.05		-.05				
Mother Irrit.			-.05						-.05			
Mother Intro.					+.05	+.05						
Relative Pot.						+.05						
Fa. Freq. Punish.				-.05								
Mo. Freq. Punish.						+.01						
Fa.Intens. Punish.			-.05				+.05				+.05	
Fa. Dem. Affect.								+.05				
Mo. Dem. Affect.					+.05							
Fa. Time w/Child								+.05				
Dominant Parent						+.05						
Social Mobility			-.05				+.05			+.01		

least 0.05. Successive variables were entered into the equation only if the contribution which they made to the multiple correlation (R) was significant, that is, had a p level of 0.10 or less. At each step (e.g., 1, 2, 3, . . .) in the equation the R is a function of all the independent variables acting in concert to predict to the dependent variable. The direction of the contribution of each variable (i.e., whether it relates positively or negatively with the dependent variable when combined with the others) is indicated both by the parenthetical comment and by the sign of the b coefficient for that variable. The b coefficients presented are those contained in the final predictive equation. Some of the variables have a small negative zero-order relationship with the dependent variable, but enter into the predictive equation with a positive b coefficient. The reverse is also true. These variables are suppressor variables (according to Guilford, 1956) and are so identified in the parenthetical comment after the name of the variable. The percentage of variance of the dependent variable accounted for by the final predictive equation is estimated by the square of the final R.

Systolic Average Casual blood pressure (Table 28) is best predicted by a combination of the variables Father Potency, Father Inclusion, and Mother Irritability. Subjects who have high Systolic Average Casual blood pressure tend to

be those who perceived their fathers as mild, soft, and lenient; as rarely doing things together with them; and who perceived their mother as hard to irritate. Only Father Potency has a significant zero-order correlation with Systolic Average Casual blood pressure. The equation containing scores on these three independent variables accounts for about 12 per cent of the variance of Systolic Average Casual blood pressure scores. The R has a p level of 0.01.

As none of the independent variables have a significant zero-order correlation with Diastolic Average Casual blood pressure, no equation was written to predict to this variable.

Systolic Usual blood pressure (Table 29) is best predicted by a combination of the variables Change in Social Class (Social Mobility), Intensity of Physical Punishment by Father, Mother Irritability, Father Inclusion, and Demonstration of Affection by Father. Subjects who have high Systolic Usual blood pressure tend to be those who reported that their family had not increased its social status; whose father never punished physically; whose mother was hard to irritate; whose father rarely did things together with them; and whose father frequently demonstrated affection

for them. The first three variables included in the equation have significant zero-order relationships with Systolic Usual blood pressure. The combination of the five variables accounts for about 24 per cent of the variance of Systolic Usual blood pressure scores and the R is significant at the one per cent level.

TABLE 28

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS INDEPENDENT VARIABLES AND AVERAGE CASUAL BLOOD PRESSURE AS THE DEPENDENT VARIABLE
(See text for further explanation)

SYSTOLIC AVERAGE CASUAL BLOOD PRESSURE

	R	b Coefficients
1. Father Potency (mild)	.23	0.36
2. Father Inclusion (rarely did things together with me)	.30	-0.74
3. Mother Irritability (hard to irritate her)	.35**	0.94
	Constant Term =	112.50

DIASTOLIC AVERAGE CASUAL BLOOD PRESSURE

none

**$p < .01$

TABLE 29

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS INDEPENDENT VARIABLES AND USUAL BLOOD PRESSURE AS THE DEPENDENT VARIABLE

SYSTOLIC USUAL BLOOD PRESSURE

	R	b Coefficients
1. Change in Social Class (none)	.28	-3.72
2. Father Intensity of Punishment (mild or never punished physically)	.36	1.79
3. Mother Irritability (hard to irritate her)	.42	0.69
4. Father Inclusion (rarely did things together with me)	.45	-0.53
5. Father Demonstration of Affection (frequent)	.49**	2.27
	Constant Term = 27.85	

DIASTOLIC USUAL BLOOD PRESSURE

	R	b Coefficients
1. Father Frequency of Punishment (never punished physically)	.24	2.16
2. Father Demonstration of Affection (often showed dislike for me)	.32**	-1.60
	Constant Term = 24.32	

**$p < .01$

Diastolic Usual blood pressure (Table 29) is best predicted by a combination of the variables Frequency of Punishment by Father and Demonstration of Affection by Father. Subjects with high Diastolic Usual blood pressure tend to be

those who reported that their father never punished them physically and who often showed dislike for them. The two variables account for about 10 per cent of the variance of the Diastolic Usual blood pressure variables. The R has a p value of 0.01.

Systolic Cold Pressor Reactivity (Table 30) is best predicted by a combination of eight parent perception variables. Subjects whose systolic blood pressure increased considerably after immersing their hand in ice water tend to be those who perceived their mother as often showing dislike; who reported that their mother made them feel resentment when she punished them; who reported that their father administered mild physical punishment (or none at all) but who punished frequently; who reported that their mother was dominant in family arguments; who perceived their father as always explaining why he punished them; and who reported their mother as unjust and inconsistent in her treatment of them. Mother Tolerance for Independence enters the equation as a suppressor variable. It has a negative relationship with Systolic Cold Pressor Reactivity but when included in the equation with a positive b coefficient helps to account for more of the variance in the Reactivity scores. It is not clear from an examination of the zero-order correlations why the signs of the b coefficients for Father Intensity

TABLE 30

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS THE INDEPENDENT VARIABLES AND COLD PRESSOR REACTIVITY AS THE DEPENDENT VARIABLE

SYSTOLIC COLD PRESSOR REACTIVITY

	R	b Coefficients
1. Mother Demonstration of Affection (often showed dislike)	.21	-2.20
2. Mother Intropunitiveness (made me feel resentment)	.27	-0.30
3. Mother Tolerance for Independence (suppressor variable)	.32	0.36
4. Father Intensity of Punishment (mild or never physically punished)	.35	1.76
5. Father Frequency of Punishment (quite frequently)	.41	-3.06
6. Mother Dominant	.48	-0.80
7. Father Demand Style (always explained why he punished)	.51	0.24
8. Mother Justice (unjust, inconsistent)	.53**	-0.36
	Constant Term =	9.06

DIASTOLIC COLD PRESSOR REACTIVITY

	R	b Coefficients
1. Mother Frequency of Punishment (quite frequently)	.33	-2.66
2. Mother Potency (stern)	.39	-0.18
3. Mother Intropunitiveness (made me feel resentment)	.42	-0.46
4. Mother Irritability (suppressor variable)	.45	0.58
5. Father Demand Style (suppressor variable)	.46	0.40
6. Father Inclusion (rarely did things together with me)	.49**	-0.38
	Constant Term =	39.63

**$p < .01$

of Punishment and Father Frequency of Punishment variables are opposite. However, an examination of scatterplots for these variables shows that there is a relationship between frequent, mild physical punishment and Systolic Cold Pressor Reactivity. The combination of these eight variables accounts for 28 per cent of the variance of Systolic Cold Pressor Reactivity scores. Although the Mother Affection, Potency and Intropunitiveness factors have significant zero-order correlations with Systolic Cold Pressor Reactivity, their combination with any of the other variables in the equation does not significantly increase the R.

Diastolic Cold Pressor Reactivity (Table 30) is best predicted by a combination of the variables Frequency of Punishment by Mother, Mother Potency, Mother Intropunitiveness, Mother Irritability, Father Demand Style and Father Inclusion. Subjects who had a large diastolic reaction to the Cold Pressor test tend to be those who reported their mother as punishing practically all the time; who perceived their mother as stern, hard and severe; who reported that their mother made them feel resentment when she punished them; and who recalled that their father rarely did things together with them. Mother Irritability and Father Demand Style enter the equation as suppressor variables. The equation accounts for about 24 per cent of the variance of Diastolic Cold Pressor

Reactivity scores. The R is significantly different from zero at the one per cent level.

As none of the independent variables had a significant zero-order correlation with Systolic Valsalva Reactivity scores, no equation was written.

Diastolic Valsalva Reactivity (Table 31) is best predicted by a combination of the two variables which also had significant zero-order correlations with it. Subjects who reported no change in the social status of their family but who recalled their father as being highly concerned about moving up in the world tend to be those whose diastolic blood pressure increased considerably after the Valsalva test. The combination of these two variables accounts for 14 per cent of the variance of Diastolic Valsalva Reactivity scores. The R is significant at the one per cent level.

Similarly, Systolic Casual Lability (Table 32) is best predicted by a combination of those two variables which also had significant zero-order correlations with it. Subjects who reported that punishment administered by their father was painful and who perceived an increase in the social status of their family tend to be those who had large discrepancies between two consecutive Systolic Casual blood pressure readings. The equation accounts for about nine per cent of the variance of Systolic Casual Lability scores. The R is as

TABLE 31

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS THE INDEPENDENT VARIABLES AND VALSALVA REACTIVITY AS THE DEPENDENT VARIABLE

SYSTOLIC VALSALVA REACTIVITY

none

DIASTOLIC VALSALVA REACTIVITY

	R	b Coefficients
1. Change in Social Class (none)	.30	-4.17
2. Father Concern with Mobility (he was very concerned)	.37**	-1.65
	Constant Term =	19.51

**$p < .01$

large or larger than that which would be expected by chance less than five times in 100.

Discrepancies in two consecutive diastolic casual blood pressure readings (Diastolic Casual Lability, Table 32) are best predicted by a combination of seven independent variables. These are: Mother Tolerance for Independence, Father Support, Father dominant in family arguments, Father Irritability, Father Time with Children, Father Intropunitiveness, and Mother Affection. Subjects with large discrepancies in two consecutive diastolic casual readings tend to be those who reported that their mother encouraged disagreeing with her; who perceived their father as cold and distant; who perceived their father as usually winning family arguments; who reported

TABLE 32

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS THE INDEPENDENT VARIABLES AND CASUAL LABILITY AS THE DEPENDENT VARIABLE

SYSTOLIC CASUAL LABILITY

	R	b Coefficients
1. Father Intensity of Punishment (it was painful)	.22	-1.57
2. Change in Social Class (high)	.28*	2.99
	Constant Term =	14.08

DIASTOLIC CASUAL LABILITY

	R	b Coefficients
1. Mother Tolerance for Independence (disagreeing with her was encouraged)	.25	0.89
2. Father Support (awkward, inconsistent)	.35	-0.44
3. Father Dominant	.42	1.37
4. Father Irritability (suppressor variable)	.44	0.84
5. Father Time with Children (no time at all)	.47	-2.81
6. Father Intropunitiveness (made me feel resentment)	.51	-0.78
7. Mother Affection (suppressor variable)	.53**	-0.57
	Constant Term =	25.80

*$p < .05$
**$p < .01$

that their father spent very little time with his children; and who recalled that their father made them feel resentment when he punished them. The Father Irritability and

Mother Affection variables act as suppressors in the equation. The variable Demonstration of Affection by Father does not contribute significantly to the R even though it had a significant zero-order correlation with the dependent variable. This combination of parent perception variables accounts for 28 per cent of the variance of Diastolic Casual Lability scores. The R is significant at the one per cent level.

Systolic Resting Lability scores are best predicted only by Mother Irritability. The R is therefore the same as the zero-order correlation.

Diastolic Resting Lability (Table 33) scores are best predicted by a combination of four variables: change in subjective social class, frequency of parental disagreement, Mother Intropunitiveness, and Mother Affection. Subjects who had large differences between the highest and lowest diastolic blood pressure measures taken during a 20-minute resting period tend to be those who reported an increase in the social status of their family, who recalled their parents as disagreeing practically all the time, and who reported that their mother made them feel resentment when she punished them. Mother Affection acts as a suppressor variable in the equation. The combination of these variables accounts for about 15 per cent of the variance in Diastolic Resting Lability scores. The R is significant at the one per cent level.

TABLE 33

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS THE INDEPENDENT VARIABLES AND RESTING LABILITY AS THE DEPENDENT VARIABLE

SYSTOLIC RESTING LABILITY

	R	b Coefficients
1. Mother Irritability (hard to irritate her)	.21*	0.25
	Constant Term =	5.49

DIASTOLIC RESTING LABILITY

	R	b Coefficients
1. Change in Social Class (high)	.26	1.94
2. Frequency of Parental Disagreement (practically all the time)	.31	-0.91
3. Mother Intropunitiveness (made me feel resentment)	.34	-0.19
4. Mother Affection (suppressor variable)	.38**	0.21
	Constant Term =	6.68

*p <.05
**p <.01

Systolic Home Lability (Table 34) is best predicted by a combination of the variables Father Potency and Relative Potency. The zero-order correlation which Father Potency has with Systolic Home Lability is improved by addition of relative Potency as a suppressor variable. These two variables in combination account for about 11 per cent of the

variance of the dependent variable. Mother Potency and Intensity of Physical Punishment by Father, which also have significant zero-order correlations with Systolic Home Lability, do not make a significant contribution to the R. The R has a p value of 0.05.

As none of the Parent Image factors or Family Questionnaire items have significant zero-order correlations with Diastolic Home Lability no multiple correlation equation could be written.

TABLE 34

MULTIPLE CORRELATION (R) AND b COEFFICIENTS USING PARENT IMAGE SEMANTIC FACTORS AND FAMILY QUESTIONNAIRE ITEMS AS INDEPENDENT VARIABLES AND HOME LABILITY AS THE DEPENDENT VARIABLE

	R	b Coefficients
SYSTOLIC HOME LABILITY		
1. Father Potency (stern)	.26	-0.29
2. Relative Potency (suppressor variable)	.33*	0.15
	Constant Term =	19.63
DIASTOLIC HOME LABILITY		
none		

*p < .05

Birth Order, Parent Identification and Problem Parents

Means and standard deviations for each of the blood pressure variables were computed for groups of Ss differentiated according to birth order (only born, first born, born second or later), parent identification (admired father or both, mother or neither), and identification of parents as a problem (yes or no). None of the differences between the means of the various groups were as large or larger than those that might be expected by chance more than five times in 100.

CHAPTER IV

CONCLUSIONS AND IMPLICATIONS FOR FUTURE RESEARCH

Because this is an exploratory research in an area in which there is little corroborative research, a discussion of the findings is necessary to consider the implications for construction of theory about parent-child relationships and their effects on physiological processes. However, considering the sample of subjects on which the research was conducted, the absence of replicative data, and the possible unreliability of some of the measures, extensive generalizations from this research are not warranted.

It is clear from Table 27, which summarized the zero-order (i.e., non-multiple) correlations between the Parent Image and Family Questionnaire variables and the blood pressure measures, that only Systolic and Diastolic Cold Pressor Reactivity are related to a number of the independent variables of the Ss' perceptions of their parents. Furthermore, only a few of the correlations are large enough to be highly significantly different from those that might be obtained by chance. While the multiple correlation technique allowed computation of correlations which were highly significant, the largest of these multiple correlations accounts for only

28 per cent of the variance of the dependent variable. The small amount of variance accounted for may indicate that, although the treatment children recall having received from their parents is significantly related to blood pressure, there are other factors which are important in the determination of blood pressure. That is, unless the blood pressure variables are highly unreliable (in which case little of the variance would be predictable) there might be other variables which could account for further portions of the variance.

These other variables were mentioned in the review of literature on psychological correlates of blood pressure in Chapter I. Blood pressure variables are known to be related to physique, other physiological processes within the body, and immediate environmental conditions. Level, reactivity, and lability of blood pressure are also genetically transmitted, according to evidence available. What this research has done, however, is demonstrate that measures of perception of treatment by parents can also be used to predict to blood pressure variables. It should be pointed out that, given reliabilities of 0.70 for both the independent and dependent variables, it is possible that the multiple correlation equations accounted for all the predictable variance in the dependent variable. A future study will be necessary to demonstrate that the predictive ability of the parent perception variables

used in this research is independent of the other variables which account for some of the variance in blood pressure measures.

The patterns of perceptions of treatment by parents seem the most important variables in this research. For this reason, the discussion that follows will confine itself to considering the possible implications of the multiple correlation equations which best predicted to each of the blood pressure variables. Most of the variables that, considered alone, correlated significantly with the blood pressure variables, also entered into the multiple correlation equations, so little information will be lost by limiting the discussion in this fashion.

The Average Casual and Usual Measures of Level of Blood Pressure

It was asserted in Chapter II that the Average Casual blood pressure measure is a reasonable estimate of blood pressure in the presence of a physician. That is, it is the level which blood pressure assumes given the moderately stressing condition of being examined by a physician. The Usual blood pressure measure was assumed to be an indication of level of blood pressure without the presence of a physician. Because the Usual measure was made up from seven independent blood pressure measures (the Resting measure and six readings taken

at home) it was expected to be more reliable than the Average Casual measure, computed from only two readings. Being more reliable it should relate to more of the parent perception variables. The data support this expectation. A comparison of Table 19 with Table 20, and Table 28 with Table 29, shows that there are more parent perception variables which correlate significantly with Usual blood pressure than with Average Casual blood pressure.

The multiple correlation equations which best predicted to each of the Average Casual and Usual measures are briefly re-presented in Table 35. It is difficult to offer an easily

TABLE 35

SUMMARY OF MULTIPLE RELATIONSHIPS BETWEEN PARENT IMAGE AND FAMILY QUESTIONNAIRE VARIABLES AND AVERAGE CASUAL AND USUAL BLOOD PRESSURE. DESCRIPTIVE PHRASES INDICATE DIRECTION OF RELATIONSHIP

HIGH SYSTOLIC CASUAL AVERAGE BLOOD PRESSURE	R = 0.35**
Father--mild; rarely did things together with me	
Mother--hard to irritate her	
HIGH DIASTOLIC CASUAL AVERAGE BLOOD PRESSURE	
no relationships	
HIGH SYSTOLIC USUAL BLOOD PRESSURE	R = 0.49**
Father--never physically punished; rarely did things together with me; frequently demonstrated affection	
Mother--hard to irritate her	
Joint--no change in social class	
HIGH DIASTOLIC USUAL BLOOD PRESSURE	R = 0.32**
Father--never physically punished; often showed dislike for me	

**$p < .01$

acceptable interpretation of the relationships between the Parent Image factors of Father Potency, Father Inclusion, Mother Irritability and Systolic Average Casual blood pressure. Father Potency and Mother Irritability contribute to the equation in a manner contrary to that predicted.

More information is contained in the set of independent variables which, when combined through multiple correlation analysis, account for 24 per cent of the variance of Systolic Usual blood pressure. These variables describe a father who was frequently absent from the home but who enjoyed a positive relationship with his son. It is not clear why this set of characteristics should lead to development of higher systolic blood pressure in his son.

The variables which predict to Diastolic Usual blood pressure (Father Frequency of Punishment and Father Demonstration of Affection) seem to describe a father whose contact with his son was minimal but was interpreted by his son as disliking. This fits with the hypothesis that Ss who perceive their father as disliking them have higher blood pressure. There are no variables which predict to Diastolic Average Casual blood pressure.

A number of the studies reviewed in Chapter I reported personality differences between high and low blood pressure Ss. Four studies mentioned differences in parents of high and low blood pressure persons. High blood pressure Ss

in studies by Saul (1939) and Wolf, et al. (1949) reported that they had domineering mothers. Gold (1943) reported that high blood pressure Ss in his study had a strong attachment to their parents. And Harris (1958) reports that high blood pressure adolescents had upward mobile fathers. None of these findings are replicated in this research. There are several possible reasons for the failure to replicate earlier findings: (1) There are considerable differences in the sample of the various studies. Of the four studies noted above, only that by Harris used normal Ss. The others involved patients in treatment. (2) All of the four studies, and the present one, used measures of level of blood pressure which are, to varying degrees, unreliable. (3) Saul and Gold had very small samples, seven and ten persons, respectively.

Another difference between the results of this study and those done previously is that, in this research, there was no relationship between level of blood pressure and reactivity and lability measures. Thacker (1940) and Jost, et al. (1952) found that high blood pressure Ss reacted more to the cold pressor test and demonstrated more lability of blood pressure. The explanations listed above also apply here in considering the failure to replicate these results. At the present time there are no data available which permit a choice between acceptance of the findings of this research and that

done previously.

Cold Pressor Reactivity

The equations written to predict to Systolic Cold Pressor Reactivity and Diastolic Cold Pressor Reactivity are represented in Table 36. These equations account for 28 per cent,

TABLE 36

SUMMARY OF MULTIPLE RELATIONSHIPS BETWEEN PARENT IMAGE AND FAMILY QUESTIONNAIRE VARIABLES AND COLD PRESSOR AND VALSALVA REACTIVITY. DESCRIPTIVE PHRASES INDICATE DIRECTION OF RELATIONSHIP

HIGH SYSTOLIC COLD PRESSOR REACTIVITY	R = 0.53*
Father--punished quite frequently; mild physical punishment; always explained why he punished	
Mother--often showed dislike for me; made me feel resentment when she punished me; unjust, inconsistent	
Joint--Mother dominant over father.	
HIGH DIASTOLIC COLD PRESSOR REACTIVITY	R = 0.49**
Father--rarely did things together with me	
Mother--punished quite frequently; stern, hard, severe; made me feel resentment when she punished me.	
HIGH SYSTOLIC VALSALVA REACTIVITY	
no relationships	
HIGH DIASTOLIC VALSALVA REACTIVITY	R = 0.37**
Father--high concern with mobility	
Joint--no change in social class	

*$p < .05$
**$p < .01$

and 24 per cent, respectively, of the variance of the two variables. While these are respectable figures, they should be accepted with caution. The multiple correlation statistic tends to overestimate relationships because it capitalizes on error (Guilford, 1956).

In order to better understand the combination of parent perception variables that predict to Cold Pressor Reactivity it might be well to review the effects the test has on different individuals. The cold pressor test is an extremely painful experience. Several of the Ss in this research gritted their teeth during the test, others asked if they would get frostbite. The test is administered with little prior warning, and most people have never immersed their hand in near freezing water for any length of time. The test is therefore a stressful experience as much because of fearful anticipation of effects as the pain itself. "Neurotic" individuals react more to this experience than do "normal" individuals, according to studies by White and Gildea (1937), and Malmo and Shagass (1952), which were reviewed in Chapter I.

The perception of parent variables which combine to predict 28 per cent of the variance of Systolic Cold Pressor Reactivity describe a mother who often showed dislike, won out over her husband in family arguments, caused her son to

feel resentment when she punished him, and who was inconsistent in her treatment of her son. The parent perception variables which combine to predict 24 per cent of the variance of the Diastolic Cold Pressor Reactivity scores describe a mother who was stern, punished quite frequently, and caused her son to feel resentment when she punished him. The variables describe the mother as seldom explaining why she punished and making unreasonable demands. That is, Ss whose systolic and diastolic blood pressure increased dramatically as a result of the cold pressor test tend to describe their mother in this fashion. This pattern of relationships fits with either of the two general hypotheses presented in Chapter I. To have a mother such as described above would certainly be a stressful experience and it might very well favor the development of neurotic characteristics. If these Ss had perceived their mother as behaving this way when they were children, they may have learned to overreact in stressful situations, much as described by Malmo, and Mowrer and Viek.

The description of mother as stern, punitive, inconsistent and unreasonable, and dominant over father is similar to descriptions of mother offered by Ss in the Anxiety group in the Funkenstein, et al., research (1957) and those by Poor Premorbid schizophrenics in the Farina (1960) and Garmezy, et al. (1961) studies. If this similarity is accurate, future

research should demonstrate that Poor Premorbid schizophrenics tend to have a high reaction to the cold pressor test.

Valsalva Reactivity

Subjects who had high Diastolic Valsalva Reactivity scores described their father as highly concerned with social mobility, and reported that their family had not increased its social status since when they were children. As commented earlier, there is no evidence in the literature as to the psychological meaning of reactivity to the Valsalva test. It is generally thought to be related to lung capacity, but this is not clearly understood. One might, in future research, look for relationships between various physical characteristics and Valsalva reactivity. If these physical characteristics are also related to family social mobility it might be possible to postulate a mechanism for the relationship between social mobility and Valsalva Reactivity. Systolic Valsalva Reactivity is not significantly related to any of the parent perception variables, which confirms the absence of such relationships in previous research.

Casual Lability

The two blood pressure readings used to compute the Casual Lability scores were taken under different testing conditions, by different examiners, using different measuring

instruments. It was expected that the combination of these sources of random error would preclude the possibility of finding any significant relationships between Systolic and Diastolic Casual Lability and the Parent Image and Family Questionnaire variables. Two variables combine to predict seven per cent of the variance of Systolic Casual Lability. They describe father as administering painful punishment and describe a change in the social class status of the family (see Table 37). These may represent a dimension of achievement-striving within the family, but it is not clear how this would lead to high blood pressure variability.

The variables which account for 28 per cent of the variance of Diastolic Casual Lability scores provide more information. The conditions of measurement of the two casual blood pressure readings varied, among others, along a dimension of formality-informality, with the $Casual_2$ reading being taken under comparatively calm, relaxed and informal conditions. It is possible that the parent perception variables which predict to Diastolic Casual Lability relate to a dimension of reaction to authority. Subjects who described their father as dominant, as spending little or no time with his children, and as making unreasonable demands and causing resentment when he punished, are perhaps more affected by two different kinds of physicians than are Ss who perceive their father as

TABLE 37

SUMMARY OF MULTIPLE RELATIONSHIPS BETWEEN PARENT IMAGE AND FAMILY QUESTIONNAIRE VARIABLES AND CASUAL, RESTING, AND HOME LABILITY. DESCRIPTIVE PHRASES INDICATE DIRECTION OF RELATIONSHIP

HIGH SYSTOLIC CASUAL LABILITY	R = 0.28*
Father--painful physical punishment	
Joint--high change in social class	
HIGH DIASTOLIC CASUAL LABILITY	R = 0.53**
Father--awkward, inconsistent; no time with children; made me feel resentment when he punished me	
Mother--disagreeing with her was encouraged	
Joint--Father dominant over mother	
SYSTOLIC RESTING LABILITY	R = 0.21*
Mother--hard to irritate her	
DIASTOLIC RESTING LABILITY	
Mother--made me feel resentment when she punished me	
Joint--high change in social class; frequent parental disagreement	
SYSTOLIC HOME LABILITY	R = 0.33*
Father--stern	
DIASTOLIC HOME LABILITY	
no relationships	

*$p < .05$
**$p < .01$

skillful, consistent, not dominant over mother, reasonable and producing guilt. Subjects who had difficulty in accepting their father as an authority figure, and who perceive physicians as authority figures, might be more likely to have

different blood pressures when confronted by different patterns of behavior by examining physicians than Ss who did not have difficulty in accepting their father as an authority figure. However, high Diastolic Casual Lability scores were as often a function of $Casual_2$ readings being higher than $Casual_1$ as the reverse, and there are not enough data to account for differential reactions such as these. Further research will have to be done to test out the hypothesis just presented.

Resting Lability

It is assumed that the Resting Lability measure is a function of variability of blood pressure in the absence of external stresses. That is, blood pressure varies over the 20 minute resting period as a result of some combination of physiological changes in the body after lying down, and various cognitive processes which the S experiences. An examination of the curves of the five blood pressure readings taken during Resting does not reveal any limited set of patterns of change which could be analyzed. The blood pressure of some Ss went down during the Resting period; for others it went up; and for others it varied up and down apparently randomly. An analysis of blood pressure changes, during a relatively controlled and constant stimulation situation such as resting in bed, compared with simultaneous readings of cortical activity

as measured by the EEG, might offer evidence to support an assumption that various thought processes contribute to elevations and depressions of blood pressure over a period of time. Several of the studies reviewed in Chapter I (e.g., those by Marston, 1917; MacWilliams, 1923) indicate that cognitive processes are related to changes in blood pressure levels.

The parent perception variables which combine to predict 14 per cent of the variance of Diastolic Resting Lability scores do not provide much information. They are, however, variables which might be associated with the development of neurotic symptomatology. Several of the studies reviewed in Chapter I reported that Ss with highly variable blood pressures also had neurotic characteristics (cf. Solomon, Darrow & Blaurock, 1939; Ostfield & Lebovits, 1960). It is not, however, clear why neuroticism relates to blood pressure variability under relatively constant conditions of measurement. This problem needs to be investigated further before definitive statements can be made.

Home Lability

The results present very little information to enable a discussion of relations between parent perception variables and Home Lability. The two variables (Father Potency and Relative Potency) which account for about 10 per cent of the

variance of Systolic Home Lability scores are concordant with the prediction that stern, hard fathers would have sons with high blood pressure lability, but offer no further understanding of the process by which this comes about.

Differences Between Systolic and Diastolic Measures of Blood Pressure

For the most part, different perception of parent variables related to the systolic blood pressure measures than related to the diastolic measures. This was not unexpected, given the low correlations between the systolic and diastolic blood pressure measures. However, not enough is known about the psychological meaning of systolic and diastolic blood pressure level and reactivity to attempt a differential interpretation of the relationships found in this research. Table 38 presents a brief summary of some of the speculated and empirically determined differences between systolic and diastolic measures as they relate to other variables. An examination of the table demonstrates that not enough adequate research has been done to permit confident predictions of relationships. For example, Ax (1952) found that diastolic blood pressure increased more than systolic blood pressure in experimental situations intended to produce anger as opposed to fear, while Schachter (1957) found the opposite. The results of the present research should be an aid to attempts to

TABLE 38

A BRIEF SUMMARY OF EMPIRICAL AND SPECULATED DIFFERENCES OF LEVEL AND REACTION OF SYSTOLIC AND DIASTOLIC BLOOD PRESSURE

STUDY	SYSTOLIC BLOOD PRESSURE	DIASTOLIC BLOOD PRESSURE
Levy, et al, 1945 Ss were Army officers	having one high reading unrelated to later development of hypertension	having one high reading strongly related to later development of hypertension
Hickam, et.al., 1948 normal male medical students	stress of important examination associated with increased cardiac output	stress of important examination associated with decreased peripheral resistance
Brod, 1960 normals and hypertensives	normals increase cardiac output to cold pressor, hypertensives slight decrease	normals decrease peripheral resistance to cold pressor, hypertensives show increase
Remington, et al., 1960 children of hypertensives	rise in anticipation of cold pressor	
Malmo & Shagass, 1952 hospitalized mental patients, urban night school students	neurotics showed greater reaction to cold pressor	psychotics had higher readings than neurotics or normals at all times
Ax, 1953 male and female paid volunteers		greater increase for anger than for fear
Schachter, 1957 male and female paid volunteers	greater increase to cold pressor and experimentally induced anger	greater increase to experimentally induced fear
Funkenstein, et al., 1957 male paid volunteers	greater increase to fear	greater increase to anger

TABLE 38--Continued

STUDY	SYSTOLIC BLOOD PRESSURE	DIASTOLIC BLOOD PRESSURE
Wolf, 1961 theoretical article	increase associated with acute emotional, manifest reaction	increase associated with calm appearance, suppressed emotion
Shapiro, 1961 male and female hypertensives	greater increase to frustration, mixed anger and fear	greater increase to cold pressor
Cattell & Scheier, 1959	higher level associated with Extraversion, A+, Q_2-, N+, M-, E+, big bones	after exercise, higher level associated with B+, smaller muscles, critical exactness, small bones

provide greater understanding of differences between systolic and diastolic blood pressure.

Summary

As stated in the introduction to this chapter, while the data offer fairly convincing evidence that perceptions of treatment by parents are related to blood pressure level and to blood pressure reactivity and lability, they do not account for a large part of the variance of these measures in this particular sample. The general hypothesis (that Ss who perceive their parents as treating them in ways similar to those perceived by persons defined as having neurotic characteristics will have higher blood pressure and higher blood pressure reactivity and lability) is supported. However, the evidence for level of blood pressure is confusing and difficult to interpret. It seems fairly well established that reactivity as measured by the cold pressor test is significantly related to parent perception variables in a direction supporting the hypothesis that neurosis-inducing treatment of the child will lead to higher reactivity. And, a respectable portion of the variance of the Cold Pressor Reactivity measures is accounted for by a combination of parent perception variables. Blood pressure lability is similarly related to perceptions of parents as treating the respondent in a way similar to that

reported by neurotic Ss, but the relationship is not as strong as that for Cold Pressor Reactivity. It is believed that this exploratory research has accomplished its purpose and enough data have been collected to demonstrate the value of continued research on the problem. The contribution of this study might perhaps be assessed by examination of previous research designed to examine perception of parent correlates of blood pressure variables. However, as mentioned earlier, no such research was encountered in a review of the literature. Harris' (1958) work, in which a few variables relating to parents were included with others, has been mentioned. In a recent article summarizing research on "The precursors of hypertension" Thomas provides the following statement, indicating the extent of knowledge at the present time.

> Patients who suffer from essential hypertension . . . have some theories of their own. They explain that high blood pressure, strokes and 'heart attacks' run in the family; that their mother, a driving, energetic woman, died of a stroke during their childhood; that they themselves took responsibility early, worked long hours and took few vacations yet never felt tired, have had appetites that are 'too good,' and have always been high strung worriers (1961, p. 260).

Future Research

One possible explanation for the apparent discrepancy between the strong relationships between neurotic symptomatology and high blood pressure levels, reactivity, and lability, found in other research and the relatively small relationships

presented in this study is the differences between the samples employed. The fact that Ss for this research were middle-class college students from stable homes (only three of the 107 Ss came from homes in which parents were separated, well below the national average) limited the possibility of finding high relationships. Inclusion into the sample of Ss with overt character or personality disorders, or persons who had experienced highly stressing home situations might have served to enhance the relationships obtained. Future research might well focus on a sample of people more representative of the general population in order to have a fairer test of the hypothesis.

Better measures of level of blood pressure are necessary in order to have measurements which are reliable. Repeated measurements of blood pressure under constant conditions would increase the likelihood of correctly identifying persons as having high or low blood pressure.

This research does not adequately resolve the question of whether there is a developmental relationship between parent treatment of the child and blood pressure characteristics, although it improves our knowledge about the problem. Definitive studies of the effects of long-term stress on blood pressure are needed. This research can be done on animals given careful consideration of the problems of generalization

of results to humans. The studies done so far either did not stress animals in a way similar to that which humans might experience, or did not stress them enough to significantly alter blood pressure characteristics. Developmental studies on humans are not yet feasible given the unreliability of blood pressure measurements on very young children. (See Remington, Lamberth, Moser and Hoobler, 1960, for a discussion of this problem.) More controlled techniques of blood pressure measurement on children might make longitudinal studies possible. It might also be possible to use data like that employed by Harris (1958), who had blood pressure measurements on six-year-old children. He found that measurements at age 18 years were similar to those taken earlier. If it could be shown that the relationships between characteristics of parent-child relationships and blood pressure increased with the age of the child, then this would argue well for a developmental effect.

To more accurately assess the relative contribution of parent perception or parent treatment variables to blood pressure characteristics, research needs to be done which also carefully measures the other variables known to be related to blood pressure. Some information was collected during this study on physiological characteristics of Ss (urine samples, to be analyzed for adrenalin content) and

blood pressure levels of parents, but not enough to warrant inclusion into this present report. Future research is planned in which adequate information of parents' blood pressure is obtained to assess the relative contribution made by hereditary transmission.

On the independent variable side, further research is necessary to adequately determine that the Parent Image Semantic is capable of measuring all the relevant dimensions of parent-child interaction. This research is in progress. The Parent Image Semantic will be used in a study of antecedents of rheumatoid arthritis, employing a nation-wide sample, to be done by the Institute for Social Research.

What this thesis does is establish some basis for the assumption that the relationships between parents and child, as they are perceived by the child, have effects on at least one of the child's physiological processes.

FOOTNOTES FOR CHAPTER I

[1]This review is in preparation for the Psychological Bulletin and is a joint effort of myself, Stevo Julius, M. D., Ernest Harburg, Ph.D., and Jack McLeod.

[2]The mean diastolic blood pressures presented are higher than those obtained on the subjects in this study and others because of use of different criteria for when the beat of the heart can no longer be heard. Medical experts divide the diastolic beat into five stages. Fishberg used the fourth stage as the criterion for his diastolic measurements. This study employed the fifth stage, which gives slightly lower mean readings.

[3]The most complete review of hypertension as a disease entity is that by Weiss (1939) or one by Page (1949). Because hypertension is more frequently encountered in Negroes than in whites, there is a separate literature which has been reviewed by Schulze and Schwab (1936), and Lennard and Glock (1956).

FOOTNOTES FOR CHAPTER II

[1] A more complete analysis of similarities and differences between home and office determinations of blood pressure can be found in a paper being prepared for publication. See S. Julius, N. F. McGinn, E. Harburg, & S. W. Hoobler. Blood pressure studies in young males. I. Self-determination of blood pressure as a research method. To be submitted to the Journal of Chronic Diseases.

[2] "We" includes Ernest Harburg and Gerald Ginsburg, who began work on the Parent Image Semantic about three years ago. I joined them after they had worked for six months.

[3] 83 Ss were used instead of 107 because of a desire to compare the results of this analysis with that by Harburg (1962), from whose sample the extra 24 Ss were drawn. As it turns out, addition of the 24 Ss changes the factor structure only slightly.

APPENDIX A

Your Code Number_____

Your School_____
(Engineering, LS&A, Dental, etc.)

Project 8
Fall 1961

Study of Family Attitudes

This study is one of many conducted over the past two years with the cooperation of University of Michigan undergraduates. We believe, and have been told by students, that the experience of taking these questionnaires and learning their purposes has been of value to their own understanding about themselves and others.

The questions have no "right" or "wrong" answers. They were chosen as part of a study design which we promise will be explained to you before the end of the semester.

Your <u>individual answers will be kept completely confidential</u>. No one besides the researcher will see them. The results will be tabulated and reported to you in group form only, e.g., percentages.

The final value of this study depends entirely on your <u>frankness</u> and <u>accuracy</u> in stating your feelings and attitudes.

Thank you for your cooperation.

Please Read These Instructions:

1. Answer the questions in order. Do not skip around.

2. Do not discuss your responses with other people while answering.

3. Be sure to answer all the items.

4. If you want to write an explanation or comment, feel free to do so. But first check the response you think is most accurate.

5. Most of the questions can be answered with a check (✓).

FIRST your code number _____.

I. Now, some background data:

A. Are you: (check your answer)

_____(1) Male

_____(2) Female

B. How old are you: ____years, ____months.

Age	
16-17	8%
18-19	53%
20-21	24%
22-23	10%
24-25	4%
26	1%

C. What college class are you in:

61% (1) Freshman

15 (2) Sophomore

10 (3) Junior

0 (4) Senior

14 (5) Graduate, professional school

D. Check one of the following places which best describes where you were raised as a child. "As a child" means for the most part of your life while growing up (from birth to about 14 years old).

15% (1) On a farm or in a village (2,500 or less)

10 (2) In a town (2,500 - 9,999)

16 (3) In a small city (10,000 - 49,999)

11% (4) In a medium city (50,000 - 150,000)

28 (5) In a metropolitan city (150,000 or over)

20 (6) In a suburb of a metropolitan city close to and almost part of the city

D1. What state(s) were you raised in?

_____

E. How many persons were living in your household when you were a child? (Please include your parents or guardians, grandparents, brothers and sisters, and yourself.)

Counting myself, there were usually _____ persons.

Comment: _____

F. Were you the first born, second born, third born, or what in your family?

I was born _____.

1st & only	11	3rd	6
1st	49	4th-5th	2
2nd	37	7th	2

G. If you have any brothers or sisters, list the ages of those brothers and sisters who are older than you.

Brothers_____

Sisters_____

List the ages of those younger than you.

Brothers_____

Sisters _____

H. Are your real parents still living together?

100 (1) Yes 7 (2) No.

H1. IF NO: What caused the separation?

_____(1) Father deceased
_____(2) Mother deceased
_____(3) Divorce or legal separation
_____(4) Other (please explain)

_____

H2. How old were you when the separation occurred?

I was _____ years old.

H3. Were either of your parents born outside the United States?

_____(1) No

_____(2) Yes (please specify the parent and the country of birth)

	Which parent?	Born where?	At what age came to U.S.?
Father 81% in U.S.			
Mother 93% in U.S.			

I. Who in your own mind was the male person in your family who had the primary responsibility for your growing up, in the period from birth to about 14 years old?

97% (1) My real father

2% (2) Someone else

1% (3) No male person

IF "someone else" please specify the relation this person was to you, e.g., uncle, brother, etc.

_____

Did he live in your house?____(1) Yes____(2) No

J. Who was the female person in your family who had primary responsibility for your growing up in the period from birth to about 14 years old?

100% (1) My real mother

_____(2) Someone else

_____(3) No female person

IF "someone else" please specify the relation this person was to you, e.g., aunt, sister, etc.

_____

Did she live in your house: ___(1) Yes

___(2) No

II. The following questions concern some background data about the two people who had primary responsibility for your training. These are the same people you referred to in the above two questions. We will use the words "father" and "mother" and understand to whom you are really referring.

A. First, what was your father's occupation when you were growing up? (1 - 14 years old)

His major occupation was: _____

What kind of work did he do and in what kind of organization or place did he work?

_____

_____

_____

What was his title, if any?

_____

B. Did your father work for himself or for an employer?

23% (1) Worked for self

26% (2) Partly self, partly someone else

51% (3) Worked for someone else

IF (3), please explain: _____

_____

_____

D. About how many people worked in the company your father worked in? (Or in his office, if self-employed?)

_____(1) He changed jobs too often for me to answer
_____(2) Less than 10
_____(3) 10 to 50
_____(4) 50 to 300
_____(5) 300 to 500
_____(6) 500 - 1,000
_____(7) 1,000 or over

D1. In the place where your father worked, did anyone work <u>under</u> him; that is, was your father in charge of the work of others?

_____(1) Yes _____(2) No

<u>IF YES</u>: Did anyone work <u>under</u> these people?

_____(1) Yes _____(2) No

<u>IF YES</u>: Did anyone work under them?

____(1) Yes ____(2) No

D2. Did your father have a boss or supervisor <u>over</u> him at work?

_____(1) Yes _____(2) No

<u>IF YES</u>: Did anyone work over your father's boss?

____(1) Yes ____(2) No

<u>IF YES</u>: Did anyone work over them? (Do not include Board of Directors.)

____(1) Yes ____(2) No

Your comments: _____

D3. Did your father's job affect the amount of time he was at home in the evenings and on week ends?

__7__ (4) He was away from home a great deal

__35__ (3) Was away quite a bit

__55__ (2) Usually was home

__10__ (1) Always was home

Comment: _____

D4. Did your mother ever do any work for pay, <u>when you were a child</u>?

__38__ (1) Yes

__66__ (2) No, never

__3__ (3) Don't remember

<u>IF YES</u>: Briefly describe what she did: _____

_____

<u>At the present time</u>:

E1. Does your father still work in the same occupation as he did when you were growing up? (Or did he work in the same occupation up to the time of death?)

__90__ (1) Yes (If "Yes," skip to Question E3)

__17__ (2) No

<u>IF NO</u>: Please answer the following question again, this time referring to <u>his present work</u> (or work at time of death).

E2. What is your father's present occupation:

_____

What kind of work does he do and what kind of organization or place does he work in? _____

_____

E3. Does he now work for himself or an employer? (Or did he at time of death?)

_____(1) Works for self

_____(2) Partly self, partly someone else

_____(3) Works for someone else

_____(4) Retired

IF (3): please explain: _____

_____

F1. Check the major source of your family's income at the present time which comes from any of the following sources: (take an educated guess)

Check one		Major Income Source
25	(1)	Self-employment (profits, fees, royalties)
5	(2)	Interest, dividends, or over 35% from commissions
8	(3)	Salary plus 15 - 34% commission, bonus, etc.
25	(4)	Salary plus less than 15% bonus, etc.
33	(5)	Salary only (any other income minor)
9	(6)	Wages
0	(7)	Pension or social security
2	(8)	Other (please specify) _____
TOTAL 100%		_____

F2. About how much total income do your parents earn yearly, at the present time? (On the average over the past few years, from whatever source.)

1 (1) Less than $3,999

22 (2) $4,000 - $7,499

25 (3) $7,500 - $9,999

29 (4) $10,000 - $14,999

24 (5) $15,000 - $29,999

6 (6) $30,000 - $50,000

_____ (7) $50,000 and over

G. How far did your parents go in school? (Please check for each parent.)

1. Father	2. Mother	
2	1	(1) Did not complete grade school (1 - 7 years)
6	3	(2) Completed grade school (8 years)
12	10	(3) Some high school (9 - 11 years)
23	33	(4) Completed high school (12 years)
20	31	(5) Some college
25	27	(6) Completed college
9	1	(7) Attained M.A. degree
10	1	(8) Attained Ph.D. degree, law degree, or M.D.

H1. How old is (or would be) your father now? _____ years

H2. How old is (or would be) your mother now? _____ years

III. Now, when you were a child (1 - 14 years old):

A. What religious preference did your father hold?

66% (1) Protestant

14% (2) Jewish

14% (3) Roman Catholic

1% (4) Other (specify) _____

Age of Parents When Subject Was Born — None 5%

	Fa	Mo
≤19	0	0
20-24	14	34
25-29	36	40
30-34	33	21
35-39	16	9
40-44	3	2
45+	5	1

IF Protestant:

A1. What denomination: _____

B. Was he a member of the church or synagogue?

67% (1) Yes 33% (2) No

C. What religious preference did your mother hold?

64% (1) Protestant

15% (2) Jewish

22% (3) Roman Catholic None 2%

0 (4) Other (specify) _____

IF Protestant:

D. What denomination: _____

E. Was she a member of the church or synagogue?

78% (1) Yes 22% (2) No

F. Were your parents "conservative" or "liberal" in their religious practices? (Please check for each parent.)

1. Father	2. Mother	
_____	_____	(1) Very conservative, held firm to rituals
_____	_____	(2) Somewhat conservative
_____	_____	(3) Little of both; it depends
_____	_____	(4) Somewhat liberal
_____	_____	(5) Very liberal, tended to minimize importance of ritual
_____	_____	(6) Did not practice any religion

G. How often did your parents actually attend religious services? (Check for each.)

1. Father	2. Mother	
37	52	(1) Once a week or more
21	19	(2) Two or three times a month
7	8	(3) Once a month
18	15	(4) A few times a year
16	9	(5) Rarely over the years
8	4	(6) Never

IV. A. People sometimes talk about the kinds of social classes in America. In your opinion, which one of these terms comes closest to describing the class that your family belonged(s) to: (1) when you were a child, and (2) at the present time? (If parents are separated, check for the head of the family.)

(1) When I was a child	(2) Now	
0	0	(1) Upper upper class
6%	16%	(2) Lower upper class
39%	56%	(3) Upper middle class
36%	23%	(4) Lower middle class
18%	3%	(5) Upper working class
1%	1%	(6) Lower working class

B. As a child, do you remember your father as being concerned about working hard in order to move up in the world?

19 (1) Yes, he was very concerned about it

39 (2) Yes, he was concerned

22 (3) Sometimes, for some things

23 (4) No, mostly he wasn't too concerned about it

4 (5) No, he was not concerned about this at all

The following questions were designed to find out what life was actually like in the families of American college students. Try to be as accurate and frank as possible. Please DO NOT consider whether your answer is "good" or "bad" or "desirable" or "undesirable." Please DO consider what are the actual facts of the matter as you feel they were when you were a child. Feel free to comment on any point you want.

V. First, some questions about authority in the family, when you were a child.

A. Which parent would you say was actually the head of the family when you were a child?

80 (1) Father

26 (3) Mother Both 1

Comment: _____

B. If your father wanted your mother to do something that she really didn't want to do, what is your estimate of the chance that she would do it?

24 (1) She would do it

57 (2) She probably would do it

22 (3) She probably would not do it

4 (4) She would not do it

C. If your mother wanted your father to do something that he really didn't want to do, what is your estimate of the chance that he would do it?

12 (1) He would do it

59 (2) He probably would do it

30 (3) He probably would not do it

6 (4) He would not do it

D. Which parent would you estimate as usually having the final word in decisions concerning the family when you were a child?

73 (1) Father

Both 4

29 (3) Mother

E. How often did your parents disagree about things regarding the family?

0 (1) Practically all the time

12 (2) Frequently

28 (3) Occasionally; now and then

49 (4) Rarely (unusual, but happened)

11 (5) Once or twice in my memory

7 (6) Never disagreed about family matters

E1. (If you checked 1, 2, 3, 4, or 5 for E) Which parent usually got his or her way in the final decision?

52 (1) Father

Both or neither 19

29 (2) Mother

Comment: _____

F. In your mind, which parent disciplined you the most? (Pointed out right from wrong and punished you in any way.)

36 (1) Father

Both 9

62 (2) Mother

Comment: _____

G. Which parent ever punished you physically? (Beating, spanking, slapping, etc.?)

32 (1) Father

Both 44 Neither 9

22 (3) Mother

H. How frequently did he and she punish you physically? (Check for each parent.)

1. Father	2. Mother		
0	1	(1)	Practically all the time
4	2	(2)	Quite frequently
35	39	(3)	Occasionally (enough to expect it)
39	34	(4)	Rarely (unusual; but happened)
20	22	(5)	Once or twice in my memory
9	9	(6)	Never punished me physically

H1. Please describe in what way you were physically punished (spanked on legs, paddled on rear, slapped in face, hairbrush on hand, etc.).

	Hit me with (rope, hand, fist, etc.)	Hit me on (face, rear, legs, etc.)
By Father:		
By Mother:		

I. How hard were you ever hit? (Regardless of how often.)

By Father	By Mother		
11	4	(1)	Extremely hard; it was painful
42	34	(2)	Quite hard; it hurt quite a bit
27	42	(3)	Not too hard; it hurt a little
4	17	(4)	Not hard; hardly hurt at all
1	4	(5)	Very lightly; did not hurt physically
22	6	(6)	Never physically punished

J. When you were a child, did you feel that you or any of your brothers/sisters were disciplined more than the others, by either parent?

_____(1) Not me or any other child in my family

_____(2) Yes, it happened

IF YES:

Circle parent doing this	Which child was disciplined more?	Indicate his/her birth order
Mother Father	Brother Sister Myself	Born 1st, 2d, ____
Mother Father	Brother Sister Myself	Born 1st, 2d, ____

K. As a child, did you feel either parent was a "problem parent" for you, for any reason that continued over a period of time? (You had any difficulty in your relations with him or her to any degree.)

__78__(1) No, not at all

__29__(2) Yes, one or both were problems to me

IF YES: Which parent? 18 Father 4 Mother 7 Both (Circle your answer)

Please describe briefly the essential problem as you saw it:

Please consider each response carefully as to its accuracy.

VI. A. When you were a child, how did you feel toward each parent as a source of affection?

1. Father	2. Mother	
__55__	__92__	(1) Wanted and got enough affection
__29__	__7__	(2) Wanted slightly more than I received

Father	Mother		
13	3	(3)	Wanted more than I received
4	3	(4)	Indifferent to affection from this parent
1	1	(5)	Did not want affection from this parent
5	1	(6)	Felt mixed feelings toward this parent (specify below)

Comment: _____

B. How did your parents show their feelings to you, when you were a child? (Check for each parent.)

1. Father	2. Mother		
36	80	(1)	Often showed affection to me
46	23	(2)	Showed it occasionally
18	2	(3)	Rarely showed affection
4	1	(4)	Usually was indifferent to me
0	1	(5)	At times showed dislike to me
1	0	(6)	Often showed dislike to me
2	0	(7)	Felt mixed feelings to me from this parent (specify below)

Comment: _____

C. When you were a child, which parent in general possessed skills or traits you <u>most admired and wanted to learn for yourself</u>?

78 (1) Father

Both 8

21 (3) Mother

Specify <u>one</u> of the traits you have in mind: _____

_____

D. How much time did your father spend doing things with his children?

15 (1) A great deal of time

26 (2) Quite a bit

44 (3) Now and then; it varied

21 (4) Very little time

1 (5) No time at all; very rarely

E. Can you describe <u>two</u> ways in which you believe you are quite <u>similar</u> to your <u>father</u> in personality?

Try to use a single <u>adjective or phrase</u>

E1. One positive way; I'm proud of this similarity with my father. _____

E2. One negative way; I wish I had less of this similarity with my father. _____

Can you describe <u>two</u> ways in which you believe you are quite <u>similar</u> to your <u>mother</u> in personality?

Try to use a single <u>adjective or phrase</u>

E3. One positive way; I'm proud of this similarity with my mother. _____

E4. One negative way; I wish I had less of this similarity with my mother _____

Your comments: _____

F. Did you ever physically fight with any of your brothers or sisters?

_____(1) No

_____(2) Yes

IF YES:

Circle which one	What was his/her birth order
brother sister	1st, 2d, _____

Part II

The Measurement of the Meanings of Ideas

The purpose of this form is to measure the meanings of certain ideas to various people by having them judge each idea against a series of descriptive scales. In filling out this form make your judgments on the basis of what the idea means to you. At the top of each page in this booklet you will find a different idea to be judged, and beneath it a set of scales. You are to rate the idea on each of these scales in order.

Here is how you are to use these scales:

If you feel that the idea at the top of the page is extremely related to one end of a scale, you should place your X as follows:

e.g., JUSTICE

fair__X__:____:____:____:____:____:____unfair

or

fair____:____:____:____:____:____:__X__unfair

If you feel that the idea is quite closely related to one or the other end of the scale (but not extremely) you should place your X as follows:

JUSTICE

strong____:__X__:____:____:____:____:____weak

or

strong____:____:____:____:____:__X__:____weak

If the concept seems only slightly related to one side as opposed to the other side (but is not really neutral) then you should X as follows:

JUSTICE

active____:____:__X__:____:____:____:____passive

or

active____:____:____:____:__X__:____:____passive

The direction toward which you check, of course, depends upon which of the two ends of the scale seems most characteristic of the idea you're judging.

If you consider the idea to be neutral for a certain scale, or both sides of the scale equally associated with the

idea, or if the scale is completely irrelevant, then you should place your X in the middle space:

safe____:____:____:_X_:____:____:____unsafe

IMPORTANT: 1) Place your X's in the middle of the spaces, not on the boundaries:

THIS NOT THIS

____:____:____:_X_:____:X___:____

2) Be sure you check every scale for every concept - do not omit any.
3) Never put more than one X on a single scale.

Sometimes you may feel as though you've had the same item before on the test. But do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the test. Make each item a separate and independent judgment. Work at fairly high speed throughout this test. Do not worry or puzzle over individual items. It is your first impressions, the immediate "feelings" about the items which are necessary.

HOW I FEEL OTHERS SEE ME

IN MOST SITUATIONS

a talker	7	26	16	8	18	25	7	a listener
passive	1	12	22	2	20	45	5	active
receiver	0	15	29	9	26	25	3	sender
aggressive	8	28	30	4	23	14	0	compliant
slow to get irritated when frustrated	16	25	22	3	15	16	10	quick to get irritated when frustrated
leader	9	35	33	6	18	5	1	follower
prone to self-blame	3	24	35	16	22	6	1	prone to blame others
controlling others	8	21	36	21	17	4	0	controlled by others
yielding to others	0	8	25	8	34	25	7	resisting others
critical of rules	8	23	20	7	18	24	7	accepting of rules

Work rapidly.

It is your initial feelings which are important.

TABLE 39

DISTRIBUTION OF RESPONSES OF 107 SUBJECTS
USING THE CONCEPT
HOW MY FATHER TREATED ME WHEN I WAS A CHILD

warm	23	35	31	4	8	6	0	cold
stern	6	25	30	7	16	14	9	mild
relaxed	16	33	32	8	12	5	1	tense
hard	1	14	30	8	35	16	3	soft
with ridicule	2	3	11	9	29	39	14	with praise
lenient	9	31	30	6	21	9	1	severe
skillfully	16	39	23	3	11	13	2	awkwardly
insensitive to my feelings	2	14	17	2	20	34	18	sensitive to my feelings
justly	39	38	13	7	7	3	0	unjustly
with punishment	3	12	21	8	21	23	19	with reason
inconsistent	2	13	9	3	21	32	27	consistent
encouraged me	43	37	14	5	7	1	0	discouraged me
concerned	52	36	12	1	5	1	0	indifferent
usually critical of me	5	9	19	13	25	29	7	usually praised me
close	28	25	26	4	16	6	2	distant

TABLE 40

DISTRIBUTION OF RESPONSES OF 107 SUBJECTS USING THE CONCEPT

HOW MY MOTHER TREATED ME WHEN I WAS A CHILD

warm	55	44	6	0	0	0	2	cold
stern	12	11	19	2	23	29	11	mild
relaxed	25	44	20	3	7	6	2	tense
hard	1	8	11	7	29	35	16	soft
with ridicule	1	1	3	6	14	43	39	with praise
lenient	15	32	35	4	13	6	2	severe
skillfully	29	42	24	5	5	1	1	awkwardly
insensitive to my feelings	2	2	6	2	5	41	49	sensitive to my feelings
justly	46	36	16	2	6	1	0	unjustly
with punishment	5	13	20	10	16	23	20	with reason
inconsistent	2	9	13	2	16	37	28	consistent
encouraged me	55	39	7	3	2	1	0	discouraged me
concerned	84	18	4	0	0	1	0	indifferent
usually critical of me	3	3	3	10	27	36	25	usually praised me
close	63	36	6	0	0	0	2	distant

TABLE 41

DISTRIBUTION OF RESPONSES OF 107 SUBJECTS USING THE CONCEPT HOW MY FATHER TAUGHT ME WHEN I WAS A CHILD

he often discussed things with me	19	24	21	2	17	16	8	he rarely discussed things with me
disagreeing with him was discouraged	7	15	21	26	23	12	3	disagreeing with him was encouraged
supported my mistakes	1	9	14	8	40	20	7	critical of my mistakes
skillful in teaching me new things	15	40	23	7	16	5	1	awkward in teaching me new things
stern	4	16	33	7	23	20	4	mild
often did things together with me	16	22	24	7	20	13	5	rarely did things together with me
easy to irritate him	9	17	16	8	21	21	15	difficult to irritate him
in a tense way	3	7	16	11	21	33	16	in a relaxed way
soft	5	19	33	10	30	9	1	hard
acted as if he were always right	10	18	19	9	17	25	9	was willing to admit his mistakes
basically he understood me	19	32	23	8	14	8	3	basically he did not understand me
impatient with me	6	9	18	5	22	30	17	patient with me
usually criticized my conduct	6	8	22	17	25	22	7	usually praised my conduct
pleased him when I acted on my own	29	35	21	12	4	6	0	displeased him when I acted on my own

TABLE 42

DISTRIBUTION OF RESPONSES OF 107 SUBJECTS USING THE CONCEPT HOW MY MOTHER TAUGHT ME WHEN I WAS A CHILD

she often discussed things with me	35	36	23	12	4	5	2	she rarely discussed things with me
disagreeing with her was discouraged	6	10	21	29	24	15	2	disagreeing with her was encouraged
supported my mistakes	10	16	29	10	26	11	5	critical of my mistakes
skillful in teaching me new things	22	28	31	8	13	4	1	awkward in teaching me new things
stern	2	11	15	5	30	27	17	mild
often did things together with me	13	42	29	3	13	6	1	rarely did things together with me
easy to irritate her	2	8	29	3	28	27	10	difficult to irritate her
in a tense way	2	3	8	2	29	44	19	in a relaxed way
soft	14	42	33	4	9	4	1	hard
acted as if she were always right	6	6	12	6	30	36	11	was willing to admit her mistakes
basically she understood me	30	39	19	2	7	8	2	basically she did not understand me
impatient with me	2	3	5	4	17	48	28	patient with me
usually criticized my conduct	3	3	9	5	30	37	20	usually praised my conduct
pleased her when I acted on my own	29	36	23	4	9	5	1	displeased her when I acted on my own

TABLE 43

DISTRIBUTION OF RESPONSES OF 107 SUBJECTS USING THE CONCEPT HOW MY FATHER DISCIPLINED ME WHEN I WAS A CHILD

often punished me	3	8	24	4	21	21	26	rarely punished me
hard	7	24	37	2	16	16	5	soft
always explained why he punished me	30	28	21	8	10	10	0	rarely explained why he punished me
usually persuaded me	7	16	21	6	24	26	7	usually ordered me
got angry when punishing me	12	32	29	5	7	19	3	stayed calm when punishing me
lenient	10	15	25	9	27	15	6	severe
easy to irritate him	8	18	22	5	23	18	13	hard to irritate him
made me feel guilty	12	30	19	9	17	15	5	made me feel resentment
expected me to do as he wished	12	16	23	8	11	25	12	expected me to know the rules
mild	9	11	22	2	37	20	6	stern
made reasonable demands	39	29	21	3	11	2	2	made unreasonable demands
strict	5	24	28	10	16	15	9	permissive
I resisted him	4	14	18	11	27	25	8	I yielded to him
often, I wanted to run away	5	6	16	12	20	24	24	I always wanted to be with my family
I blamed myself when punished	9	21	23	14	30	6	4	I blamed him for punishing me

TABLE 44

DISTRIBUTION OF RESPONSES OF 107 SUBJECTS USING THE CONCEPT HOW MY MOTHER DISCIPLINED ME WHEN I WAS A CHILD

often punished me	4	16	26	4	24	19	14	rarely punished me
hard	3	10	24	5	36	20	9	soft
always explained why she punished me	21	41	28	3	10	4	0	rarely explained why she punished me
usually persuaded me	11	26	33	2	23	7	5	usually ordered me
got angry when punishing me	10	31	33	3	11	13	6	stayed calm when punishing me
lenient	8	29	33	5	18	11	3	severe
easy to irritate her	3	8	34	5	29	18	10	hard to irritate her
made me feel guilty	17	29	21	12	20	7	1	made me feel resentment
expected me to do as she wished	10	22	30	7	12	16	10	expected me to know the rules
mild	11	26	33	4	21	9	3	stern
made reasonable demands	27	45	24	1	5	3	2	made unreasonable demands
strict	16	15	27	5	25	21	8	permissive
I resisted her	4	10	15	9	34	25	10	I yielded to her
often, I wanted to run away	2	4	19	10	23	23	26	I always wanted to be with my family
I blamed myself when punished	10	19	28	14	26	7	3	I blamed her for punishing me

APPENDIX B

TABLE 45

INTERCORRELATION MATRIX OF ALL PHYSIOLOGICAL MEASURES. N FOR HOME AND USUAL MEASURES = 71. N FOR CASUAL MEASURES = 83. N FOR COLD PRESSOR, VALSALVA, RESTING LABILITY AND PHYSIQUE MEASURES = 107.

	AVG CAS		USUAL		COLD PRESS	
	Syst	Dias	Syst	Dias	Syst	Dias
Avg. Casual						
Dias	.38					
Syst	.83	.18				
Usual						
Dias	.12	.35	.18			
Syst	-.11	-.15	-.13	-.16		
Cold Pressor						
Dias	.10	-.14	.08	-.15	.50	
Syst	.24	.13	.33	.18	-.09	-.17
Valsalva						
Dias	.11	-.13	.19	.02	-.12	-.01
Syst	-.07	-.32	-.07	-.12	-.07	-.09
Cas. Lability						
Dias	.28	-.11	.17	-.07	-.06	.04
Syst	.16	-.09	.16	.07	-.01	-.08
Rest. Lability						
Dias	.05	-.21	.03	-.08	.13	.05
Syst	-.03	.03	.07	-.05	-.13	.01
Home Lability						
Dias	.20	.07	.27	-.04	.00	.17
Weight	.59	.17	.63	.16	-.08	-.07
Overweight	.54	.00	.58	.08	.00	.04

TABLE 45--Continued

VALSALVA		CASUAL LAB		RESTING LAB		HOME LAB		
Syst	Dias	Syst	Dias	Syst	Dias	Syst	Dias	WEIGHT
.36								
-.02	.14							
.07	-.05	-.05						
.09	.11	.01	-.10					
-.05	-.04	.17	.13	.23				
-.14	-.04	.03	.00	-.06	.02			
.02	-.07	-.11	.15	.05	.17	.36		
.11	.02	.00	.17	.19	.01	-.07	.17	
.15	.00	.06	.20	.25	.09	-.03	.17	.83

APPENDIX C

TABLE 46

INTERCORRELATION MATRIX OF FAMILY QUESTIONNAIRE ITEMS
N = 107

	PHYSICAL PUNISHMENT				AFFECTION					EDUCATION			AGE
	Freq.		Intens.		Satisf with		Amount		Fa. Time w/ Child			INCOME	
	Fa	Mo	Fa	Mo	Fa	Mo	Fa	Mo		Fa	Mo		Fa Mo
PHYSICAL PUNISHMENT													
Frequency													
Fa													
Mo	22												
Intensity													
Fa	49	10											
Mo	-08	37	19										
AFFECTION													
Satisfaction with													
Fa	-20	-08	-11	16									
Mo	08	-06	05	-05	37								
Amount													
Fa	-09	08	-11	00	63	10							
Mo	08	-14	-10	-14	19	58	30						
Father Time w/Children	15	-16	-02	-16	34	15	27	10					
EDUCATION													
Fa	06	01	07	05	14	19	-02	01	15				
Mo	-14	04	-02	00	08	12	-02	-08	-02	46			
INCOME	-04	02	10	15	00	06	-16	01	-05	49	31		
AGE													
Fa	09	-01	-09	10	05	-10	11	02	12	12	03	-03	
Mo													
BIRTH ORDER	-02	-10	-10	-08	-08	-11	01	-04	02	-15	-13	-10	41

TABLE 47

INTERCORRELATION MATRIX OF PARENT IMAGE FACTORS. N = 107.

	FATHER						MOTHER					
	Pot	Sup	Incl	Irrit	In-tro	Dem Style	Pot	Aff	Just	Tol Ind	Intr	Irrit
FATHER												
Supp.	.34											
Incl.	.11	.75										
Irrit.	.46	.76	.57									
Intro.	.33	.59	.46	.55								
Dem. Style	.38	.57	.49	.55	.49							
MOTHER												
Pot.	.14	.15	.24	-.03	.01	.12						
Aff.	.14	.33	.35	.21	.10	.06	.48					
Just	.20	.21	.21	.08	.16	.40	.28	.49				
Tol. Indep.	.06	.17	.25	.06	.21	.09	.42	.57	.66			
Intro.	-.03	.17	.22	.04	.40	.13	.33	.38	.59	.62		
Irrit.	-.01	.03	.38	-.11	.08	.07	.27	.37	.40	.70	.56	
RELA-TIVE												
Pot.	.69	.16	-.09	.38	.25	.21	-.62	-.24	-.05	-.25	-.26	-.21

REFERENCES

Alexander, F. Emotional factors in essential hypertension: Presentation of a tentative hypothesis. Psychosom. Med., 1939a, 1, 175-179.

Alexander, F. Psychoanalytic study of a case of essential hypertension. Psychosom. Med., 1939b, 1, 139-152.

Alexander, H. A few observations on the blood pressure in mental diseases. Lancet, 1902, 2, 18-20.

Angell, J. R., & Thompson, H. B. Organic processes and consciousness. Psychol. Rev., 1899, 6, 32-69.

Armstrong, H. G. The blood pressure and pulse rate as an index of emotional instability. Amer. J. med. Sci., 1938, 195, 211-219.

Ausubel, D. P. Theory and problems of child development. New York: Grune & Stratton, 1958.

Ax, A. F. The physiological differentiation between fear and anger in humans. Psychosom. Med., 1953, 15, 433-442.

Ayman, D. An evaluation of therapeutic results in hypertension. J.A.M.A., 1930, 95, 246-249.

Ayman, D. Personality type of patients with arteriolar essential hypertension. Amer. J. med. Sci., 1933, 186, 213-223.

Ayman, D. Heredity in arteriolar (essential) hypertension: A clinical study of 1524 members of 277 families. Arch. int. Med., 1934, 53, 792-802.

Baldwin, A. L., Kalhorn, J., & Breese, F. H. Patterns of parent behavior. Psychol. Monogr., 1945, 58. Whole No. 3.

Barach, J. H. The constitutional factors in hypertensive disease. J.A.M.A., 1928, 91, 1511-1514.

Bard, P. (Ed.) Medical physiology. St. Louis: C. V. Mosby, 1956.

Benedict, Ruth B. Onset and early course of essential hypertension. J. chron. Dis., 1956, 4, 221-230.

Berliner, K., Fujiy, H., Ho Lee, D., Yildiz, M., & Garnier, B. The accuracy of blood pressure determination: A comparison of direct and indirect measurement. Cardiologia, 1960, 37, 118-128.

Brod, J. Essential hypertension: Haemodynamic observations with a bearing on its pathogenesis. Lancet, 1960, 2, 773-778.

Brower, D. The relation between certain Rorschach factors and cardiovascular activity before and after visuo-motor conflict. J. gen. Psychol., 1947a, 37, 93-95.

Brower, D. The relations between Minnesota Multiphasic Personality Inventory scores and cardiovascular measures before and after experimentally induced visuo-motor conflict. J. soc. Psychol., 1947b, 26, 55-60.

Buss, A. H. The psychology of aggression. New York: Wiley, 1961.

Cannon, W. B. The wisdom of the body. New York: Norton, 1932.

Cattell, R. B. The Sixteen PersonAlity Factor questionnaire. IPAT, 1602 Coronado Drive, Champaign, Ill.: Rev. ed., 1957.

Cattell, R. B., & Scheier, I. H. Extension of meaning of objective test personality factors: Especially into anxiety, neuroticism, questionnaire, and physical factors. J. gen. Psychol., 1959, 61, 287-315.

Cranston, R. W., Chalmers, J. H., Taylor, H. L., Henschel, A., & Keys, A. Effect of a psychiatric interview on the blood pressure response to cold stimuli. Federation Proceedings, 1949, 8, 30.

Darrow, C. W. Differences in the physiological reactions to sensory and ideational stimuli. Psychol. Bull., 1929, 26, 185-201.

Doyle, A. E., & Fraser, J. R. E. Essential hypertension and inheritance of vascular reactivity. Lancet, 1961, 2, 509-511.

Dreger, R. M., & Sweetland, A. Traits of fatherhood as revealed by the factor analysis of parent attitude scales. J. gen. Psychol., 1960, 96, 183-187.

Droppleman, L. F., & Schaeffer, E. S. Boys' and girls' reports of maternal and paternal behavior. Paper read at Amer. Psychol. Ass., New York, August, 1961.

Engel, B. T., & Bickford, A. F. Stimulus-response and individual-response specificity in patients with essential hypertension. AMA Arch. gen. Psychiat. (in press).

Farina, A. Patterns of role dominance and conflict in parents of schizophrenic patients. J. abnorm. soc. Psychol., 1960, 61, 31-38.

Farris, E. J., Yeakel, E. H., & Medoff, H. W. Development of hypertension in emotional gray Norway rats after air blasting. Am. J. Physiol., 1945, 144, 331-341.

Fishberg, H. Hypertension and nephritis. Philadelphia: Lea & Febiger, 1939.

Funkenstein, D. H., King, S. H., & Drolette, Margaret E. The mastery of stress. Cambridge: Harvard Univ. Press, 1957.

Gardner, J. W., Mountain, G. E., & Hines, E. A., Jr. The relationship of migraine to hypertension and to hypertension headaches. Amer. J. med. Sci., 1940, 200, 50-53.

Garmezy, N., Clarke, A. R., & Stockner, Carol. Child rearing attitudes of mothers and fathers as reported by schizophrenic and normal patients. J. abnorm. soc. Psychol., 1961, 63, 176-182.

Gold, L. Mental characteristics associated with "essential" hypertension. Psychiat. Quart., 1943, 17, 364-371.

Graham, J. D. P. High blood pressure after battle. Lancet, 1945, 1, 239-240.

Gressel, G. C., Shobe, F. O., Saslow, G., DuBois, P. J., & Schroeder, H. A. Personality factors in essential hypertension. J.A.M.A., 1949, 140, 265-271.

Grimak, L. P. Reproduktsiia emotsional'nikh sostoianii para shiutista v. gipnoze. [Reproduction of emotional states of a parachutist under hypnosis.] Vop. Psikhol., 1959, 5(3), 139-142.

Gubner, R. L. Life expectancy of the young hypertensive. In A. N. Brest & J. N. Moyer (Eds.), Hypertension: Recent advances. Philadelphia: Lea & Febiger, 1961. Pp. 18-23.

Guilford, J. P. Fundamental statistics in psychology and education. New York: McGraw-Hill, 1956.

Hamilton, J. A. Psychophysiology of blood pressure: I. Personality and behavior ratings. Psychosom. Med., 1942, 4, 125-133.

Harburg, E. Covert hostility: Its social origins and relationship with overt compliance. Unpublished doctoral dissertation. University of Michigan, 1962.

Harris, R. E. Some observations on blood pressure in children. Proc. 26th Ross Pediatric Conference, 1958, 49-54.

Hathaway, S. R., & McKinley, J. C. Minnesota Multiphasic Personality Inventory manual. New York: Psychological Corp., 1951.

Hawley, M. C. Studies of blood pressure in states of excitement and depression. Arch. int. Med., 1913, 12, 526-538.

Hickam, J. B., Cargill, W. H., & Golden, A. Cardiovascular reactions to emotional stimuli. J. clin. Invest., 1948, 27, 290-298.

Hines, E. A., Jr. Range of normal blood pressures and subsequent development of hypertension. J.A.M.A., 1940a, 115, 271-274.

Hines, E. A., Jr. The significance of vascular hyperreaction as measured by the cold-pressor test. Amer. Heart J., 1940b, 19, 408-416.

Hokanson, J. E. The effects of frustration and anxiety on overt aggression. J. abnorm. soc. Psychol., 1961a, 62, 346-351.

Hokanson, J. E. Vascular and psychogalvanic effects of experimentally aroused anger. J. Pers., 1961b, 29, 30-39.

Innes, G., Millar, W. M., & Valentine, M. Emotion and blood pressure. J. ment. Sci., 1959, 105, 840-851.

Jost, H., Ruilmann, C. J., Hill, T. S., & Gulo, Martha Jo. Studies in hypertension: II, Central and autonomic nervous system reactions of hypertensive individuals to simple physical and psychologic stress situations. J. nerv. & ment. Dis., 1952, 115, 35-48.

Kaiser, H. F. Relating factors between studies based on different individuals. Mimeo. Urbana: Bureau of Educational Research, University of Illinois, July 15, 1960.

Kalis, B. L., Harris, R. E., Sokolow, M., & Carpenter, L. G., Jr. Response to psychological stress in patients with essential hypertension. Amer. Heart J., 1957, 53, 572-578.

Kaplan, S., Gottschalk, L. A., Magliocco, E. B., Rohorst, D. D., & Ross, W. D. Hostility in verbal production and hypnotic dreams of hypertensive patients. Psychosom. Med., 1961, 23, 311-322.

Klopfer, B., Ainsworth, Mary D., Klopfer, W. G., & Holt, R. R. Developments in the Rorschach technique. Yonkers-on-Hudson, N. Y.: World Book, 1954. Volume I.

Koller, E. K., & Katz, J. (Eds.) A bibliography of the world literature on blood pressure, 1920-1950. Boston: Commonwealth of Massachusetts, 1952.

Landis, C., & Gullette, Ruth. Studies of emotional reactions. III. Systolic blood pressure and inspiration-expiration ratios. J. comp. Psychol., 1925, 5, 221-253.

Landis, C., & Wiley, L. E. Changes of blood pressure and respiration during deception. J. comp. Psychol., 1926, 6, 1-19.

Langfeld, H. S. Psychological symptoms of deception. J. abnorm. Psychol., 1920-1921, 15, 319-328.

Lennard, H. L., & Glock, C. Y. Studies in hypertension: VI. Differences in the distribution of hypertension in negroes and whites: An appraisal. J. chron. Dis., 1957, 5, 186-196.

Levy, R. L., Hillman, C. C., Stroud, W. D., & White, P. D. Transient hypertension: Its significance in terms of later development of sustained hypertension and cardiovascular-renal diseases. J.A.M.A., 1944, 126, 829-833.

Levy, R. L., White, P. D., Stroud, W. D., & Hillman, C. C. Transient hypertension: The relative prognostic importance of various systolic and diastolic levels. J.A.M.A., 1945, 128, 1059-1061.

Lipkin, M. Psychosomatic factors in essential hypertension. Med. Clin. N. America. 1949, 33, 703-712.

Lovell, G. D. Physiological and motor responses to a regularly recurring sound. Psychol. Bull., 1941, 38, 715. (Abstract)

McLeod, J. Yielding as a response to cognitive imbalance. Unpublished doctoral dissertation. University of Michigan, 1962.

MacWilliams, J. A. Some applications of physiology to medicine. III. Blood pressure and heart action in sleep and dreams. Brit. med. J., 1923, 2, 1196-1200.

Maddocks, I. The influence of standard of living on blood pressure in Fiji. Circulation, 1961a, 24, 1220-1223.

Maddocks, I. Possible absence of essential hypertension in two complete Pacific island populations. Lancet, 1961b, 2, 396-399.

Malmo, R. B. Anxiety and behavioral arousal. Psychol. Rev., 1957, 64, 276-287.

Malmo, R. B., & Shagass, C. Studies of blood pressure in psychiatric patients under stress. Psychosom. Med., 1952, 14, 82-93.

Marcussen, R. M. Vascular headache experimentally induced by presentation of pertinent life experience: Modification of the course of vascular headache by alterations of situations and reactions. Res. Publ. Ass. nerv. & ment. Dis., 1950, 29, 609-614.

Marston, W. M. Systolic blood pressure symptoms of deception. J. exper. Psychol., 1917, 2, 117-163.

Matarazzo, J. D. An experimental study of aggression in the hypertensive patient. J. Pers., 1954, 22, 423-447.

Metropolitan Life Insurance Co. Mortality rates. Statistical Bull., 1962, 43 (Jan.), 8.

Miller, D. R., & Swanson, G. E. Inner conflict and defense. New York: Holt, 1960a.

Miller, D. R., & Swanson, G. E. The changing American parent. New York: Wiley, 1960b.

Miller, M. L. Blood pressure findings in relation to inhibited aggressions in psychotics. Psychosom. Med., 1939, 1, 162-172.

Milton, G. A. A factor analytic study of child rearing behaviors. Child Develpm., 1958, 29, 381-392.

Modell, A. H., & Potter, H. W. Human figure drawing of patients with arterial hypertension, peptic ulcer, and bronchial asthma. Psychosom. Med., 1949, 11, 282-292.

Monroe, R. R., Heath, R. G., Mead, R. G., Stone, R. L., & Ritter, K. A. A comparison of hypertensive and hypotensive schizophrenics. Psychosom. Med., 1961, 23, 508-519.

Morris, D. P. Blood pressure and pulse changes in normal individuals under emotional stress: Their relationship to emotional instability. Psychosom. Med., 1941, 3, 389-398.

Morrison, S. L., & Morris, J. N. Epidemiological investigations on high blood pressure without evident cause. Lancet, 1959, 2, 864-870.

Morrison, S. L., & Morris, J. N. Nature of essential hypertension. Lancet, 1960, 2, 829-832.

Moschowitz, E. Hypertension: Its significance, relation to arteriosclerosis and nephritis, and etiology. Amer. J. med. Sci., 1919, 158, 668-684.

Moses, L., Daniels, G. E., & Nickerson, J. L. Psychogenic factors in essential hypertension: Methodology and preliminary report. Psychosom. Med., 1956, 18, 471-485.

Mowrer, O. H., & Viek, P. An experimental analogue of fear from a sense of helplessness. J. abnorm. soc. Psychol., 1948, 33, 193-200.

Mussen, P., & Distler, L. Masculinity, identification, and father-son relationships. J. abnorm. soc. Psychol., 1959, 59, 350-356.

Neiberg, N. A. The effects of induced stress on the management of hostility in essential hypertension. Dissertation Abstr., 1957, 17, 1597.

O'Hare, J. P. Vascular reactions in vascular hypertension. Amer. J. med. Sci., 1920, 159, 369-380.

Osgood, C. E., Suci, G., & Tannenbaum, P. H. The measurement of meaning. Urbana, Ill.: Univ. Illinois Press, 1957.

Ostfield, A., & Lebovits, B. Z. A comparison of the effects of psychological stress in renal and essential hypertension. Psychosom. Med., 1958, 20, 414. (Abstract)

Ostfield, A., & Lebovits, B. Z. Blood pressure lability: A correlative study. J. chron. Dis., 1960, 12, 428-439.

Page, I. H. Pathogenesis of arterial hypertension. J.A.M.A., 1949, 140, 451-457.

Palmer, R. S. The significance of essential hypertension in young male adults. J.A.M.A., 1930, 94, 694-697.

Palmer, R. S. The factor of mental stress in essential hypertension. New England J. Med., 1937, 216, 689-693.

Palmer, R. S. Psyche and blood pressure. J.A.M.A., 1950, 144, 295-298.

Pfeiffer, J. B., Jr., & Wolff, H. G. Studies in renal circulation during periods of life stress and accompanying emotional reactions in subjects with and without essential hypertension: Observations on the role of neural activity in the regulation of renal blood flow. Res. Publ. Ass. nerv. & ment. Dis., 1950, 29, 929-953.

Pickering, G. W. The genetic factor in essential hypertension. Ann. int. Med., 1955, 43, 457-464.

Platt, R. Severe hypertension in young persons; A study of 50 cases. Quart. J. Med., 1948, 41, 83-93.

Reiser, M. F., Brust, A. A., & Ferris, E. B. Life situations, emotions, and the course of patients with arterial hypertension. Psychosom. Med., 1951, 13, 133-139.

Reiser, M. F., Brust, A. A., Shapiro, A. P., Baker, H. M., Ranschoff, W., & Ferris, E. B. Life situations, emotions and the course of patients with arterial hypertension. Res. Publ. Ass. nerv. & ment. Dis., 1950, 29, 870-880.

Reiser, M. F., Rosenbaum, M., & Ferris, E. B. Psychologic mechanisms in malignant hypertension. Psychosom. Med., 1951, 13, 148-159.

Remington, R. D., Lamberth, B., Moser, M., & Hoobler, S. W. Circulatory reactions of normotensive and hypertensive subjects and of the children of normal and hypertensive parents. Amer. Heart J., 1960, 59, 58-70.

Robbins, L. L. Psychological factors in essential hypertension. Bull. Menninger Clin., 1948, 12, 195-202.

Robbins, S. D. A plethysmographic study of shock and stammering. Amer. J. Physiol., 1919, 48, 285-331.

Robinson, J. D. A study of the relationship between blood pressure and certain aspects of personality. Bull. Brit. psychol. Soc., 1959, 37, 5A. (Abstract)

Roff, M. A factorial study of the Fels parent behavior scales. Child Develpm., 1949, 20, 29-45.

Rushmer, R. F. Circulatory effects of three modifications of the Valsalva experiment. Amer. Heart J., 1947, 34, 399-418.

Ruskin, A., Beard, O. W., Schaffer, R. L. Blast hypertension: Elevated arterial pressure and victims of the Texas City disaster. Amer. J. Med., 1948, 4, 228-236.

Saul, L. A. Hostility in cases of essential hypertension. Psychosom. Med., 1939, 1, 153-161.

Saul, L. A., Sheppard, Edith, Selby, Dorothy, Lhamon, W., Sachs, D., & Master, Regina. The quantification of

hostility in dreams with references to essential hypertension. Science, 1954, 119, 382-383.

Schulze, V. E., & Schwab, E. H. Arteriolar hypertension in the American negro. Amer. Heart J., 1936, 11, 66-74.

Schachter, J. Pain, fear, and anger in hypertensive and normotensives. Psychosom. Med., 1957, 19, 17-29.

Schaeffer, E. S. Multivariate measurement and factorial structure of children's perceptions of maternal and paternal behavior. Paper read at Amer. Psychol. Ass., New York, August, 1961.

Sears, R. R., Maccoby, Eleanor E., & Levin, H. Patterns of child rearing. Evanston, Ill.: Row, Peterson, 1957.

Selye, H. On the production of malignant hypertension by chronic exposure to various damaging agents. Rev. Canad. de Biol., 1943, 2, 501-505.

Sewell, W. H., Mussen, P. H., & Harris, C. W. Relationships among child training practices. Amer. soc. Rev., 1955, 20, 137-148.

Shapiro, A. P. Psychophysiologic mechanisms in hypertensive vascular disease. Ann. int. Med., 1950, 53, 64-83.

Shapiro, A. P. An experimental study of comparative responses of blood pressure to different noxious stimuli. J. chron. Dis., 1961, 13, 293-311.

Shapiro, A. P., & Horn, P. W. Blood pressure, plasma pepsinogen, and behavior in cats subjected to experimental production of anxiety. J. nerv. & ment. Dis., 1955, 122, 222-231.

Shapiro, A. P., & Melhado, J. Observations on blood pressure and other physiologic and biochemical mechanisms in rats with behavioral disturbances. Psychosom. Med., 1958, 20, 303-313.

Shreenivas, M. B. B. S. Blood pressure - normal range. Indian Heart J., 1951, 3, 22-26.

Simonson, E., & Brozek, J. Review--Russian research on arterial hypertension. Ann. int. Med., 1959, 50, 129-193.

Solomon, A. P., Darrow, C. W., & Blaurock, M. Blood pressure and palmar sweat (galvanic) responses of psychotic patients before and after insulin and metrazol therapy. Psychosom. Med., 1939, 1, 118-137.

Steiglitz, E. J. Emotional hypertension. Amer. J. med. Sci., 1930, 179, 175-182.

Steinman, B., Jaggi, U., & Widmer, J. Uber den einflub von gerauschen und larm auf den blutdruck des menschen. Cardiologia, 1955, 27, 233-239.

Steinman, B., Rickenbach, K., & Gianoli, A. Uber das verhalten der blutdruckwellen beim normalen und erhohten arteriellen druck. Cardiologia, 1953, 23, 154-167.

Stevenson, I. P., Duncan, C. H., Flynn, J. T., & Wolf, S. Hypertension as a reaction pattern to stress: Correlation of circulatory hemodynamics with changes of attitude and emotional state. Amer. J. med. Sci., 1952, 224, 286-299.

Storment, Charlyne, Townsend. Personality and heart disease. Psychosom. Med., 1951, 13, 304-313.

Thacker, E. A. A comparative study of normal and abnormal blood pressures among university students, including the cold pressor test. Amer. Heart J., 1940, 20, 89-97.

Thomas, Caroline Bedell. Characteristics of smokers compared with nonsmokers in a population of healthy young adults, including observations on family history, blood pressure, heart rate, body weight, cholesterol and certain psychologic traits. Ann. int. Med., 1960, 53, 697-718.

Thomas, Caroline Bedell. The precursors of hypertension. In I. G. Page (ed.), Hypertension and its treatment. Med. Clin. N. Amer., 1961, 45, 259-270. Philadelphia: Saunders.

Thurrell, R. J., Greenfield, N. W., & Roessler, R. The prediction of physiological responsivity from psychological responsivity. J. psychosom. Res., 1961, 5, 211-214.

Tichener, J. L., Sheldon, M. B., & Ross, W. D. Changes in blood pressure of hypertensive patients with and without group psychotherapy. J. psychosom. Res., 1959, 4, 10-12.

Vancura, A. On transient hypertension in young subjects. Cardiologia, 1950, 16, 124-128.

Weiss, E. Recent advances in the pathogenesis and treatment of hypertension: A review. Psychosom. Med., 1939, 1, 180-188.

White, B. V., Jr., & Gildea, E. F. "Cold pressor test" in tension and anxiety: A cardiochronographic study. Arch. Neurol. & Psychiat., 1937, 38, 914-945.

Windesheim, J. H., Roth, Grace M., & Hines, E. A., Jr. Direct arterial study of the blood pressure response to cold of normotensive subjects and patients with essential hypertension before and during treatment with various hypertensive drugs. Circulation, 1955, 11, 878-888.

Wolf, S. Psychosomatic aspects of hypertension. Med. Clin. N. America, 1961, 45, 339-345.

Wolf, S., Pfeiffer, J. B., Ripley, H. S., Winter, O. S., & Wolff, H. G. Hypertension as a reaction pattern to stress: Summary of experimental data on variations in blood pressure and renal blood flow. Ann. int. Med., 1948, 29, 1056-1076.

Wolf, S., & Shepard, E. M. An appraisal of factors that evoke and modify the hypertensive reaction pattern. Res. Publ. Ass. nerv. & ment. Dis., 1950, 29, 976-984.

Wyss, D. Die psychotherapie der juvenilen hypertonie. Deutsch Med. Woch., 1955, 80, 822-826.

Yeakel, Eleanor H., Shenkin, H. A., Rothballer, A. B., & McCann, S. M. Blood pressure of rats subjected to auditory stimulation. Amer. J. Physiol., 1948, 155, 118-127.