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# ADHERING TO MEDICAL REGIMENS:

*Experiments in Patient Education  
and Social Support*

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## Chapter 1

### OVERVIEW OF THE FINDINGS AND THEIR ROLE IN APPLICATION

#### A Problem

The Veterans Cooperative Studies on Antihypertensive Drugs (1967, 1970, 1972) demonstrated that among perfectly adherent patients, medication could produce an impressive drop in blood pressure and could reduce the incidence of morbid events associated with uncontrolled high blood pressure. Yet the Veterans Administration studies had won only part of the battle against hypertension.

We know that only part of the battle was won because it is estimated that only half the people receiving treatment for high blood pressure in the United States are under effective control (Intersociety Commission for Heart Disease Resources, 1970). Although the reasons for this lack of control are not documented, surely a large percentage of these persons are not maintaining prescribed regimens.

#### Purpose of the Study

This book describes a pilot effort to identify factors which determine why these patients do or do not adhere to their regimens.

In order to study adherence, several goals were set: (1) review the literature to develop a theoretical framework for guiding our research; (2) develop measures to assess the effects of potential predictors of adherence on adherence behavior; (3) examine the relationships among patient perceptions of the nature of the regimen, the health care environment, other environments of the patient, self-perceptions of competence, psychological well-being, and indicators of adherence (such as change in blood pressure);

and (4) develop and test a program of patient education and social support as an experimental test of methods for improving adherence to antihypertensive regimens.

This chapter presents an overview of the study. The results are summarized, and some implications of the findings for future research and for application are discussed. Chapter 2 presents a review of the literature on adherence and the model which guided the research. Chapter 3 describes the sample and methodology of the study. The results are presented in detail in Chapters 4, 5, and 6. Chapter 4 presents the main effects or first order relationships. Chapter 5 presents analyses of interaction effects. Chapter 6 concludes with a comparison of three patient groups. One of these groups received patient education intended to emphasize social emotional support as well as factual information about health care for high blood pressure. A second of these groups received patient education intended to emphasize only factual information. Both of these groups were run by nurse clinicians. The instructional procedures used are detailed in Appendices C and D. The third group received no treatment other than that regularly provided to patients as part of their routine care for high blood pressure.

The literature indicates that there may be a number of social-psychological factors which may determine the extent to which a person is able to strictly follow a physician's recommendations. These candidates for study include the patient's motivation to adhere (versus competing motivations which draw the person away from adherence), belief's in one's self-competence to adhere, and the amount of emotional strain the patient experiences. The demand nature of the regimen, or its difficulty, and patient knowledge of the regimen are also expected to be determinants of adherence.

Social support also receives much attention in the literature. The lack of such support has been found to consistently predict dropping out of treatment for psychiatric illness, alcoholism, and high blood pressure. Social support is also expected to affect many of the parameters mentioned in the preceding paragraph. Support in the form of encouragement, reassurance, and help may increase the patient's self-competence and motivation to adhere. Stress generated by the demands of the regimen and by demands

from other areas of life may have its effects on emotional and psychosomatic strains buffered by the presence of such support. Chapter 2 attempts to define many of these variables, state hypotheses regarding their interrelationships, and link the total set of variables together in a single model. Each factor is hypothesized to be necessary but not sufficient to produce adherence.

### Methods

Ambulatory patients with high blood pressure ( $\geq 140/90$  mm Hg) in site treatment up to a year were studied. All patients had no other serious diseases (such as terminal cancer or psychosis). Cross-sectional self-administered survey questionnaire data were obtained on a pool of 200 patients. Seventy of these patients also were part of a longitudinal sample of 6-8 weeks duration.

Chapter 3 describes the statistical procedures for building the survey instruments and the reliabilities of the measures. The characteristics of the sample, including participants and persons dropping out of the study, are also described. Overall, there were few significant differences between patients asked to participate who did so and those who declined to do so. On the other hand, there was a slight tendency for patients who remained in the longitudinal sample to be more adherent than those who completed only the initial questionnaire.

A pretest-posttest design was used to compare the social support, information or lecture, and standard treatment or "control" groups. Chapters 3, 4, and 6 describe the methodologies used in the analyses of longitudinal data obtained with this design.

### The Findings

#### *The Main Effects*

Figure 1-1 summarizes what we believe to be the best picture of predictors of adherence derivable from the findings of this study. The figure is in many ways a simplification of a very complex set of findings and should be thought of as (1) a guide for the health care practitioner who wants some educated guesses, and (2) hypotheses for the researcher who wishes to further study

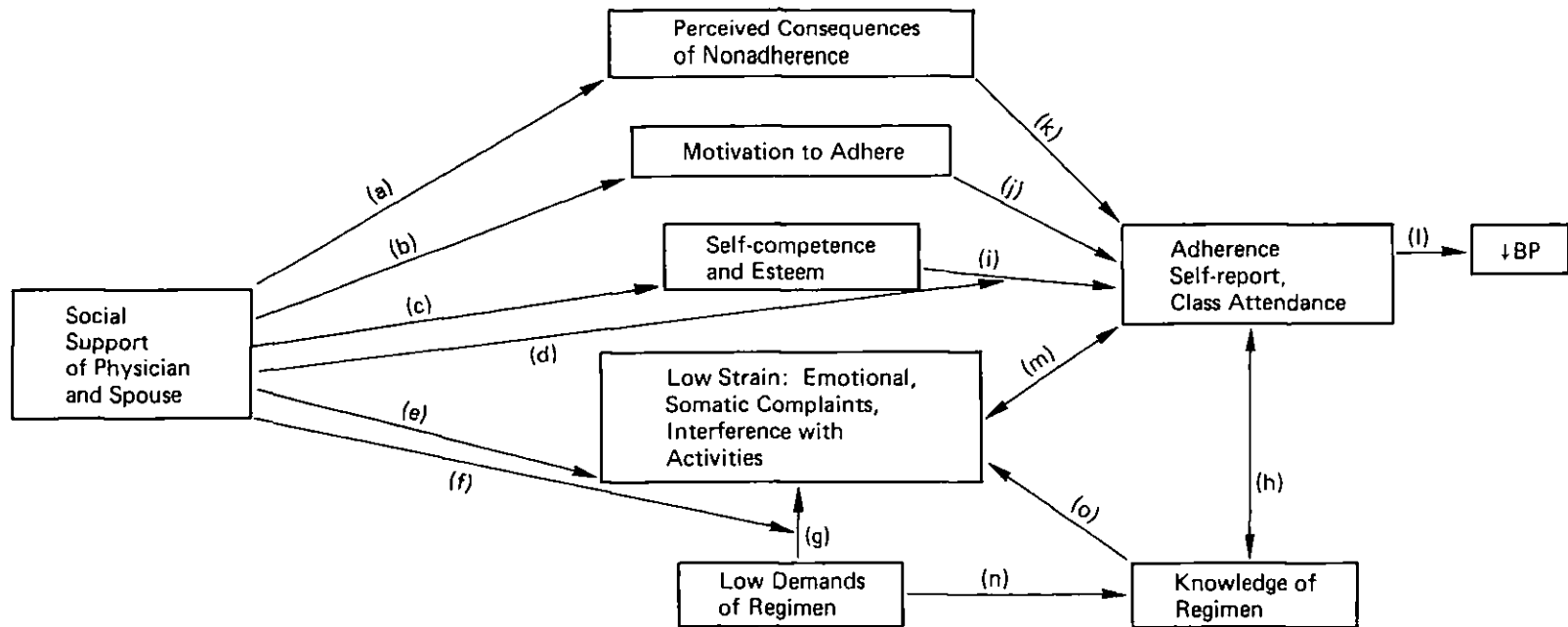


Figure 1-1. Simplified interpretation of the relationships among variables in the study of adherence. Arrows indicate probable causal paths. Where arrows intersect, the effect of the intersected arrow is hypothesized to be enhanced by the value of intersecting arrow.



these matters. The arrows are labeled by letters for reference to the text.

The analyses showed three types of variables which were directly associated with levels of blood pressure.

1. The more adherent the patients were according to their self-reports, the lower their blood pressures (l). This provides evidence of the predictive validity of the self-report measures of adherence. Not all self-report measures were equally predictive, however, so further development of such measures will be required.

2. Patients who had the most accurate knowledge of their regimens also had the lowest blood pressures. In fact, knowledge of one's regimen seemed to be more important than general knowledge about the nature of high blood pressure and its control. This suggests that given a choice between teaching either type of knowledge, the former would be more important.

3. Patients who perceived the consequences of nonadherence as most serious were the most likely to have low levels of blood pressure.

The ways in which each of these three types of parameters might affect blood pressure did not necessarily appear to be the same. Although it seems obvious that adherence would directly affect levels of blood pressure, knowledge of regimen and perceived seriousness of nonadherence should have indirect effects. The findings suggest that knowledge may have its effects by reducing psychological strains, particularly somatic complaints (o), and by ensuring that adherence is carried out correctly (h). The data suggest the perceived consequences of nonadherence have effects on blood pressure by promoting adherence (k). The more adherent patients were the ones who believed that nonadherence would have the most serious consequences for their health.

The analyses also linked a number of other variables in the hypothesized model (see Chapter 2) of adherence with one another. Persons with complex regimen demands were less likely to have accurate knowledge of what they were supposed to do as part of their regimen (n). They were also more likely to experience a variety of psychological strains including interference with normal activities (g). It remains for future studies, however, to develop measures of these psychological strains which reflect

unique responses to psychological stress and unique responses to side-effects of the medications. Then the contributions of both the effects of stress and medication can be separated and studied independently.

Self-reported adherence, as already noted, was associated with both low levels of blood pressure and with perceived consequences of nonadherence. More adherent patients were also less likely to experience psychological strains such as somatic complaints, anxiety, depression, and anger-irritation, and were less likely to report that their high blood pressure was interfering with the normal pursuit of their daily activities (m). The more adherent patients were also more likely to have high self-competence or high self-esteem (i). They were the patients who attended the greatest percentage of classes as part of the field experiment. Percentage of classes attended was directly associated with the amount of information the patient knew about high blood pressure and the regimen and with low levels of psychological and psychosomatic strain. Cause and effect for the latter relationship may work in both directions.

The role of social support was a major focus of this study. Social support from the spouse was associated with low levels of depression (e). Social support from other sources had no such effect. On the other hand, social support from the spouse and physician tended to be highest for patients who were highly motivated to adhere (b), and social support from the physician was an important correlate of perceived consequences of nonadherence (a). Social support from one source was not always substitutable for social support from other sources.

Despite the fact that so many of these variables were linked to one another in both statistically and theoretically significant ways, there are still gaps in the data which will require much further study through the use of better measures and through more complex analyses. Many of the variables in Figure 1-1, although linked to one another, showed no direct link to either adherence or level of blood pressure. In part this pattern of results may be due to the weak first-order relationships among many of the variables and to the insensitivity of many of the measures, many of which were used in research for the first time and have serious

scaling problems which need to be overcome. (These issues are discussed in Chapter 3 on methodology.)

There is some hope, however, that more complex hypotheses reflecting more than simple additive relationships are the key to uncovering further links among the variables. The next section summarizes results of some exploratory analyses of this type.

### *Conditioning Analyses*

The failure to demonstrate any direct link between social support, or knowledge, or some of the other variables, and adherence is not necessarily a contradiction of the theories and hypotheses presented in Chapter 2. There it is argued that many of these variables are necessary but not sufficient conditions for adherence. For example, social support might not lead to adherence by itself but it might encourage a patient who felt competent to meet demands of the regimen to take the first step. Consequently social support might enhance the effect of other causes of adherence.

The pilot analyses reported on in Chapter 5 indicate that such multivariate relationships are plausible and may perhaps provide a better picture of the conditions under which variables such as those presented in Figure 1-1 are related to one another. For example, demands of the regimen, although directly related to reports of high blood pressure interfering with the pursuit of normal activities, showed complex relationships to interference when a number of other parameters were considered. The link between demands of the regimen and perceived interference was likely to be strongest when the patient also had many competing motives. The positive association between regimen demands and interference with normal activities was likely to be buffered or obliterated when the patient had accurate knowledge of the regimen. Such knowledge apparently helped patients cope with the demands of their regimens. Patients who reported the least amount of interference with activities had both the least demanding regimens and social support from either the spouse or the physician (f). For persons with high social support of the spouse and high demands of the regimen, however, interference was clearly the highest. Either the support for these persons was overnurturant or the high

interference with activity for persons with complex regimens was eliciting high levels of social support. The interpretation of such findings will require additional longitudinal studies which further examine conditions under which support can be harmful or helpful.

Pilot analyses also examined the relationship between self-esteem and adherence, two variables which, by themselves, were positively correlated. When both self-esteem was high and social support from physician or spouse was high, adherence reached the highest levels. High self-esteem without social support, however, was associated with the lowest levels of reported adherence (d). This suggests that patients who feel competent still need to have someone around who appreciates and praises their efforts.

#### *The Field Experiment*

In an attempt to demonstrate the potential value of social support we instituted a special patient education program described in Appendix C. When this program was compared with a lecture format and with a control group of patients who had only the normal services of their health care systems, these findings appeared: First, there were many similarities in the apparent changes in patient attitudes and knowledge among both the social support and the lecture groups. These similarities showed both groups to be superior to the control group. The social support and lecture patients showed relative gains in knowledge about health care, increases in reported ability to take care of their health, higher motivation to adhere, more serious attitudes about the health consequences of nonadherence, and greater levels of self-reported adherence.

The social support and lecture groups also had higher scores on social support than the control patients. This suggests that the lecture group was run more supportively than we would have liked, or at least was perceived that way by patients. As noted in Chapter 6, taped recordings of some of the lecture sessions revealed that there was a good deal of social support present in them. A less ambiguous test of the effects of "information only" might have to be limited to exposing patients to a videotaped presentation. The videotape would have restricted social inter-

action among the patients and between the patients and the nurse. We may at least conclude that the social support program was superior to the control condition in producing all of the above differences.

We then compared changes in mean blood pressure as a function of the experimental condition. There were no differences in the mean amount of change in blood pressure level among the three groups between pre- and posttest although the sample as a whole showed a significant drop in systolic and diastolic blood pressures. Subsequent analyses by Flowers\*, however, showed that there were differences using categorically designated cutpoints to describe controlled and uncontrolled blood pressure. Patients in the social support group were more likely than patients in the lecture or control groups to gain or maintain a clinically controlled blood pressure.

#### *Long Term Effects*

Short term experiments such as this can only demonstrate what may and may not be important determinants of adherence for the span of time under study. Adherence for controlling blood pressure, however, must be life long. Consequently in order to think about a realistic application of a patient support system, one must consider mechanisms which will reinforce patient adherence for the rest of the patient's life. Obviously one cannot expect patients to attend classes every week for such a period nor would anyone be able to come up with enough material to sustain either the patient's or the educator's interest for that long.

We attempted on an informal basis to get some idea of how follow-up social support systems for patients might work. For three of the social support groups we scheduled a two month follow-up. In two out of three cases patients volunteered their

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\*R.V. Flowers, R.D. Caplan, R.V. Harrison, and J.R.P. French, Jr., "Can Both Categorical and Continuous Measurement of Blood Pressure Be Used in Research Designs? An Empirical Text," paper presented at the National Conference on High Blood Pressure Control Washington, D.C., April 1977.

homes, and in the third case the follow-up was held at the clinic in one of the meeting rooms used for the classes.

The follow-up scheduled at the clinic was basically a failure. Only one patient showed up. Although the choice of an afternoon hour might have been the problem this seems unlikely since this group met for its sessions during this same time period two months earlier. The follow-ups scheduled in the evenings at patients' homes had far better attendance.

The meetings at the patients' homes had somewhat of a social atmosphere to them. The patients brought hors d'oeuvres which were low in sodium and saturated fats, and they shared their experiences in adhering during the preceding months. These patients generally felt that the get-togethers were good for their morale because the gatherings provided social reinforcement for adhering which was not as easily available when the patients were surrounded by their everyday, predominantly normotensive acquaintances. One woman, the wife of a patient, volunteered to start a newsletter to keep people in touch. We could envision the potential makings of a voluntary organization similar to Alcoholics Anonymous.

It may well be that a voluntary organization, run by well-motivated people, would be an efficient and effective way of allowing patients to receive as little or as much continued support for their adherence as they liked. The use of "community-based" programs of health care is a popular theme at health care conferences these days. A Down With High Blood Pressure Club run by patients might be one type of community-based program if it drew its resources and energy from the patients themselves.

#### Looking Towards the Future

Hopefully this study and other studies will demonstrate (1) that some progress is being made in the area of health care research and (2) that the progress, in part, has been made by discovering that the answers may be a bit more complex than current health education practices would suggest. So a primary recommendation must be that further research needs to be pursued.

Although research-oriented organizations may have a primary commitment to the development of more sensitive, reliable, and

valid measures of adherence and its predictors, health care systems cannot always be expected to devote the time required to such an effort. On the other hand, health care systems do have the patients with high blood pressure, the personnel with technical competence in health care delivery (physicians, nurses), and a need to increase the quality of health care and to reduce costly strokes and coronary accidents that might be precipitated by patient nonadherence. Accordingly, continued teamwork between research-oriented organizations and health care delivery systems seems highly advisable. This is a type of evaluation research, in which both the research organization and the health care system can share overlapping interests and derive overlapping benefits.

In order to develop some good techniques for patient education, some cyclical process of application and evaluation appears to be required. This cycle should start off with some ideas for a new procedure, then the development of measurement instruments to assess the quality of the procedure, and then trials bracketed by baseline and posttest measures. Finally there needs to be a careful evaluation of the results, followed by further improvement of the measures and of the procedures, starting up a new cycle and continuing for as many cycles as may be required. The current project, as an example, has practically completed one such cycle, and we cannot fully realize the benefit of this first cycle until we apply what we have learned in a next stage of research.

Many hospitals and clinics may have serious questions about the extent to which they can really benefit from such cooperative programs of research. We can only report the current state of affairs with regard to this project. It entered into a cooperative agreement with the participating clinics. In exchange for cooperation, the project was able, through funding arrangements in the grant, to pay for special nurse clinicians to run the groups. The nurses helped generate the designs for the social support groups and lectures, received counseling and advice on how to run the groups, and essentially received further specialized training as a benefit of the research program. Now that the study has formally ended one of these nurses is running patient education groups as a permanent member of the clinic staff. The other

nurses have nurse-clinician positions in which they can use these skills. These personnel are providing services which are now fully funded by the revenues of the clinics which they serve.

Future research efforts may be more or less beneficial for all involved parties than this one. There are no guarantees--except that the welfare of the patient not be compromised. In order to continue such research, all parties (excepting the patient) must be willing to adopt the spirit of scientific inquiry and to thereby incur the risk of being wrong as well as the probability of being right. In our view, this is the only spirit by which health care education for patients can be pursued productively.

### Some Suggestions for Health Care Practitioners

Practitioners need information in improving patient adherence with high blood pressure regimens now. Yet, the normal inclination of the virtuous scientist is to call for delay in drawing any firm conclusions, at least until all the methodological and theoretical issues have been resolved (something which may take, say, 2 to 20 years). Rather than tell the practitioner to wait some more "until all the data is in," we would like to help by offering a set of recommendations for improving patient adherence that are based on two sources: (1) the research of others which is reviewed in Chapter 2, and (2) our findings from this study. We offer these recommendations as the most likely directions, as of now, for improving patient adherence.

1. Social-emotional support may increase the patients' motivation to adhere. The patient who lacks such support from a practitioner (or from a spouse), may end up reasoning, "If my doctor (spouse, et cetera), does not think I am important and worth listening to, why should I think I am important? Why should I care enough about myself to care about my health?"

Social-emotional support may enhance the self-competence of your patients and allay their fears and anxieties. Many people experience anxieties when they find they have a life-threatening illness. They worry about questions such as, "Am I going to be all right? Can I handle the situation capably? Will anyone here



help me understand how I feel?" A practitioner's silence about these concerns may leave the concerns as unsolved questions in the patient's mind, where they may interfere with the rational handling of the regimen. If the patient does not bring up these questions, it may be necessary to bring them up for the patient so that they can be confronted and dealt with openly.

Our own findings suggest that in some conditions social support may be viewed as stressful by the patient, so a word of caution is in order. The findings suggest that patients should not be given more support than they can tolerate because some patients may feel that their autonomy is being threatened. A friendly, encouraging attitude, plus a willingness to listen, must be oriented towards avoiding this type of threat if social support is to increase patient self-sufficiency.

Finally organizing the clinic so that the patient sees the same practitioner each time may improve both the practitioner's ability to provide social support and the patient's ability to receive it. It is very difficult to provide social support to a patient when you have little opportunity to follow-up with the same patient. Similarly, the patient who sees a different practitioner every time must waste valuable visiting time reassessing the nature of the new practitioner and deciding whether or not the elements of a trusting relationship are present. Practitioner continuity in care can be beneficial to all parties.

2. View patients as persons with competing sets of motives and demands. Each of us knows that there are other desirable goals in life besides maintaining blood pressure within some normal range. When a patient decides whether or not to pursue health care, the patient considers the value of spending resources, like time (spent in the waiting room, for example), on health care or on other competing needs. The patient, like all of us, probably engages in some type of cost-benefit analysis, either consciously or unconsciously. The larger the costs of adherence appear, the more likely the patient is to feel that the same expenditure of time and effort will produce greater benefits in pursuing other goals. Whether or not the practitioner agrees with the patient's cost-benefit analysis is quite irrelevant. The patient has his or her own private rationale and particular

perspective. It is important to understand and accept that perspective in order to determine just how much each particular patient will tolerate in the way of resource expenditure before the patient decides that a longer life is not worth the costs in other life areas. This suggestion brings us to the next point.

3. Make the regimen as simple as possible. Patients who are given regimens which overload them may simply decide to follow none of the regimen rather than do what they can. One cannot predict such responses. Consequently, it may be helpful to give the patient a small bit of the total regimen at a time, if this is possible. One can then gradually add on other aspects of the regimen as the patient demonstrates an ability to cope with what already was prescribed. If one considers return appointments part of the total set of items in a patient's regimen, then efforts should be made to simplify this aspect of the regimen too. Accordingly, the patient's return visit should be scheduled and set up by the practitioner and not left as an added responsibility of the patient.

4. Test to be sure the patient understands the particular regimen, how it works, and what side effects should be reported. Although this might seem like another dry suggestion about the importance of patient education, it really involves some very interesting and complicated psychological issues. The first issue is that there is a human tendency for all of us to assume that if we tell people to do something, they will (1) understand us and (2) do it. There is now ample evidence to show that if you tell patients what the regimen is, they may (1) misunderstand you and (2) follow the instructions improperly. Consequently we suggest that you think about patient education as improving the relationship between what you tell the patient and what the patient retains.

The second issue is that humans, in general, learn best when they have a low to moderate amount of anxiety; research suggests that very high levels of anxiety are associated with low levels of learning (Montague, 1953). If a visit to a health practitioner produces high anxiety, we should expect that patients will have a difficult time listening accurately to health care information given to during a clinic visit. The challenge for practitioners

is to reduce the patient's anxiety to a level where learning is likely to be optimal. Obviously this is both an art and a skill. Just having patients talk about how they feel may be a useful way of lowering the patients' anxieties. Efforts to make the patients feel at ease and comfortable can also be effective. Obviously these are just a few of the counseling techniques that might prove effective.

As for testing what the patient knows, the simplest means is to have the patient repeat the regimen back to you until you are satisfied with the quality of the instruction. This is a good way of finding out how well you communicate things to your patients. The method is also a type of "programmed learning" technique for helping you sharpen your own instructional skills. As you get better in patient instruction techniques, you will find patients making fewer errors in repeating to you what you have told them, and you will spend less time correcting their misunderstandings. As we pointed out, patient education is a complex, but interesting, psychological problem for both the practitioner and the patient.

5. Measure your degree of success. Many physicians have a pretty realistic idea of how difficult it is to get patients to adhere. Other physicians, however, do not show this awareness. If one ignores all patients who dropped out of treatment, and thinks of only of the patients who stayed in treatment over the years, as some of these latter physicians do, then it is easy to be fooled into thinking that one is always successful in getting patients to adhere. Consequently, to provide yourself with a realistic sense of your success in obtaining patient adherence, it is important to accurately measure your success and to review these measures periodically, perhaps every six months.

Clearly it would be difficult to measure the number of years you added on to the lives of hypertensive patients or the complications which you prevented by getting your patients to adhere (although tables are available to make estimates). One has to choose to measure those things, accordingly, which are reasonably practical to measure and which do not overly interfere with the practice of health care. For example, you might keep track of the percent of appointments patients keep and miss for each six month period as an indicator of how well you are doing in moti-

vating your patients to take care of themselves. There are other data of this sort which could be easily tallied as well -- such as the percent of patients who gained more than ten pounds, lost more than ten pounds, or kept a constant weight during the six month period.

In Chapter 2 we note that patients need specific goals ("I will lose three pounds in the next twenty days by not eating fatty foods") rather than vague goals ("I will lose weight"). As a practitioner you should also attempt to set specific rather than vague goals for your own practice. "By showing interest in each patient's emotional concerns, I will see if I can reduce the percent of missed appointments by twenty percent in the next six months" would be a far better goal to strive for than vague goals, such as "I will cut down on missed appointments" or "I will be more supportive of my patients." A well-specified goal allows you to examine some explicit criteria (of your own choosing) rather than depending on the extent to which you "feel" you are doing a better job.

Physicians tell us that acute diseases are more rewarding to treat than chronic diseases because of the concrete sense of accomplishment provided by performing such treatment. With the treatment of chronic diseases, however, the patient never becomes quite well and the health care practitioner does not derive quite the same sense of accomplishment. For these reasons, we believe that ways of creating a sense of accomplishment in chronic health care need to be considered. As a general strategy, we suggest measuring overall aspects of your health care delivery which are related to the behavior of your chronic patients. Measures on the total set of patients with chronic illness should be considered in place of measures of your clinical success with each individual patient. For example, percent of kept appointments in your practice, percent of patients who show an improvement in mental attitude (less anxious, more confident) about their health even if they remain at risk of coronary heart disease, mean change in blood pressure for your total practice, and so on, can be worth measuring, so some sense of progress (or need for progress) can be perceived.

Measuring one's own success is extremely important. The

feedback that can be obtained from such self-measurement can become a source of stimulation for continued professional growth throughout one's career, as well as a reward for caring about others so that they will care about themselves.

## Chapter 2

### THEORETICAL MODELS OF ADHERENCE

Our efforts have been guided by previous theories and research on health behavior, by the reactions and suggestions of the patients participating in the study, by practical considerations at each health care site, and by our past experiences and assumptions about human behavior. This chapter presents the literature and theory as well as some of our assumptions that guided the study.

#### Integrating Previous Studies--The Search for a Model

Although human behavior has multiple determinants, the practical limitations of research usually confine a study to the examination of only one or two determinants at a time. All other determinants are usually ignored or else they are controlled, such as by randomization, so that they have no effect on the behavior being studied. The result of such procedures is as follows: (1) these studies have high internal validity but little generalization to health care settings where all determinants are in operation simultaneously, and (2) the resulting, published literature is a collection of largely unintegrated findings about single determinants of adherence behavior.

Consequently a review of the literature is much like an anthropological examination of artifacts at a dig. There are a lot of bones but the picture of the skeleton remains evasive. Very often people are quite successful in cataloging the findings from these reviews of the literature on adherence (e.g., Haynes and Sackett, 1974). Nevertheless few persons have attempted to guess at the shape of the total model of adherence on the basis of such

catalogues (for exceptions see Rosenstock, 1966; Kasl & Cobb, 1966; Becker, Drachman, & Kirscht, 1974).

The model that follows is, like previous models, based on studies of adherence and related behaviors in a disparate literature. We will be able to test some hypotheses suggested by the model. Although some hypotheses cannot be tested with our data base they are included because they represent assumptions that have guided us in the design of the study and its educational programs for patients or because they should be considered more comprehensive than this one.

#### A Model of the Determinants of Adherence and Its Effect on Blood Pressure

Figures 2-1 to 2-3 present successively elaborated versions of the model that guided the research project. These models also provide a framework for systematically reviewing the literature believed to support various hypotheses.

Figure 2-1 represents five major types of variables in the study. Before examining this figure and the others that follow, a number of conventions should be noted so that the format of the figures can be easily followed. First, an arrow between two boxes indicates a hypothesized causal relationship between a predictor and a dependent variable. Along each such arrow in parentheses is a letter. The alphabetic notation is for convenience in referring from the text to the figures. Except where otherwise noted, all arrows depict positive relationships.

The following presentation of the model starts by considering the dependent variables, that is, our major goals of adherence and the lowering of blood pressure, and proceeds backwards toward their respective predictors. Consequently, each goal will always be identified before considering the paths to that goal. Figure 2-1 will be elaborated by the subsequent addition of other predictors of adherence in Figures 2-2 and 2-3.

In examining the models that follow, the reader may well find additional arrows that could be drawn from one variable to another. In fact many of the hypothesized relationships may operate in both directions. The models attempt only to present the most likely or plausible hypotheses in predicting to adherence in an attempt to

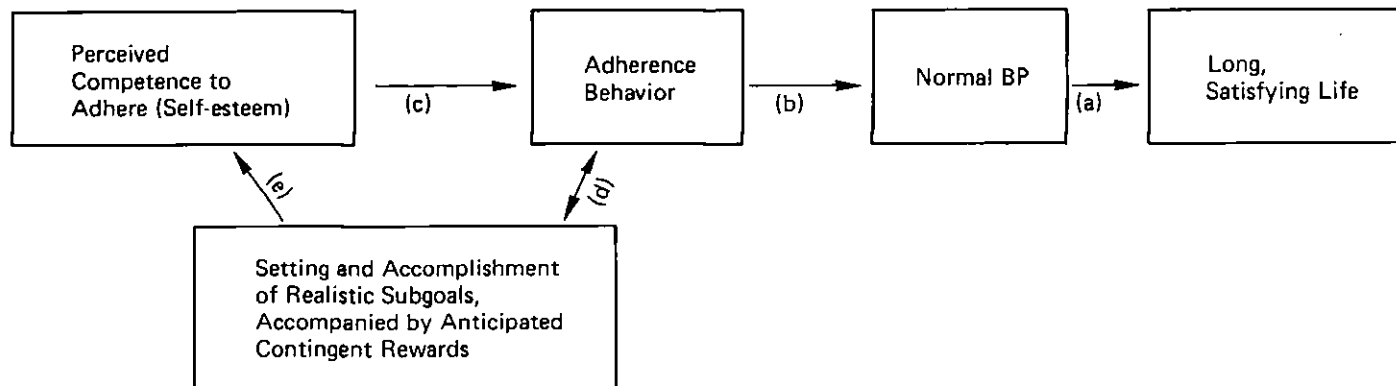


Figure 2-1. Model of major hypothesized predictors of adherence and their effects on blood pressure. Arrows between boxes indicate causal relationships. The letters on each arrow are used for reference in the text.



keep the presentation of a rather complex system of hypotheses as simple as possible. If nothing else, it is hoped that the models presented below serve as a heuristic aid in thinking about determinants of adherence.

*Figure 2-1*

Let us assume that most people want a long, satisfying life and have some innate motive of self-preservation which relates to this desire. Although the physician knows of scientific evidence which shows that keeping blood pressure within normal limits will contribute to this goal (arrow a), the connection is not universally accepted by patients. This connection can become a reality once the patient decides to adopt the primary mechanism for the control of high blood pressure--adherence (arrow b). Taking medication is the main component of adherence. (See demonstrations of theoretical effectiveness provided by the Veterans Administration Study Group, 1967, 1970, and typical protocols suggested by Task Force I, Hypertension Information and Education Advisory Committee, 1973.)

Adherence behavior also can include other behaviors such as restrictions on the intake of salt in the diet, regulated exercise, weight control, cessation of cigarette smoking, and changing of life style to reduce psychological strain. Aside from the issue of whether or not these other prescribed steps have been demonstrated to reduce blood pressure and the risk of associated target-organ diseases, the important point is that they are behaviors which are often sought by physicians. There is no debate about the value of other adherence behaviors including the keeping of medical appointments, prompt refilling of depleted prescriptions, and the reporting of side effects. Now let us turn to some of the determinants of adherence.

Health-related motives, paths, and goals. At the outset health-related motives, paths to health, and goals should be distinguished from one another because they are important concepts relating to the study of adherence. Although goal-setting is not a major part of the experimental design of this study, its concepts need to be considered because they form an important part of any theory of adherence and because they may help explain findings from

this study. Motives are basic forces or drives such as for security, esteem, food, self-preservation, power, achievement and love. If an object or activity can directly satisfy one of these motives, it is said to be a goal.

For example, eating is a consummatory activity which will directly satisfy the motive for food, so eating food is the goal of a hungry person. Other instrumental activities which stem from this motive, such as buying and cooking food, are only parts of the path which lead to the goal, and they will not satisfy the hunger. This distinction between paths and goals is a gradation rather than a simple dichotomy because a person will often set up sub-goals along the path to some ultimate goal. The hypertensive patient with the ultimate goal of self-preservation may have a sub-goal of avoiding a heart attack; and initially the control of blood pressure may be only a path to this sub-goal. After a period of striving, the path of blood pressure control may become a sub-goal in itself with the result that the motivation to control blood pressure is enhanced.

It is important to emphasize that goals and sub-goals stem from the person's own motives; they are thus very different from the prescriptions or quotas which others induce on the person. Controlled blood pressure can still be a goal as long as it satisfies some motive (or motives) even if the motive is unrelated to self-preservation. For example, some people may decide to control their blood pressure in order to win the approval of their physician (motive for esteem or praise) or in order to satisfy some personal challenge (motive for achievement). A single goal may consequently satisfy several motives within a single person simultaneously.

Most motives are either innate (such as for food and water) or else they are socialized through processes such as child-rearing. Consequently they may be quite permanent and resistant to change or influence from outsiders in later life. Outsiders, such as the health care professional, can influence the paths that a person takes and the difficulty of the goals that a person sets, but the motives that determine whether or not an object will be valued as a goal are relatively resistant to outside influences. Thus the motive or will to live or die is largely up to the patient and the

path and goals leading to long life are potentially influenced by the health care professional.

In trying to help a patient strive toward a particular goal or utilize an effective path, the health care professional can make use of a variety of bases of power (French & Raven, 1968): expert, legitimate, referent, coercive, and reward. Power is defined as the influence one person has over the other's behavior. The more the health care professional is perceived as an expert by the patient, the more likely the professional's advice will be accepted. If the patient accepts the sick role, then the patient may decide that the health care professional has a legitimate right to prescribe paths, but if the patient fails to accept the sick role, then the legitimacy of such prescribed behavior may not be accepted.

Physicians or nurses will have referent power if the patient decides to identify with them because the patient likes them. In such a case the patient does what the doctor says because the patient likes the doctor (or does not do what is advised because the patient dislikes the doctor).

Coercive power, despite its seeming ease of application, has some drawbacks. For one thing, it tends to lead to the pursuit of quotas where it is used. In factories for example the statement "perform six units of work per hour or lose your job" leads to just six units rather than seven or more. People generally dislike the person who uses coercive power so that referent power can become reduced to a minimum as a result. Furthermore, when coercive power is used, people only pursue the path to the goal while the administrator of the punishments is actually present (Kelman, 1958). As a familiar example, consider whether or not you are likely to increase the diligence of your tooth brushing before going to the dentist in the hope of reducing the scolding you will receive.

Reward power is likely to lead to increased, rather than decreased, liking of the physician or nurse and therefore increased referent power of the health care professional.

Now we will turn to some additional facets of goal-related behavior--the extent to which goals need to have certain properties to be attained and the extent to which they need to be set in certain ways with certain degrees of involvement by the goal-striver.

The importance of specificity in setting goals (smoke one less cigarette today) rather than vagueness (cut down on smoking) has been demonstrated in a number of studies on goal attainment (e.g., Kanfer et al., 1974; Lewin, 1951; French et al., 1966; Locke, 1967). These studies involved a wide variety of behaviors ranging from changing eating habits to setting production goals in a factory and all demonstrated the superiority of goal specificity.

The use of subgoals represents a method for setting up specific, concrete steps which lead toward the achievement of the end goal (Miller et al., 1960). A set of subgoals in some order of sequence are often described as the path to the end goal. Subgoals are easier to achieve compared to the end goal. Consequently, they are more likely to lead to experiences of success. Such experiences are thought to decrease the subjective difficulty of each succeeding adherence subgoal. Consequently, adherence leads to further adherence. Davis, 1967; Kegeles, 1963; Latiolais & Berry, 1969; and Roth et al., 1971 report findings which support this conclusion. By contrast, omitting subgoals and aiming only for complete adherence is most likely to lead to a failure experience. Such an experience may increase the patient's subjective estimate of the difficulty of adherence and lead to eventual patient dropout.

These studies suggest, then, that the patient who sets intermediate goals will be more likely to achieve perfect adherence than the person who sets out to achieve perfect adherence on the first day without subgoals. This principle may be difficult to practice by some physicians if they believe that if a patient does not comply 100 percent, the regimen might just as well not be followed at all. Yet in terms of the principles we have just stated, this latter strategy would only reward end goals and would punish the setting and completion of subgoals. To the adage "nothing succeeds like success" we add "no matter how small the achievement."

The use of rewards, intrinsic and extrinsic, also appears important for producing adherence. There is now a large body of research which suggests that behavior which is instrumental in eliciting a reward is most likely to show some permanence in the human's repertoire (see Bandura [1969] and Watson & Tharp [1972] for reviews of the literature and the theory in this area). The recent work of Kanfer et al. (1974) further demonstrates that the

rewards need to be anticipated, or explicitly identified in advance before the person begins to strive towards the goal. Where reinforcement is merely contingent on the performance and is not indicated beforehand, performance is not likely to meet desired levels of commitment or adherence. Kanfer et al. (1974) found that anticipated rewards produced stronger subsequent adherence than rewards which incidentally occurred after the first successful trial.

The research on the effects of rewards on behavior suggest that the provision of anticipated rewards should come as soon as possible after the desirable adherence behavior has occurred. Such provision of rewards, however, is a problem for persons with high blood pressure because they normally receive no symptomatic reward or punishment feedback as a direct result of how they take their medications. Furthermore, a reward of the potential avoidance of cardiovascular, renal, and other diseases and the possibility of extended longevity are rewards that may only be realized or appreciated years after the adherence behavior starts. Consequently such rewards are probably too abstract and too distant in time to be powerful rewards.\* Such rewards may lack high instrumental value or utility for patients. According to the original work of Lewin (1951), and to adherence literature subsequently reviewed by Rosenstock (1966), and to a recent study of sick role behavior in a low-income population by Becker et al. (1974), the subjective utility of health behavior in terms of the rewards it produces is an important determinant of adherence. If the rewards are unappealing or not subjectively valid, adherence is unlikely to occur.

Not all immediate, concrete rewards, however, are likely to lead to good adherence. A recent review of the literature on the use of token economies or token reinforcement (gold stars, tokens, and the like which might later be exchanged for gifts) suggests that token rewards may lead to token learning and performance

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\*Patient dropout rates around the world (WHO, 1974) are almost invariant (seven out of every nine patients) regardless of culture. The lack of feedback from "the silent disease" and the delayed "pay off" for adherence in terms of longevity may cut across all cultural boundaries equating the dropout rate wherever studies have been conducted.

(Levine & Fasnacht, 1974). Such extrinsic rewards have produced a mixed pattern of results. There have been short term successes in desired behavioral outcomes, but in many cases such rewards seemed to reduce motivation, performance, and satisfaction with the task at hand. Consequently Levine and Fasnacht warn the practitioner to approach the use of such tokens with "trepidation."

The use of intrinsic, internalized rewards seems like a far safer and more durable path toward long term health care adherence. Kelman (1958), for example, demonstrated that extrinsic sources of compliance only lead to the desired behavior when the giver of the rewards is present. On the other hand, Kelman found that internalization produces self-maintaining adherence to a behavioral goal. Although there is often a fine line between an external or extrinsic reward and an internal or intrinsic reward, intrinsic rewards can involve the feeling of self-satisfaction in reaching a goal, feelings of self-esteem, and realizations of self-competence and ability to cope with one's environment.\*

Processes which lead to the setting of goals. The presence of specific goals with well-defined subgoals and anticipated rewards, discussed in the preceding section, is a necessary but not a sufficient condition for adherence. In addition to these factors, the goal striver must be involved in the setting of the goals (or health care contract\*\*) and the paths to these goals. Kiesler (1971, Chapter 2) indicates that commitment relies largely on the freedom of choice or volition of the person (patient). A patient who is told that he or she must take a specified number of pills per day at specified times, must change diet in specific ways, and must avoid stressful situations is a patient who is not given any freedom of choice. The goals are present but the volition is absent.

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\*Tokens can have intrinsic significance, however, if they are valued in their own right. A recent report on the use of tokens in some branches of Alcoholics Anonymous illustrates this point (Bassin, 1975).

\*\*A health care contract is usually a nonlegal document drawn up by a goal striver that states the goals and the rewards to be accrued if the goals are attained. Such contracts are usually drawn up with the help of a counselor trained in the techniques of behavioral modification. The contract is intended to make the goals more concrete for the goal striver and hence more attainable.

A large number of other studies, particularly on setting work goals, also indicate that freedom of choice, which we shall refer to here as participation in goal setting, leads to higher levels of performance than no participation in goal setting (Coch & French, 1948; French, Israel, & Aas, 1960; French et al., 1966; and Likert, 1961). Unfortunately, one cannot cite the results of patient participation in health care settings as little or no research has been done on the area. For example, Haynes and Sackett's 1974 search of Current Contents, of the computerized "Medline" bibliographic system, and of reviews of the literature for 1972-74 produced 246 articles on adherence, none of which considered patient participation as a key variable.

The studies on participation identify certain principles which should be followed if participation in setting the health care contract is to lead to adherence. The research of French et al. (1966) suggests that the patient must perceive that (1) it is legitimate for the patient to participate, that (2) the patient has the expertise to make the decisions, and that (3) the decisions deal with aspects of the health care contract which are genuinely important to the patient.

With regard to the first point, many patients and physicians believe that only the physician has any legitimate right (that is, right based upon the person's status) to set the health care contract. A physician, by law, is the only person who is allowed to prescribe medicine. This is an example of legitimate authority. However, there are no laws which require that the patient be excluded from deciding whether or not to take medication once a prescription has been written, nor do patients seek the consent of physicians when deciding not to adhere. Consequently it is moot as to whether the patient or the physician has legitimate authority on setting the health care contract. For our purposes, the patients are told that part of their role will be to set up such a contract based on their physician's recommendations. Patients need this "o.k." if they are to proceed without feeling they are violating some important rule or protocol.

With regard to expertise, only the physician has the expertise arrive at a diagnosis and an ideal regimen. The patient, however, has the potential for being the expert in setting realistic

subgoals since the patient may feel that no one else can know one's abilities as well as oneself. For most physicians, the demands on their time are such that they do not have a good opportunity to really know the ability of each patient to adhere. Furthermore, since only one-eighth of all patients remain in adequate treatment for high blood pressure, one must face the reality that most patients will not accept the physician's recommendations regardless of who actually has the expertise. Because such expertise is also not normally part of most patients' repertoire, the social support system discussed shortly is intended to help patients become more aware of their abilities to adhere so they can become experts in this area and set attainable goals.

The third principle, participation in meaningful decisions, raises an important medical care question: just how far should a patient be allowed to go without violating notions of medical good sense about what do and do not constitute areas of patient expertise? A meaningful area might be decisions regarding how many cigarettes the patient is going to cut down on per day for the next week or how many servings of non-allowed foods the person is going to avoid in the next week. Such decisions are directly linked to the final goal of good health behavior which may involve, as subgoals, complete cessation of smoking and complete adherence to the prescribed diet.

Decisions on taking (not prescribing) medication is another area for meaningful decision-making by patients. If Mrs. Smith presently takes only one out of three pills per day, she would be told that it is all right to decide to try taking two out of three pills per day for the next week if she wants to set that as the next subgoal. Although two out of three pills is far from ideal, criticism, threat, and the expression of dissatisfaction may lead a patient like Mrs. Smith to drop out. Getting Mrs. Smith to set an intermediate goal may be far more successful in obtaining complete adherence in the long run. By contrast, asking a patient to indicate whether he or she would prefer to purchase the pills in a plastic or a glass bottle is not as likely to be perceived as meaningful since the composition of the container is not directly linked to any specific health care contract or adherence behavior.



The importance of getting a person to set realistic subgoals has been emphasized because these are the types of goals that have the best chance of being accomplished. The accomplishment should do much to enhance people's perceived competence to adhere (arrow e, fig. 2-1) and such perceptions should spur them on to further adherence behavior (arrow c). The actual behavior should serve as a feedback mechanism helping them set new goals based on past accomplishments (arrow d). Consequently, the model presents a self-generating loop that perpetuates itself as long as behavior is successful and incremental in reaching goals and that terminates itself as behavior becomes unproductive and does not progress toward end goals.

Need to achieve versus need to avoid failure. Getting people to set attainable goals may require some care because people do not always do so (Atkinson & Feather, 1966). The setting of goals depends partly upon traits of the person. People whose need to achieve is greater than their fear of failure set goals which they believe have a moderate or fifty-fifty chance of attainment. People whose fear of failure is greater than their need to achieve, by contrast, either set very difficult goals (little chance of attainment) or very easy goals. These people avoid setting goals with an intermediate subjective probability of goal attainment. Studies of these people show that the actual probability of attainment or success is not as important as the person's subjectively assigned probability in determining the types of goals which are set.

Persons with a relatively strong need for achievement prefer goals of intermediate difficulty. These goals seem to provide them with an element of challenge which heightens their feelings of achievement when they are successful. Very difficult goals are avoided because they are not likely to lead to achievement. Very easy goals are also avoided because they are not seen as a need-satisfying achievement.

Persons with a stronger need to avoid failure, by contrast, prefer very easy goals so that failure can be avoided. They also prefer very difficult goals as a way of getting off the hook: "Of course I failed, but then who wouldn't have failed given the obvious difficulty of the task." Goals of intermediate difficulty

are avoided by persons with a need to avoid failure because these goals produce high levels of anxiety. If a person with a need to avoid failure is forced to pursue a goal of intermediate probability of success, they will eventually "leave the field" or drop out to avoid failure.

The studies on need achievement have several implications for the creation of patient adherence. If high levels of adherence are desired in the long run, then patients cannot be left to set goals completely on their own since some patients will set impossible goals, subsequently fail, and then drop out. Nor can the same goal be set for all patients. If the same goal is set for everyone, it will be perceived by some patients as being of low difficulty (which will lead high need achievers to avoid such goals and drop out for lack of challenge), by other patients as being of intermediate difficulty (which will lead persons with a need to avoid failure to drop out), and by still other patients as of high difficulty (which will lead persons with a need to achieve to avoid the goal and drop out and will lead some persons with a need to avoid failure to take on the "impossible" so no one will blame them for failing).

The studies on need achievement indicate that the subjective difficulty (subjective probability of success) of a final goal becomes lower as each subgoal is achieved. Consequently, new subgoals which are of adequate, but not of unreasonable, difficulty for the patient must be added to the health care contract at each step. Patients need to have the opportunity to upgrade their next subgoals in the health care contract as they change their perceptions of the subjective probabilities of these subgoals on the basis of new successes. This process of progressive goal setting and resetting relies on help from other persons in helping the goal setter evaluate whether or not his or her goals are realistic and are of appropriate difficulty to meet the person's need for achievement or need to avoid failure.

The next section further discusses the role of motives and paths to goals in adherence. Figure 2-2 is an elaboration.

*Figure 2-2*

In Figure 2-2, some arrows intersect other arrows as is the case for arrow (h) intersecting arrow (c). Such intersections represent interaction effects of the variables at the origin of the two arrows on the dependent variable. The relationship created by the intersecting arrow (h) is always positive unless noted otherwise and supercedes the relationship depicted by the intersected arrow in the sense that it represents a more powerful effect on the dependent variable only when the two predictors interact. In the example just considered one would state the interaction as follows: Perceived competence to adhere leads to adherence particularly if the person perceives of the adherence behavior as more useful than other behaviors.

Motives and perceived utility. As defined previously, motives refer to a disposition to strive towards certain kinds of goals (Atkinson & Feather, 1966). Thus, the strength of a person's motive for health or self-preservation is equivalent to the person's disposition to strive towards the goal of health or long life.

Any particular patient faced with the choice of adhering or not is really faced with a choice of pursuing different motives. These motives, such as health, short term pleasures from entertainment, financial security, freedom from unpleasant topics, excitement or stimulation, and so forth may all be present and competing in any person. To set time aside to go to the clinic means that the person's motive for health is stronger than the motive for alternative competing needs.

We have already noted that long life is the end goal of the entire model. Even though the lowering of blood pressure may be an intrinsic goal for some patients, for most patients the real goal of interest is life itself and it may serve as a motive to determine their subgoals (arrow r). Reviews of the literature and models based on the literature generally support the hypothesis that whether or not a person adheres depends on the relative strength of the motive to achieve health (Rosenstock, 1966; Becker, Drachman, & Kirscht, 1974; and Kasl & Cobb, 1966, for example). In Figure 2-2 such motives to achieve health have a direct effect on

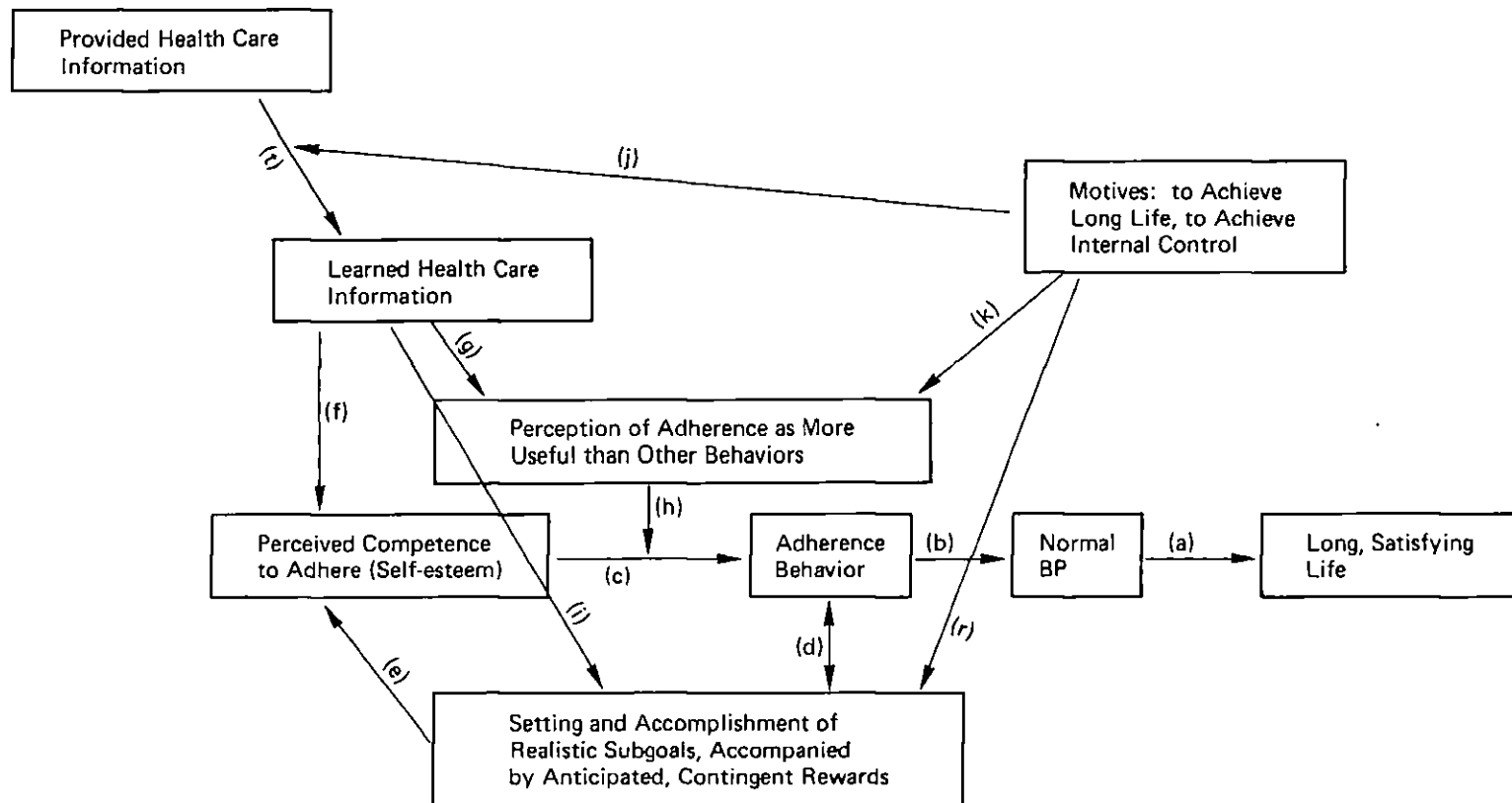


Figure 2-2. Model of the major hypothesized predictors of adherence and their effects on blood pressure. Arrows between boxes indicate positive causal relationships. The letters on each arrow are used for reference in the text. Interaction effects are indicated by the intersection of one arrow upon another. The resultant relationship supercedes the effect of the intersected arrow and is always more positive.

whether or not any specific adherence behavior is perceived as more likely to lead to a desired goal compared to other behaviors (k).

What determines if an adherent behavior is seen as useful?

(1) The behavior must be seen as leading to a desirable goal. To reiterate, a goal is merely an object or state or consummatory behavior that satisfies some motive of the person. (2) The behavior must be perceived as being more useful than other behaviors in reaching this goal. To illustrate these points consider a patient who is deciding whether or not to take some prescribed medication for high blood pressure, to take a garlic oil purchased in the local health foods store (an often mentioned folk-"remedy"), or to do nothing at all about high blood pressure. If the person's motive for self-preservation is stronger at the moment than other competing motives, then the choice for the person narrows down to the prescribed drug or the garlic oil, assuming that the person believes that the control of high blood pressure is a subgoal for the motive of self-preservation. If the person believes that garlic oil will be a more effective path to the goal of controlled blood pressure than the medication, the pills or tablets get left behind. If the person believes the opposite, the garlic oil loses out. For some persons, both paths to the goal may be perceived as efficacious and both might be taken. If the person's motive for self-preservation is weak relative to motives for other things or if the person does not believe that control of blood pressure is a subgoal that will satisfy the motive of self-preservation, then the patient will do nothing to bring high blood pressure under control.

Consequently, if the person believes the adherence behavior prescribed by the health care personnel is most useful, then the perceived competence to perform the behavior will lead to the behavior being performed (arrow h). If however, the person does not perceive the behavior as being useful, then no adherence will take place, according to this theory, even if the person feels perfectly competent to perform the behavior.\*

The strengths of motives, such as motives related to the achievement of health, may vary over time depending on whether or

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\*Chapter 5 considers additional conditioners of the effects of self-competence on adherence.

not goals are met which satisfy these motives. These motives are elements of the person's psychological structure that predispose the person to approach certain goals and ignore other goals at any one point in time. External-internal control (Rotter, 1966) is one such element or trait which may determine predisposition to adherence. Internal control refers to the belief that one's rewards in life are contingent on one's behavior. Persons high in external control believe their rewards are a matter of forces beyond their control such as luck and the good or bad graces of others. In Figure 2-2 we hypothesize that the higher the patient's internal control, the higher the perceived utility of an adherence behavior (k). If the person believes that the lowering of blood pressure is a matter of fate, then taking medication will be perceived of as a waste of energy. The best support for a link between external-internal control and adherence comes from studies of beliefs as supernatural causes and cures of illness. Persons who hold such beliefs show very poor adherence with medical regimens (Diamond, Weiss, & Grynbaum, 1968; Kegeles, 1963).

It is also likely that persons high on external control do not adhere because they do not set any goals. One study has partly tested this proposition (Brown & Gordon, 1971) and found that persons high on internal control were very thoughtful in setting their goals whereas persons high on external control selected goals almost at random without much forethought.

, Despite the attractiveness of external-internal control as a predictor, Becker (1974) has noted that it is one of the variables most unrelated to adherence in the literature where it has been studied. Some studies (Gurin, Gurin, Lao, & Beattie, 1969; Chun & Campbell, in press) suggest that Rotter's measure is multidimensional and that this makes it difficult to use as a predictor of adherence. Two factors appear in the measure: political and personal efficacy. Only the latter appears related to achieving behavior as indicated by socioeconomic status and by other measures of motivation. The two factors only share 16 percent common variance. The use of the personal efficacy factor alone may prove to be a more successful predictor in models of adherence.

Provided versus learned health care information. Figure 2-2 depicts health care information as a necessary but not a sufficient

condition to produce adherence. There are too many intervening variables for information alone to be a sufficient condition. If this hypothesis is actually the case, then we should expect to find only weak, positive support in the literature for any relationship between health care information and adherence behavior. The Haynes and Sackett (1974) review supports this prediction. There are 14 studies listed under the heading of "knowledge of disease (or of) therapy" which we shall take as a crude approximation of learned information. Six studies reported a positive relationship to adherence, eight studies found no relationship, and no studies found a negative relationship. Intelligence, a potential determinant of a person's ability to learn health care information, was unrelated to adherence in all five studies which examined I.Q.

In Figure 2-2 we depict provided health care information as a determinant of learned health care information (t). Providing information by teaching is no guarantee that all the information is transferred (see studies by Ley & Spellman, 1967; Joyce, Caple, Mason, Reynolds, & Mathews, 1969). Both the science of learning theory and the art of application are involved in determining the imperfect relationship between what is taught a patient and what the patient actually remembers or selects to retain. We hypothesize that the degree of learning is largely determined by the motivation of the learner (arrow j). A person with no interest in prolonging life may find it wasteful to pay attention to a presentation on risk factors in heart disease or on over-the-counter drugs that raise blood pressure. A person with a good deal of motivation to live may learn quite a bit, provided such information is perceived as instrumental to a long life.

The learned health care information should have a direct effect on the patient's perceptions of which behaviors will and will not be useful in the control of blood pressure (arrow g). The well-motivated patient may be eating garlic to keep blood pressure down and may only find out from health care information that taking medication appears to be far more effective.

Learned health care information may also increase the perceived competence of the person to adhere (arrow f). Such information may show the patient how to take medicines and ways to avoid forgetting important questions at the next visit to the

physician. Educational opportunities to practice these situations in a class room setting may boost perceived competence.

Learned health care information should also help the patient set realistic goals (arrow i). Such knowledge may help the patient gauge what is and is not possible.

*Figure 2-3*

Life's stresses and strains. The stress (load, stressor) placed upon a person produces certain strains (arrow q). Some of these strains may be psychological affects (depression, anxiety, boredom, for example), others may manifest themselves in noticeable somatic complaints (sweaty palms, upset stomachs, loss of sleep, and so forth), and still others may show up as silent physiological changes, such as an elevation in blood pressure, catecholamines, cholesterol, or pulse rate.

Strains with self-detectable symptoms such as anxiety or depression may directly lower a person's perceived competence (arrow n) to perform adherence behaviors. Such strains may have widespread effects not depicted in Figure 2-3. High levels of anxiety and tension may interfere with the patient's ability to learn health care information. Furthermore, unpleasant affects may change the person's motive hierarchy so that becoming mentally healthy becomes more important to the patient than becoming physically healthy.

Psychological strains may also have a direct effect on blood pressure (arrow s), probably in combination with stressful situations. Thus, anger (Gentry, 1970) and anxiety have been associated with increases in blood pressure (e.g., Funkenstein, King, & Drolette, 1954). Expressed anger appears to relieve high blood pressure (Alexander, 1939; Funkenstein, King, & Drollete, 1957; Groen, Van Der Valk, Welner, & Ben-Ishay, 1971).

Psychological strains are usually produced by environmental stresses although some medications for hypertension can produce feelings of depression and other negative affects as side-effects (for example, see AMA Committee on Hypertension, 1973). Environmental stresses from family, work, and community settings can also generate such strains (see the national survey by Gurin, Veroff, & Feld, 1960, for example). These life stresses may also affect



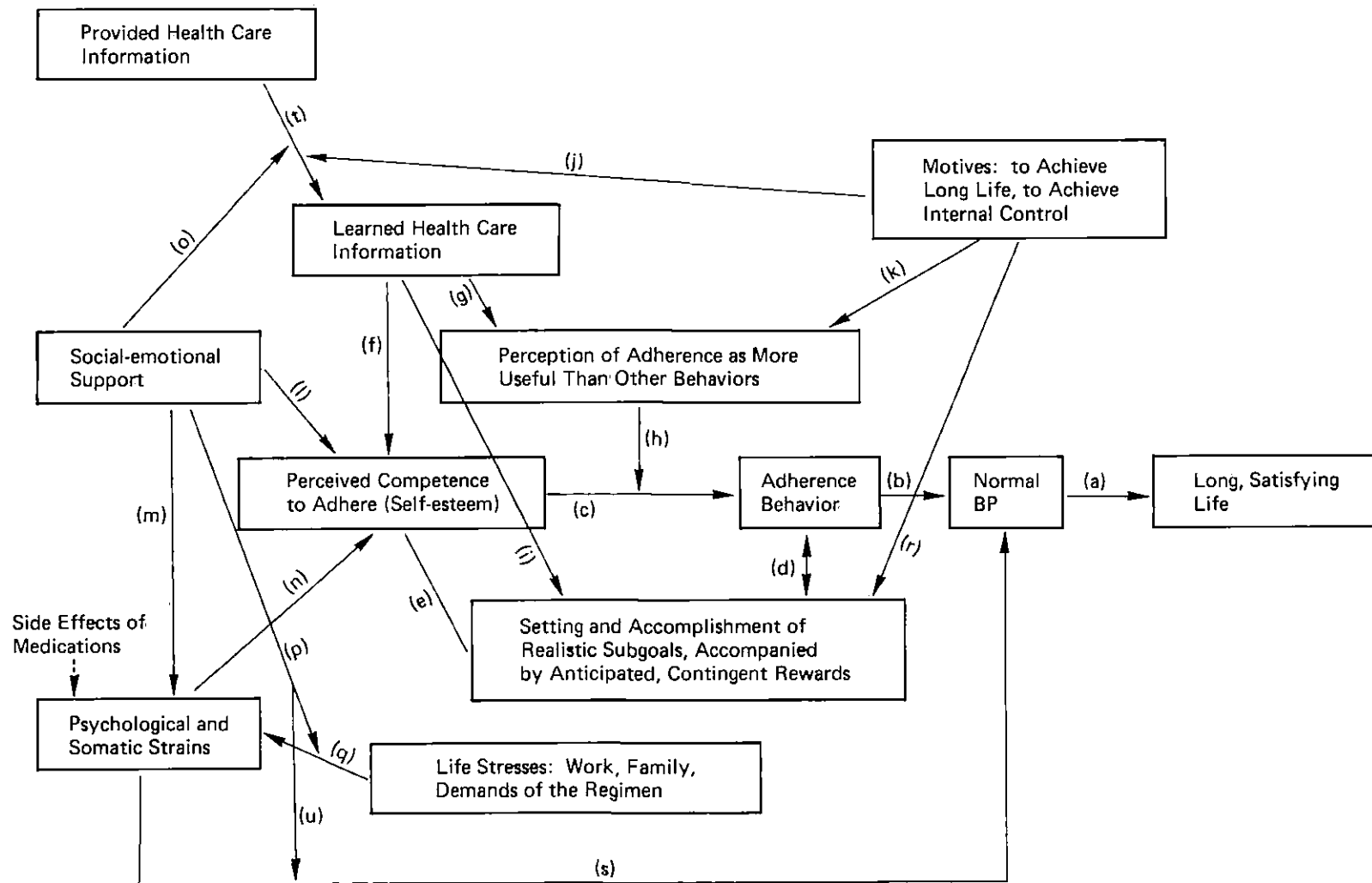


Figure 2-3. Model of the major hypothesized predictors of adherence and their effects on blood pressure. Arrows between boxes indicate positive causal relationships, unless noted otherwise. Interaction effects are indicated by the intersection of one arrow upon another. The resultant relationship, unless noted otherwise, supercedes the effect of the intersected arrow and is always more positive.

physiological strain, morbidity, and mortality. (Dohrenwend & Dohrenwend, 1974 provide a compendium of such research.) Several studies link occupational stresses to elevated blood pressure levels and other risk factors in coronary heart disease (Cobb & Rose, 1973; Cobb, 1974; French & Caplan, 1972) and Harburg and colleagues (Schull, Harburg, Erfurt, Schork, & Rice, 1970) suggest that high stress neighborhoods may play a greater role than genetics in accounting for the incidence of blood pressure among city dwellers and particularly among Blacks. Consequently, any health care programs that can reduce demands and stress on the patient and the attendant psychological strains, may succeed in lowering blood pressure independently of effects of medication and changes in diet. Programs that increase stress and strain on the patient as a result of the new demands of health care may, to some extent, accomplish just the opposite.

If the demands of the regimen are too great, the patient may quit treatment, stopping medication and stopping further visits to the physician. Although this relationship is not shown directly in Figure 2-3, dropping out of treatment is assumed to occur by way of feelings of psychological strain (arrow q) and by perceived incompetence to adhere, induced by the regimen.

#### Social Support: A Key Variable in Adherence?

At the outset, it should be noted that what follows is only a working definition of social support. We anticipate continuing to tinker with the definition and refine it in future work.

Social support is defined as any input directly provided by another person (or group) which moves the receiving person towards goals which the receiver desires. A distinction is made between social support, supportive behavior, and supportive relations. Social support refers to the input. Supportive behavior refers to the act of providing the input. Supportive relationships refer to the pattern of relations between two or more persons, at least one of whom is receiving inputs. In what follows, the definition of social support will be considered in more detail. Then a word will be said about supportive behavior. Finally a few comments will be made about the nature of supportive relations.

First a distinction must be made between objective and subjective social support. Objective social support is measured by some third person or other "objective" instrument. On the other hand, subjective social support is based on the receiver's self reports. Social support inputs, behaviors, and relationships can all be operationally defined in terms of their objective and subjective measurements. It is important to specify whether one is describing objective or subjective support because what may be objectively observed may not necessarily be the same as what is subjectively perceived, and consequently objective and subjective support may have quite different effects on the receiver of support.

Now let us turn to some of the components in the definition of support--the first of which is the term "input." Input can refer to an almost endless list of objects, some of which are physical (money, muscle power), some of which may be information (how to get to a certain street address, the fact that one's tie is on straight, and so forth), and some of which may be social-emotional (agreement with you, praise, indications of understanding your plight, and so forth). Pinneau (1975) has referred to these different types of inputs as tangible, informational, and social emotional.

The distinctions between these different sorts of support is not fully defined nor understood at the moment. Nevertheless, it is probably safe to assume that any particular input can represent a mixture of the various types of social support. (For example, I could buy a friend a cup of coffee which would both warm my friend's innards and at the same time tell my friend that I am meeting my friend's need for affiliation.) It is also likely that in any sequence of inputs of social support there will be interspersions of the various types of social support. In this study we have focused our measures primarily on emotional rather than tangible support because the former is most often identified in the literature as an important determinant of patient adherence.

The second aspect of the definition of social support refers to the clause "directly provided by another person (or group)." Certain types of support, although they move the person towards a goal, are not social. For example, airplanes move people towards affiliation (friends), power (business contacts), and a number of other goals. Airplanes, however, are not social supports because

they are, for the most part, technological systems dependent on humans (at least for now) for their operation. A friendly word or a smile from the flight crew, on the other hand, would be considered social support because it was directly provided by humans. It may well turn out that this distinction between social and asocial support is best described along a continuum rather than as a dichotomy. This is one aspect of the definition which must be considered further both theoretically and in empirical research.

The last phrase of the definition of social support, "movement towards goals which the receiver desires," contains several important elements. First, "movement towards the goal," implies the use of dynamic rather than static measurement techniques. Post-support (baseline) and post-support measures of distance from the goals must be obtained. If objective social support is being studied, objective measures of distance must be used. If subjective social support is being measured, subjective (self-report) measures must be used.

Second, it is the receiver who defines the goals, and not anyone else, according to our definition.\* Third, these desired goals are not assumed to be good or bad in any moralistic sense. Other persons and society may have some opinion as to the value of the receiver's goals both for the person and for others and society. Such opinions, although admittedly important to all of us as part of a society, are of no relevance to our definition of a desired goal. A desired goal in this definition is simply one which the receiver wants. Consequently one hypothetical "unit" of praise,

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\*Even though the receiver does the defining, this does not necessarily mean that such goals cannot be objectively measured. In theory objective measurement of another's goals may be possible (some people have tried to use projective tests, for example, to get at goals the respondent either was not conscious of or did not wish to divulge), although to date efforts to measure goals without relying on self-reports have been relatively unproductive.

Conceivably there may be instances where one ends up with a hybrid measurement--that is, objectively observed input, objectively observed movement towards the goal, and subjectively observed desirability of the goal. These hybrids must be expected as a fact of life in research because, as noted, objective measurement instruments may not be available for all classes of variables. Furthermore, some theorists may wish to argue that unconscious states are not open to objective measurement and accordingly, the desirability of a goal is best measured subjectively.

whether provided to a tyrant or a kind person, would be scored as one unit of social support in either case if both receivers considered esteem a desirable goal for their respective selves. To take another example, although you or I may think that it is good to have clear goals in mind, and although you or I may think that clear goals are good for other people, inputs which help clarify other's goals for them are not necessarily inputs of social support. By our definition, such inputs are only social support if the receiver desires to have his or her goals clarified. (Evidence, in fact, demonstrates that tolerance for ambiguity about matters in life varies from person to person [Frenkel-Brunswik, 1949].)

Potential versus actual social support. Many people find comfort in knowing that if they ever need help, some particular person will be there to help them in one way or another. In one sense, such potential support is not problematic for the preceding definition. People build up reputations as potential sources of help by past activities. These past activities have immediate effects at the time of application and they have continuing effects as demonstrations of potential for the future. Potential is simply the input of security--the information that aid will be present at some future point in time, should it be required. If security is a desired goal, the behavior of another which conveys information about the availability of future help is social support by definition. The problematic aspect of potential support is one of measurement. If one can use objective instruments to infer potential, fine. It seems likely, however, that studies of potential support will rely heavily for sometime to come on the receiver's self-report.

Fantasied support also poses no problems for our definition. This type of support is purely subjective. The receiver provides reports of the inputs and their effects. The extent to which objective concomitants of such support exist is purely an empirical question. Consequently, people who report receiving encouragement and advice from departed relatives, hear voices from religious figures, and believe that someone who is objectively an enemy is consciously helping them are receiving subjective social support.

Support itself is considered as one end of a continuum which ranges to negative support. Negative support is input which moves

the receiver away from desired goals. There are lots of examples in daily life of both support and negative support. Some behaviors of others free us up to pursue our goals, other behaviors hinder us, and still others may fall somewhere in the middle of the continuum neither helping nor hindering our pursuits.

Supportive behaviors. So far we have only considered input. A number of behaviors are potentially supportive because they allow supportive input to occur. Various schools of psychotherapy have presented schemes for such behaviors. For example, Carl Rogers (1951) suggested reflective interviewing because self-discovery allows the receiver to move towards self-desired goals quickly and efficiently. As part of a system and theory of counseling known as Re-evaluation Counseling, Jackins (1962) has proposed that the behaviors of listening attentively, validating or affirming the other person's thoughts, helping the person cathect negative affects, and praising the other person are supportive acts (if done at appropriate times) because they move persons towards the goals they desire. Transactional analysis (Berne, 1964) and many other schools of therapy also attempt the same goals. Similarly many normative theories of organization focus on ways in which organizational members can help one another meet their desired goals (most notably Likert, 1961; Maslow, 1965; and Argyris, 1964). Appendix C discusses some of the supportive behaviors we attempted to use in this study and the skills involved in using them.

Supportive relationships. The nature of social support relationships between persons is an object of study in its own right. A large set of concepts can be considered which reflect the qualitative and quantitative nature of such relationships. Kahn (1975, personal communication) has generated a number of these characteristics including the reciprocity of such relationships (equities and exchanges), their temporal aspects (duration of each interaction, overall "life expectancy" of the relationship), sequential aspects (who initiates and who finishes?), size (number of persons in the social support network), and role specialization (do certain people provide particular types of social support?).

An understanding of these relationships, aside from the nature of the inputs, would appear to be very important in the study of social support. For example, one needs to be able to determine the

conditions under which reciprocity in providing social support should be expected in order to determine whether or not all persons in the social support relationship should show the same effects of support. Some persons may be supportive largely as a function of their formal role obligations (such as clergy, counselors, physicians) whereas other persons may provide support only for reciprocity of support (as is the case in friendships). If one was to study pairs of patients providing support for one another, it would be important to know whether some obligatory or reciprocity model was in operation as a way of determining the extent to which both patients derived social support from the relationship.

It is not within the scope of our study to examine all of the above characteristics as determinants of socially supportive relationships. Nevertheless, we have taken the time to point out these considerations because it is the understanding of such questions which is probably needed before one can predict adequately the extent to which social behaviors and relations will be supportive.

Research on social support. No previous study that we know of has explicitly defined social support and proceeded to test hypotheses about its relationship to adherence with medical regimens. There are, however, a number of studies which have demonstrated that various indicators of social support are key predictors of patient adherence. Lack of social-emotional satisfaction has been reported as a major reason for patient dropouts in hypertensive clinics (Caldwell et al., 1970) and in arthritic treatment clinics (Chen & Cobb, 1958). Support from the family has been shown to be important in arthritic patient adherence with the use of a hand resting splint (Oakes et al., 1970) and with return to work after congestive heart failure (Lewis, 1966; actual disability due to the illness was unrelated to whether or not the person returned to work); similar results are reported by Sparkman (1962).

The Kansas studies of ambulatory clinics for hypertensives (Lewis & Resnick, 1967; Lewis et al., 1969) suggested that social-emotional support had a positive effect on patient health and adherence. A clinic run by nurses and supervised by physicians was compared with a physician-run clinic. The nurse clinic was superior in a number of ways: there were fewer health-related

complaints, broken appointments, and days of hospitalization. The time spent in the waiting room by patients at the nurse clinic was only a tenth that spent at the physician clinic, yet visiting time at the nurse clinic was twice that at the physician clinic.

(Finnerty, et al., 1973, have demonstrated the effectiveness of reduced waiting time.) There were other outstanding differences which merit attention. An analysis of critical events indicated that the physicians spent their limited amount of time with the patients arriving at diagnoses, prescribing drugs, and educating the patients on factual information such as dosages. The nurses, however, spent the greatest amount of their time with the "psychological perceptions of the patient's attitudes," providing psychological support of the patient, and reviewing of the patient's medical problems.\* So social support appeared as a key input in the health care setting.

In the Haynes and Sackett (1974) review of the literature on patient adherence, 25 studies are reported which deal with predictors which can be taken as indicators of social support (influence of family and friends, family stability, "good" social environment, pretreatment home satisfaction, and social isolation). Sixteen of these studies reported findings which support the positive relationship between social support and adherence, only one study showed a negative relationship, and eight studies showed no relationship to adherence. Haynes and Sackett give poor ratings on the quality of the measures to four of these latter eight studies. Even if one assumes that the other half of the "non-replications" had reliable, valid measures, the percentage of studies in favor of the social support hypothesis remains very high.

Finally a recent review of research on dropping out of treatment (Baekeland & Lundwall, 1975) finds 19 out of 19 studies (100 percent) showing that social isolation and/or lack of affiliation is a major cause of such dropout.

Although these studies report relationships between social support and adherence, they do not detail the mechanisms by which

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\*Chart reviews, conducted by the physicians reinforced the contention that the nurses were able to identify essentially all the important medical problems that occurred. The cost per patient in the nurse clinic was \$98.51 while in the control clinic it was \$127.24.



social support is expected to lead to adherence. The arrows between social support and adherence in Figure 2-3 indicate several of the hypothesized ways in which social support may affect eventual adherence or nonadherence.

Social emotional support may determine the extent to which a person can learn the health care information provided (arrow o). Argyris (1964), an organizational psychologist, points out that people learn primarily under conditions of psychological success--that is conditions of feeling that they are competent (arrow l) and that they are making progress. And people do not learn well under conditions of psychological failure. The reader may well harbor fond memories of his or her greatest teachers as persons who produced such feelings of psychological success by being sources of encouragement and other attributes set forth in our definition of social-emotional support. Conversely, you may well remember the teachers who lacked these qualities and who consequently instilled either feelings of psychological failure or apathy.

Social emotional support, by its very nature, is expected to reduce psychological and somatic strains (arrow m). Such support should be particularly salient when persons experience discomfort due to anxiety or depression, typical reactions when patients find out that they have an illness which could affect the course of their lives if it is not brought under control.

Emotional support also may buffer or diminish the effects of environmental stresses on psychological (arrow p) and physiological strain (arrow u) by increasing people's tolerances for stress.\* Findings supporting the latter hypothesized interaction are reported in two studies. The first study (Caplan, 1971), a cross-sectional one, found that job stress, such as work load in white collar occupations, were positively correlated with risk factors in coronary heart disease such as serum cholesterol and diastolic blood pressure but only for persons who reported low social support in relationships at work. The second study (Cobb, 1974), a longitudinal one, found that serum cholesterol levels of blue collar

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\*Chapter 5 considers additional variables which may also condition the effects of stress on strain.

workers returned to normal levels following a permanent closing of their factory only among those workers who reported high levels of social support from family, friends, and relatives.

There are also studies that suggest that the risk of coronary disease is particularly high among persons who have lost social support through death of a next of kin (Parkes, Benjamin, & Fitzgerald, 1969; Rees & Lutkins, 1967), who have a nonsupportive wife (Dean, 1971), who have been rejected by a loved one (Kits Van Heijningen & Treurniet, 1966), who have co-workers who are indifferent or who do not like them (Groen, Dreyfuss, & Guttman, 1968), or who have a superior whom they dislike (Medalie, 1971). Where the loss is through death of a loved one there is not only the new stress of coping with the situation but the additional loss of the very social resource who could have helped the bereaver cope with the situation.

These studies, in summary, suggest that social emotional support may determine adherence by affecting (1) perceived competence to adhere, (2) the amount of health care information that the person learns and the skills learned for adherence, (3) psychological feelings of strain, and (4) relationships between stress and strains that might interfere with adherence. In the latter instance, social emotional support may serve as a buffer.

The evidence which suggests that social support may affect blood pressure independent of the effects of medication is too important to ignore in a study of the effects of regimens on high blood pressure. A study that isolates the variance in blood pressure due to medication, to diet and other aspects of the regimen, and to social-psychological factors in the health care system, may tell us whether or not the way in which we prescribe treatment is as important as what we prescribe.

Although these findings suggest that social emotional support can either act directly or as a buffer on factors that affect adherence, it may well be that stress has its strongest effects on persons who desire social support or have an ability to accept social support. For persons who do not perceive such a need or who lack the ability to accept social support graciously, the amount of

social support given may not have much of an effect. Gore (1973, personal communication) in support of this hypothesis, finds that social support is most likely to buffer the effects of job stresses and life events on depression but only in persons who are high on dependence, that is high on need for social emotional support. Her longitudinal study examined the effects of job loss on a sample of males.

Demographic characteristics and adherence. Assessments of age, race, sex, education, income, and socioeconomic status are a routine necessity in any study of this type. They allow the researcher to convey to others the nature of the population studied and suggest the populations to which the findings might be generalized. For these purposes, such measures are included in this study.

On the other hand, we have no great expectations of finding any relationship between demographic characteristics and adherence behavior. On theoretical grounds, we do not have such expectations because demographic variables are global surrogate variables, that is, each represents a host of confounding variables. For example, income can represent variance in education, race, social stress, socialization, sex, and goals, just to mention a few such variables. If only some of these underlying factors are related to adherence whereas others are not, one obtains a weaker relationship between the surrogate variable and adherence than would be obtained by studying the strongest predictor with which the surrogate is coincident. "Weaker," however, may be an understatement. Table 2-1 presents the results of Haynes and Sackett's (1974) review of studies dealing with demographic features of the patient. The box score for the entire table may be summed up as follows: of 190 studies which examined demographic features, 73 percent (141 studies) found no relationship between demography and adherence. Only 49 of the 190 studies (26 percent) found any relationship at all.

### *Applying the Model*

In Figures 2-1 to 2-3 we have drawn a map derived from the reports of early explorers who used crude instruments. It is a

Table 2-1

The Percent of Studies Showing Positive, Negative, and No Relationship between Demographic Characteristics and Patient Adherence (adapted from Haynes and Sackett, 1974, p. 71)

| Demographic Characteristics        | Reported Relationship                                        |      |            |     |        |       | Total Number of Studies |
|------------------------------------|--------------------------------------------------------------|------|------------|-----|--------|-------|-------------------------|
|                                    | Positive %                                                   | (n)  | Negative % | (n) | None % | (n)   |                         |
| Age--young versus old              | 19                                                           | (7)  | --         | (0) | 81     | (30)  | 37                      |
| Sex--female versus male            | 1                                                            | (3)  | 1          | (3) | 98     | (26)  | 32                      |
| Education                          | 25                                                           | (8)  | --         | (0) | 75     | (24)  | 32                      |
| Social class, socioeconomic status | 31                                                           | (4)  | --         | (0) | 69     | (9)   | 13                      |
| Occupational status                | 33                                                           | (6)  | --         | (0) | 67     | (12)  | 18                      |
| Income                             | 14                                                           | (2)  | 7          | (1) | 69     | (11)  | 14                      |
| Marital status                     | [Correlation found, but direction unspecified: 35%] 65% (11) |      |            |     |        |       | 17                      |
| Race--White vs. Black              | 54                                                           | (7)  | --         | (0) | 46     | (6)   | 13                      |
| Ethnic background                  | --                                                           | (0)  | --         | (0) | 100    | (5)   | 5                       |
| Religion                           | --                                                           | (0)  | --         | (0) | 100    | (4)   | 4                       |
| "Demographic variables"            | --                                                           | (0)  | --         | (0) | 100    | (1)   | 1                       |
| Housing                            | --                                                           | (0)  | --         | (0) | 100    | (2)   | 2                       |
| Urban vs. Rural                    | 50                                                           | (1)  | 50         | (1) | --     | (0)   | 2                       |
| Total                              | 21                                                           | (38) | 3          | (5) | 77     | (141) | 190                     |

Note: The percents of the row are given.

Includes the six studies in which "correlations were found" but no direction of the relationship is specified. Percents in the row are based on the 184 studies in which a direction is specified for the relationship. Of all 190 studies, 73 percent found no relationship.

map more for the use of other explorers venturing into largely uncharted territory than for the use of travelers who need a reliable guide. The rest of this study will provide data that hopefully will allow us to draw a new, more accurate map--a map of relationships we have been able to test and confirm and of relationships for which there is still uncertainty.

## Chapter 3

### METHODS OF THE STUDY

Before going into the details of the methodology and design of the study, a brief overview of the goals and design will be presented. This study really has several goals, some of which are potentially in conflict with one another. First, the study attempts to develop the best possible intervention for increasing patient adherence. To reach this goal might ideally take several years because one would want to attempt one type of intervention, evaluate it, plan another, and then execute and evaluate it, and continue to repeat this cycle until an acceptable criterion of patient adherence had been reached. As a pilot study, we really go through only one such cycle as a preliminary to future efforts.

Second, the study attempts to develop measures which are valid and reliable so that these interventions can be evaluated. It is somewhat contradictory to be developing one's measures of predictors and indicators of adherence at the same time that one is attempting to evaluate an intervention. The better strategy would be first to have valid, reliable measures in hand, and then proceed to use them in an evaluation of intervention strategies. To some extent we can approximate this strategy because we will present data on the interrelations among the measures before using them to evaluate the effectiveness of the interventions. This data will be obtained by using the total pool of respondents in the study in a survey research design.

Third, the study, as already noted, attempts to evaluate the intervention strategies. For this purpose, patients have been selected so that each person is in one of three treatment conditions: (1) social support (plus information about health care), (2) information only, and (3) a control condition of regular care

provided by the health care facility. Pretreatment (pretest) and posttreatment (posttest) measures of the predictors and indicators of adherence are used to evaluate the effectiveness of the treatments.

Fourth, the study attempts to test unequivocally a set of underlying hypotheses about social support and other potential determinants of adherence. These hypotheses have been reviewed in Chapter 2 and summarized in Figure 2-3. Data from both the survey research sample, in which all respondents are pooled regardless of treatment, and the experimental treatments, in which groups of respondents are compared with one another, are used to test these hypotheses. The availability of pre- and posttest measures also allows us to test the predictive relationships of the variables in a longitudinal design.

In the sections which follow, details are presented on the selection of respondents, the nature of the sites, the treatments, the types of analyses, and the measures.

### Sample

This section describes the manner in which patients were obtained for the study, overall characteristics of the sample with regard to demographic and health-related variables, and the nature of the three clinics at which the study was conducted. These clinics are referred to here as City, Rural, and University.

#### *Patient Eligibility*

To be eligible for the study, a patient had to give informed consent, had to be literate in order to fill out the questionnaires, had to have entered treatment for high blood pressure (140/90 mm Hg) at the site within one year of the study, and was not supposed to have any extremely serious illnesses such as terminal cancer or psychosis. Consequently patients with manageable diabetes, ulcers, and other relatively nondisabling health problems were allowed to enter the sample. These criteria were followed at City and Rural. A small number of patients were identified by a health nurse clinician rather than the physicians. At University any patients, regardless of when they began treatment,

were taken. More will be said shortly about the use of the latter clinic's sample. A sample cover page informing the respondent of the purpose of the study is presented in Appendix A.

Initially we planned to restrict the sample to newly identified hypertensives. The physicians at the sites quickly pointed out the difficulty of fulfilling this criterion. They said that it was often impossible for them to determine whether or not a new patient in their practice was or was not newly identified. Such identification was difficult because patient histories and memories were often of questionable reliability. These sites were not affiliated with large screening programs that could refer large numbers of newly detected hypertensives.

No attempt was made to select patients on the basis of standardized types of regimens. Instead it was assumed that there would probably be no systematic bias by regimen in the way in which patients were assigned to experimental and nonexperimental treatment groups. Aside from this logic, standardization of regimens would have been infeasible because participating physicians often followed certain preferences in prescribing medication which were based on their particular clinical familiarity with one set of drugs over other sets.

### *Sites*

City clinic. The sample from this site consisted of out-patients from clinics of a large, urban, privately owned hospital serving Detroit's white and nonwhite populations. Some patients came from the clinic that specializes in hypertension whereas other patients came from general clinics and clinics specializing in other disorders. To obtain the sample, physicians in all clinics were sent a description of the study and a shuffled set of three types of letters to patients asking them to participate: letters to (1) controls, (2) persons in a lecture treatment, and (3) patients in a group emphasizing social-emotional support as well as information. (See Appendix B for copies of these letters.) These treatments are described below. Physicians were instructed to remove the top letter off the shuffled pack and give it to the patient, referring the patient to an office where descriptive materials and information for the study would be handed out and



where patients' questions about the study could be answered. Of the 151 patients asked to participate in the study at this site, 126 or 83.4 percent agreed. Despite our attempts to ensure random assignments to the groups, there were more persons assigned to the social support group than to the lecture group, and fewer persons assigned to the control groups. Doctors appeared to be hesitant to give patients letters referring them to the control condition probably because the benefits to the patient were not as obvious. One of the nurses running the groups started recruiting patients for the support treatment from one of the clinics because there was concern over whether or not the initial social support groups would have enough patients to be able to start up as scheduled.

Rural clinic. This outpatient clinic serves a number of rural communities. The clinic had approximately 12 physicians on its full time staff. Patients were primarily referred by nurses, although a few were referred by the physician. All 24 patients of this site entered the social support treatment because the site could not supply enough patients to divide them into three types of treatment groups. The response rate was not ascertainable at this site.

University clinic. These patients were drawn from the hypertension clinic of a large medical school hospital at a midwestern university. The clinic serves outpatients from the university and nonuniversity community and surrounding communities. This sample was used (1) in order to increase the total sample size of patients in the study for the purposes of conducting item analyses of the questionnaire, and (2) for the purpose of conducting multivariate analyses which might require a total sample of patients larger than that drawn from the other two clinics. Although longitudinal data from two points in time were gathered on patients at the other two sites, at this site the pretest was administered to one group of patients and the posttest to another group. These were samples of opportunity of patients who arrived for appointments. There was no reason to assume that the patients filling out the pretest and the patients filling out the posttest would differ from one another in any significant manner since they both came from the same population. In fact not one of 15  $t$  tests comparing the University

pretest and posttest samples on a variety of demographic and health-related variables showed a difference significant at the .10 level. Sixty-two patients completed the pretest questionnaire and a small sample of nine patients completed the posttest. Virtually all persons asked to complete questionnaires at this site agreed.

#### *Use of Cross-Sectional Versus Longitudinal Samples*

In those cases where a very large sample size was required for analyses, the cross-sectional sample from Time 1 was used. In those cases where data were gathered only at the pre- or posttest, analyses were necessarily limited to only the pretest or only the posttest sample. Whenever possible and appropriate, longitudinal rather than cross-sectional analyses were performed. The longitudinal sample included all patients who completed both the pretest and the posttest questionnaire and, in the case of the lecture and social support treatments, attended at least 50 percent of the classes. Experimental group patients who failed to attend half their classes were excluded from this sample because they cannot be said to have received the treatment to which they were assigned.

The resultant sample sizes. Table 3-1 presents the distribution of participating patients by site and by treatment for the 200 persons who completed the pretest version of the questionnaire. Table 3-2 presents a similar distribution for the 120 patients who completed the posttest questionnaire. Table 3-3 shows the distribution by treatment of the 77 patients who comprised the longitudinal sample, that is, filled out both the pre- and posttests. The proportion of patients in each treatment group completing both pre- and posttests did not differ significantly ( $\chi^2 = 1.06$ ; d.f. = 2).

Were the treatment groups different from one another at Time 1? The abbreviations and index scale values of the variables on which the groups are compared, and of all other indices, are listed in Table 3-4. These measures are described in detail further on in this chapter.

Table 3-5 presents the means and standard deviations by site and group on a number of demographic and health related variables. This table compares, by a series of F tests, all those who completed the pretest version of the questionnaire.

Table 3-1

Distribution of Patients by Site and Treatment at the Pretest

| Treatment      | City | <u>Site</u> |            | Total |
|----------------|------|-------------|------------|-------|
|                |      | Rural       | University |       |
| Social Support | 49   | 24          |            | 73    |
| Lecture        | 39   |             |            | 39    |
| Control        | 26   |             | 62         | 88    |
| Total          | 114  | 24          | 62         | 200   |

Table 3-2

Distribution of Patients by Site and Treatment at the Posttest

| Treatment      | City | <u>Site</u> |            | Total |
|----------------|------|-------------|------------|-------|
|                |      | Rural       | University |       |
| Social Support | 40   | 15          |            | 55    |
| Lecture        | 33   |             |            | 33    |
| Control        | 23   |             | 9          | 32    |
| Total          | 96   | 15          | 9          | 120   |

Note: 12 City, 1 Rural, and 7 University patients in the posttest sample failed to complete the pretest.

Table 3-3

Distribution of Patients by Treatment for the Longitudinal Sample

| Treatment      | <u>N</u> | % of Sample       |
|----------------|----------|-------------------|
| Social Support | 36       | 47.4              |
| Lecture        | 23       | 52.3              |
| Control        | 18       | 58.1 <sup>1</sup> |
| Total          | 77       | 51.0              |

Note: The total N for calculation of percentages is all City and Rural patients who filled out the pretest questionnaire or the post-test questionnaire or both.

<sup>1</sup>University control patients are excluded from this calculation.

Table 3-4

Indices, Abbreviations, and Range of Values Used in Tables

| Abbreviation | Variable or Index Name                             | Scale Values                                              |
|--------------|----------------------------------------------------|-----------------------------------------------------------|
| Age          | Age                                                | actual age                                                |
| Education    | Education                                          | 1 = none<br>8 = master's or doctoral degree               |
| Time HBP     | Time patient first informed of high blood pressure | 1 = less than one month ago<br>6 = 4 or more years ago    |
| Sys BP       | Systolic blood pressure                            | actual blood pressure in millimeters of mercury           |
| Dias BP      | Diastolic blood pressure                           |                                                           |
| Somatic      | Somatic Complaints                                 | 1 = never or a little of the time<br>4 = most of the time |
| Anxiety      | Anxiety                                            |                                                           |
| Depression   | Depression                                         |                                                           |
| Irritation   | Irritation and Anger                               |                                                           |
| Pos Affect   | Positive Affect                                    |                                                           |
| Self-esteem  | Self-esteem                                        | 1 = slightly or not at all<br>4 = very                    |

Table 3-4 (continued)

| Abbreviation   | Variable or Index Name                                                    | Scale Values                                                                                                        |
|----------------|---------------------------------------------------------------------------|---------------------------------------------------------------------------------------------------------------------|
| Interference   | Interference with Activities                                              | 1 = high blood pressure doesn't interfere at all<br>4 = it interferes a great deal                                  |
| % Attend       | Percent of Class Meetings Attended                                        | actual percentage                                                                                                   |
| Restr Food     | Consumption of Restricted Foods                                           | 1 = none<br>2 = some                                                                                                |
| Fill Pre       | Fill Prescription Promptly                                                | 1 = filled more than one week after getting prescription<br>5 = filled the same day prescription was received       |
| Refill Pre     | Refill Prescription Promptly                                              | 1 = prescription not yet re-filled<br>6 = prescription filled one week or more before patient ran out of medication |
| Take Medicines | Adherence in Taking Medication                                            | 1 = not taking medicines<br>5 = never forgets to take medicine                                                      |
| Pill Disc S    | Discrepancy between number of pills taken and prescribed (self-report)    | } actual discrepancy                                                                                                |
| Pill Disc R    | Discrepancy between number of pills taken and prescribed (medical record) |                                                                                                                     |

Table 3-4 (Continued)

| Abbreviation | Variable or Index Name                                 | Scale Values                                                    |
|--------------|--------------------------------------------------------|-----------------------------------------------------------------|
| Adhere SV    | Adherent Self-View Vignettes                           | 5 = adherent<br>1 = nonadherent                                 |
| Knowl Reg    | Knowledge of Medical Regimen                           | 2 = correct knowledge<br>1 = incorrect knowledge                |
| TF Test      | True-False Test of knowledge about high blood pressure | 0 = all items incorrect<br>10 = all items correct               |
| Demands      | Demands of the Regimen                                 | index composed of standard scores<br>-1.3 = low<br>1.3 = high   |
| Change       | Changes in Eating and Living Habits                    | 1 = less than I would want<br>2 = much more than I want         |
| Comp Motives | Competing Motives                                      | 1 = greatly reduced ability<br>4 = has had no effect            |
| Help Conc    | Help in Adhering of Others' Concern                    | 1 = greatly reduced ability<br>7 = greatly increased ability    |
| Tangible Sup | Tangible Support of Health Care System                 | 1 = very inadequate<br>4 = very adequate                        |
| Conseq       | Consequences of Nonadherence                           | 1 = it won't affect my health<br>5 = it will eventually kill me |

Table 3-4 (Continued)

| Abbreviation     | Variable or Index Name                              | Scale Values                                           |
|------------------|-----------------------------------------------------|--------------------------------------------------------|
| Intrinsic Motive | Self-Mediated (Intrinsic) Motivation for Adherence  | 1 = has had no effect<br>4 = greatly increased ability |
| Extrinsic Motive | Other-Mediated (Extrinsic) Motivation for Adherence |                                                        |
| Friends          | Number of Friends and Social Visits                 | 1 = low<br>9 = high                                    |
| SS Boss          | Social Support of Boss                              | 1 = low social support<br>5 = high social support      |
| SS Spouse        | Social Support of Spouse                            |                                                        |
| SS Friend        | Social Support of Best Friend                       |                                                        |
| SS M.D.          | Social Support of Physician                         |                                                        |
| SS Behav         | Support Behaviors                                   | 9 = not at all<br>4 = four or more times               |
| Concern          | Concern of Others                                   | 1 = almost none<br>4 = a lot                           |
| Give SS          | Ability to Give Social Support                      | 0 = low<br>4 = high                                    |
| Accepts SS       | Ability to Accept Social Support                    | 1 = very uncomfortable<br>4 = very comfortable         |
| Trust            | Trust in Others                                     | 1 = low<br>2 = high                                    |



Table 3-5

Differences by Site and Treatment Groups at the Pretest

| Characteristic | City                       |      |                     |      |                     |      | Rural                      |      | University          |      | <u>F</u> | <u>p</u> < |
|----------------|----------------------------|------|---------------------|------|---------------------|------|----------------------------|------|---------------------|------|----------|------------|
|                | Social Support<br><u>X</u> | s.d. | Lecture<br><u>X</u> | s.d. | Control<br><u>X</u> | s.d. | Social Support<br><u>X</u> | s.d. | Control<br><u>X</u> | s.d. |          |            |
| Age            | 48.7                       | 13.0 | 49.6                | 13.1 | 52.4                | 12.4 | 47.3                       | 11.0 | 44.6                | 12.7 | 2.10     | .10        |
| Education      | 5.1                        | 1.5  | 4.3                 | 1.6  | 4.4                 | 1.7  | 4.9                        | 1.6  | 5.5                 | 1.8  | 3.84     | .01        |
| Time HBP       | 4.4                        | 1.7  | 4.6                 | 1.7  | 4.7                 | 1.6  | 3.8                        | 1.6  | 4.8                 | 1.4  | 2.29     | .10        |
| Sys BP         | 141.0                      | 25.9 | 142.0               | 24.7 | 145.0               | 25.4 | 144.0                      | 21.1 | 138.0               | 22.1 | 0.48     | NS         |
| Dias BP        | 87.1                       | 13.0 | 90.5                | 16.6 | 86.0                | 12.9 | 90.6                       | 13.0 | 98.5                | 10.3 | 6.67     | .001       |
| Somatic        | 1.7                        | 0.5  | 1.8                 | 0.5  | 1.7                 | 0.5  | 1.5                        | 0.4  | 1.7                 | 0.4  | 1.72     | NS         |
| Depression     | 1.8                        | 0.7  | 1.8                 | 0.9  | 1.9                 | 0.4  | 1.3                        | 0.8  | 1.7                 | 0.5  | 2.92     | .05        |
| Anxiety        | 1.9                        | 0.7  | 2.1                 | 1.0  | 2.1                 | 0.8  | 1.8                        | 0.6  | 1.9                 | 0.7  | 1.00     | NS         |
| Irritation     | 1.9                        | 0.6  | 2.1                 | 0.6  | 2.1                 | 0.6  | 1.8                        | 0.7  | 1.8                 | 0.5  | 1.33     | NS         |
| Pos Affect     | 2.5                        | 0.8  | 2.4                 | 0.8  | 2.7                 | 0.7  | 2.8                        | 0.7  | 2.7                 | 0.7  | 1.49     | NS         |
| Self-esteem    | 3.5                        | 0.5  | 3.4                 | 0.5  | 3.5                 | 0.6  | 3.5                        | 0.5  | 3.4                 | 0.5  | 0.06     | NS         |
| Interference   | 1.5                        | 0.8  | 1.4                 | 0.8  | 1.4                 | 0.7  | 1.1                        | 0.2  | 1.2                 | 0.4  | 2.35     | .10        |
| Fill Pre       | 4.5                        | 0.9  | 4.7                 | 0.9  | 4.6                 | 0.7  | 4.6                        | 0.9  | 4.4                 | 1.1  | 0.38     | NS         |

Table 3-5 (continued)

| Characteristic | City        |                 |              |      |              |      | Rural       |                 | University   |      | F    | p<  |
|----------------|-------------|-----------------|--------------|------|--------------|------|-------------|-----------------|--------------|------|------|-----|
|                | Social<br>X | Support<br>s.d. | Lecture<br>X | s.d. | Control<br>X | s.d. | Social<br>X | Support<br>s.d. | Control<br>X | s.d. |      |     |
| Knowl Reg      | 1.6         | 0.3             | 1.7          | 0.3  | 1.8          | 0.2  | 1.8         | 0.2             | 1.8          | 0.3  | 1.68 | NS  |
| TF Test        | 7.4         | 1.7             | 7.4          | 1.9  | 7.0          | 2.3  | 7.0         | 1.4             | 8.2          | 1.3  | 3.56 | .01 |
| Demands        | -.03        | .59             | .16          | .54  | -.21         | .51  | -.26        | .51             | .05          | .56  | 3.09 | .05 |
| Friends        | 4.7         | 2.2             | 4.2          | 1.6  | 4.7          | 2.0  | 5.5         | 1.7             | 5.3          | 2.0  | 2.22 | .10 |
| SS Boss        | 3.4         | 1.3             | 3.3          | 1.3  | 3.6          | 1.4  | 3.7         | 1.2             | 3.7          | 1.1  | 0.29 | NS  |
| SS Friend      | 3.9         | 1.0             | 4.1          | 0.8  | 4.1          | 0.9  | 4.3         | 0.7             | 4.0          | 0.9  | 0.78 | NS  |
| Accepts SS     | 3.4         | 0.6             | 3.4          | 0.7  | 3.3          | 0.8  | 3.2         | 0.6             | 3.3          | 0.7  | 0.49 | NS  |

Most of the differences in Table 3-5 were probably due to differences in the locations of the sites. Patients at the University clinic were drawn in part from the university community. Not surprisingly, they were younger and better educated than patients at other sites and scored higher on the test of knowledge about hypertension. Their diastolic blood pressures were also higher suggesting that problem cases are particularly sent to the university clinic.

City clinic patients had fewer friends and less social contact with friends than did patients at other sites suggesting differences in urban, rural, and university community lifestyles. They were also more frequently depressed, especially in comparison to patients at the Rural clinic. Control group patients at the City clinic reported less demanding medical regimens than other City and University patients.

The Rural patients had learned of their hypertension more recently than had the other groups. They reported that the demands of their medical regimens were less stringent, especially relative to the City lecture group, and they reported that their illness interfered less with their normal activities. Data from patient medical records showed no differences in the number of different medications and the total number of pills doctors prescribed for patients at the three sites.

Combining the patients across sites into three treatment groups greatly attenuated these differences. Of 20  $F$  statistics, only 4 remained significant at  $p < .10$ , 1 (education) at  $p < .05$ , and 1 (diastolic blood pressure) at  $p < .01$ . These are close to the number of significant differences one would expect to find by chance among a randomly constituted set of groups. Thus despite the problems of generalizing from samples of opportunity, the data show that there was relatively little bias in the pretest cross-sectional sample from one treatment to another.

Were there significant initial differences by site and treatment in who was excluded from and included in the longitudinal sample? Patients who did and did not meet the criteria for inclusion in the longitudinal sample were compared separately for each treatment group on each of the 20 variables already presented in Table 3-5. This yielded 60 comparisons. University patients were

excluded from this analysis since they were never intended to be part of the longitudinal sample.

Of the 60 comparisons, eight (13 percent) were significant at  $p < .10$ . This is slightly above the percentage one might expect by chance. Table 3-6 shows the means, standard deviations, and  $t$  statistics for the eight comparisons which reached significance at the .10 level.

The persons in the social support longitudinal sample were quite representative of all social support patients, although they had somewhat fewer friends and were slightly more adherent according to self-reported promptness in filling their initial prescriptions for medications. Lecture group patients in the longitudinal sample were also higher than their peers in adherence in filling initial prescriptions. Apparently, then, the most adherent patients tended to come to the experimental classes and fill out the study posttest questionnaire. Control patients did not have any classes to miss, and thus the longitudinal control sample was not self-selected for such commitments.

There were no significant differences in adherence measures between control patients in the longitudinal and non-longitudinal samples. Longitudinal sample lecture patients were less frequently depressed, tended to be more irritated than other lecture patients, and were slightly more accurate in reporting their regimens (as judged by comparing their self-reports with their medical records).

Control patients in the longitudinal sample were an average of 18 years older than other control patients and experienced more somatic complaints such as headaches and dizziness. Perhaps they were motivated to contribute to medical science by their discomfort and their closer proximity to the age range when death becomes more probable. Younger persons might not have been as attracted to a control treatment because of their documented lower interest in health related behavior. (See the review by Kasl, 1974, for studies examining age and health behavior.)

Medical record data showed no differences among longitudinal and non-longitudinal sample patients, regardless of treatment, on the number of medications and amount of each prescribed.

To summarize the above analyses, there was little evidence of any consistent differences by treatment group between patients

Table 3-6

Significant Differences Between Persons Remaining in Longitudinal Sample and Not Remaining, for Each Treatment Group

| Treatment | Variable   | <u>Longitudinal Sample</u> |      |                |      | <u>t</u> | <u>p</u> < |
|-----------|------------|----------------------------|------|----------------|------|----------|------------|
|           |            | Not remaining<br>X         | s.d. | Remaining<br>X | s.d. |          |            |
| Social    |            |                            |      |                |      |          |            |
| Support   | Friends    | 5.4                        | 1.8  | 4.6            | 2.2  | 1.70     | .10        |
|           | Fill Pre   | 4.3                        | 1.1  | 4.8            | 0.6  | -1.98    | .10        |
| Lecture   | Depression | 2.3                        | 1.2  | 1.5            | 0.5  | 2.55     | .05        |
|           | Irritation | 2.5                        | 0.9  | 1.8            | 0.3  | 1.99     | .10        |
|           | Knowledge  | 1.5                        | 0.3  | 1.8            | 0.3  | 1.99     | .10        |
|           | Fill Pre   | 4.2                        | 1.4  | 5.0            | 0.2  | -2.48    | .05        |
| Control   | Age        | 39.1                       | 11.9 | 57.5           | 8.2  | -4.45    | .001       |
|           | Somatic    | 1.4                        | 0.3  | 1.9            | 0.5  | -2.46    | .05        |

included in the longitudinal sample and those who were excluded. Only self-reported adherence in filling prescriptions could be considered a useful predictor of adherence in attending classes and completing both questionnaires. This relationship would probably have been stronger if the self-report measure was not subject to ceiling effects (discussed shortly). All in all, Table 3-6 showed that what differences there were between persons included and excluded from the longitudinal were minimal, nonconsistent across treatments, and at about chance level of occurrence.

Table 3-7 examines pretest means on the same 20 variables by site and treatment group for the longitudinal sample. In this way we can determine the extent to which the treatment longitudinal samples were well-matched with one another at pretest. University patients were again excluded from this analysis. The four longitudinal groups were quite similar at Time 1. Only four differences out of 20 reached significance at the .1 or .05 level and none were significant at the .01 level. The control patients were older and the Rural social support patients more adherent than the others in the longitudinal sample because of the selection shown in Table 3-6. The differences in the time that patients were first told of their high blood pressure and in the frequency with which they were depressed, parallel those shown for the entire sample in Table 3-5. Once again, examination of medical records showed no differences among groups in the number or amount of different medications prescribed for patients. All in all, there were fewer initial differences among sites and treatments for the longitudinal sample patients than for the entire sample at Time 1, and collapsing the sample across sites into three treatment groups, therefore, seemed justified.

Role of age. Variables which showed significant between-treatment differences in Tables 3-5 through 3-7 were examined to see if they were correlated with age because age was one of the major variables differing significantly among the groups. Perhaps the differences were due to age. None of the variables for which there were significant between-group differences showed any significant correlation with age. In fact, age was correlated significantly with only a few measures in the entire set and all of these relationships were relatively weak (.19 with Social Support from

Table 3-7

Pretest Differences by Site and Treatment Groups  
for the Longitudinal Sample

| Characteristic | City               |                 |                     |      |                     |      | Rural              |                 | <u>F</u> | <u>p</u> < |
|----------------|--------------------|-----------------|---------------------|------|---------------------|------|--------------------|-----------------|----------|------------|
|                | Social<br><u>X</u> | Support<br>s.d. | Lecture<br><u>X</u> | s.d. | Control<br><u>X</u> | s.d. | Social<br><u>X</u> | Support<br>s.d. |          |            |
| Age            | 52.0               | 11.7            | 48.5                | 13.3 | 57.5                | 8.2  | 45.1               | 8.0             | 3.15     | .05        |
| Education      | 5.0                | 1.3             | 4.6                 | 1.7  | 4.3                 | 1.8  | 5.0                | 1.8             | 0.76     | NS         |
| Time HBP       | 4.8                | 1.5             | 4.4                 | 1.7  | 4.6                 | 1.8  | 3.1                | 1.5             | 2.22     | .10        |
| Sys BP         | 141.0              | 28.3            | 141.0               | 24.2 | 143.0               | 21.8 | 137.0              | 15.7            | 0.08     | NS         |
| Dias BP        | 87.0               | 12.4            | 88.4                | 12.6 | 84.6                | 11.1 | 89.5               | 9.9             | 0.40     | NS         |
| Somatic        | 1.8                | 0.6             | 1.7                 | 0.2  | 1.9                 | 0.5  | 1.5                | 0.2             | 1.29     | NS         |
| Depression     | 1.8                | 0.7             | 1.5                 | 0.5  | 2.0                 | 1.0  | 1.4                | 0.4             | 2.76     | .05        |
| Anxiety        | 2.0                | 0.7             | 2.0                 | 0.9  | 2.2                 | 0.8  | 2.0                | 0.8             | 0.41     | NS         |
| Irritation     | 2.0                | 0.6             | 1.9                 | 0.8  | 2.2                 | 0.7  | 2.0                | 1.0             | 0.64     | NS         |
| Pos Affect     | 2.6                | 0.7             | 2.4                 | 0.8  | 2.5                 | 0.7  | 2.6                | 0.8             | 0.17     | NS         |
| Self-esteem    | 3.5                | 0.4             | 3.5                 | 0.4  | 3.4                 | 0.6  | 3.2                | 0.6             | 1.09     | NS         |
| Interference   | 1.6                | 0.9             | 1.3                 | 0.8  | 1.5                 | 0.8  | 1.1                | 0.1             | 2.60     | .10        |

Table 3-7 (continued)

| Characteristic | City                       |      |                     |      |                     |      | Rural                      |      | <u>F</u> | <u>p</u> < |
|----------------|----------------------------|------|---------------------|------|---------------------|------|----------------------------|------|----------|------------|
|                | Social Support<br><u>X</u> | s.d. | Lecture<br><u>X</u> | s.d. | Control<br><u>X</u> | s.d. | Social Support<br><u>X</u> | s.d. |          |            |
| Fill Pre       | 4.7                        | 0.7  | 5.0                 | 0.2  | 4.5                 | 0.6  | 5.0                        | 0.0  | 2.60     | .10        |
| Knowl Reg      | 1.7                        | 0.3  | 1.8                 | 0.3  | 1.8                 | 0.2  | 1.8                        | 0.2  | 0.92     | NS         |
| TF Test        | 7.4                        | 1.7  | 7.5                 | 2.2  | 6.6                 | 2.5  | 6.8                        | 1.7  | 0.88     | NS         |
| Demands        | -.02                       | .60  | .04                 | .58  | -.17                | .51  | -.45                       | .30  | 1.82     | NS         |
| Friends        | 4.4                        | 2.4  | 4.2                 | 2.1  | 4.4                 | 1.6  | 5.2                        | 1.6  | 0.43     | NS         |
| SS Boss        | 3.3                        | 1.4  | 3.2                 | 1.5  | 3.6                 | 1.4  | 3.2                        | 1.5  | 0.21     | NS         |
| SS Friend      | 4.0                        | 1.1  | 4.1                 | 0.6  | 4.2                 | 0.7  | 4.0                        | 0.8  | 0.20     | NS         |
| Accepts SS     | 3.3                        | 0.6  | 3.4                 | 0.6  | 3.4                 | 0.6  | 3.1                        | 0.7  | 0.51     | NS         |



the Physician;  $-.26$  and  $-.24$  with the True-False Test of knowledge, for pre- and posttest respectively;  $.20$  with objective number of pills prescribed at pretest;  $.24$  with systolic blood pressure at pretest; and  $.22$  with amount of Tangible Support from the Health Care System).

## Experimental Design

### *Collection of Data and Implementation of Treatments*

All respondents at City and Rural were administered pre- and posttest questionnaires approximately 8 to 14 weeks apart. University respondents filling out the pretest did so approximately 6 to 12 weeks before posttest patients filled out the questionnaire. There is no importance to this fact since there did not appear to be any major changes in the hospital system, the population samples, or the wider environment during this period of time. (See Campbell & Stanley, 1963, for a discussion of maturation and history as nuisance variables in quasi-experimental designs.)

Approximately one week after the completion of the pretest measures, patients entered the experimental treatments. Control group patients received no treatment other than the normal care provided by their physicians. Lecture group patients attended a series of four weekly one-hour lectures on the nature of high blood pressure and its treatment. Attendance at the lecture sessions ranged from 7 to 22 patients and from 2 to 10 guests of the patients, namely friends and relatives. The average patient attendance was 16.5 at the first session and 10.5 at the fourth. Most of the dropouts from the classes occurred after the first meeting. Patients who missed more than half the meetings were excluded from the longitudinal sample.

The materials for the lectures were based on the ten points of information that patients should know according to the National Task Force on High Blood Pressure (Hypertension Information and Education Advisory Committee, 1973) and several other sources, including materials prepared by Kaunisto, Connelan, & Zweifler (1974). A nurse clinician led these groups. The topics covered are described briefly in Appendix D. The controls at City were sent instructional materials after the posttest. In this way they

received informational benefits as compensation for their efforts, and their physicians had the reassurance that the control patients would derive some benefits from their participation.

Social support group patients attended a series of six, two-hour weekly classes run by a trained nurse clinician. She was often assisted by a person from the project's staff trained in techniques in group dynamics. This treatment condition provided the same factual information as was provided to the lecture group patients, but there was also the provision of social-emotional support through various discussion techniques and role plays dealing with adherence behavior. This treatment is described in more detail in Appendix C.

The social support classes were somewhat smaller than the lecture classes. Attendance ranged from 5 to 13 patients with from 1 to 9 guests. The average patient attendance was 10.7 at meeting one and 7.7 at meeting six indicating less of a dropout problem than in the lecture group. Most of the dropouts occurred after meetings two and four. Patients who missed more than half the meetings were excluded from the longitudinal sample.

The social support group had originally been intended to be a "buddy" group made up of pairs of patients who would then continue to provide support and encouragement for one another outside of the class setting on a long-term basis. A pilot run of procedures indicated that the pairing of co-patients would be very difficult to implement. Patients resisted choosing co-patients, perhaps because the groups were small in size thereby limiting each patient's free choice of an acceptable buddy. Second, persons were being asked to choose a buddy by the end of the second of the six meetings. People found this uncomfortable because it pushed them into a close social relationship at a rate too quick for comfort compared to the rate at which they formed such relationships in other settings. The patients suggested that they be allowed to bring a spouse or relative as a buddy--and this is the final type of pairing upon which we settled.

Not everyone, however, was able to bring a buddy. There were different reasons for this. Some people did not have friends or relatives who could be counted on to be supportive. Second, the

ability to bring a buddy appeared to depend on the time of day during which these sessions were run.

If the classes were run on weekdays during the daytime, then participants were most likely to be housewives and the unemployed and could not bring employed friends and relatives with them. If the classes were run on weekdays in the evening (particularly in the City site which was located in a relatively high crime, low income, residential area of often deteriorating brownstone apartment buildings) persons were likely to come only if they could bring a friend or spouse--for security and protection. If the classes were run on Saturday, then people who probably were motivated to sacrifice weekend leisure time to attend the clinic would show up. These casual observations led us to believe that there is no one time for running patient instruction that would be universally acceptable to all patients and would allow one to draw a genuinely random sample of the patient population into the sessions. The times helped select the patients.

*Sticking to Rigid Treatment Protocols Versus  
Changing Horses in Midstream: What is in the  
Best Interest of Research?*

Prior to beginning the actual collection of data and the running of treatment groups, two pilot groups, one at City and one at Rural, were conducted to test out the interventions for social-emotional support. The experience in running these groups led to the following conclusions: (1) It was clear that several modifications would need to be made in the procedures although much of what we had introduced seemed satisfactory. (2) It was likely that we would want to make alterations with each new social support group on the basis of (a) ideas derived from running each preceding group and (b) differences from group to group in the needs of the patients. A genuinely supportive system should allow for the second factor anyway. The groups were run in succession rather than simultaneously so such alteration from one group to another was feasible.

In a rigidly controlled laboratory study all people are usually subjected to the same treatment only after there is an acceptable treatment in hand. Sometimes a considerable amount of

pretesting is required to develop such a treatment. Such pretesting often takes considerably less time in a laboratory study than in a field experiment. In a laboratory study it may be easy to run six groups of persons in two or three days. On the other hand, in a field experiment such as this one, one might be able to run six pilot variations on the intervention within six months. Consequently, the amount of pilot testing feasible in a field experiment may be severely restricted by the amount of time allocated for running the total study.

Often in field studies, there is an inclination to follow some proposed procedure because that is the procedure one described in a proposal. Yet sometimes in the course of instituting such a procedure it becomes apparent that there are faults in it. Then it seems irrational to follow to the original procedure solely because it was described in a proposal. Sticking with an originally proposed intervention when one sees things wrong with it does great harm to the advancement of science in our opinion. Accordingly, it was felt that flexibility in pretesting new ideas in successive social support groups throughout the course of the study would offer us the best chance of arriving, by the end of the study, at a satisfactory treatment worth evaluating in a more formal, subsequent design. We were fortunate in having a grant agency that supported this strategy. Nevertheless, the danger of constantly changing procedures throughout a study, even a pilot study, should be acknowledged. If the changes occur constantly, then it becomes difficult, if not impossible, to identify a reliable improvement in one's intervention procedures. In a way, the choice between changing procedures as one moves through the study and keeping procedures constant, even though one can see flaws in them which could be improved, represents a dilemma--one that we are not sure can be easily resolved in a pilot effort of this sort.

#### *Methods of Testing Hypotheses*

As is often the case in field experiments, this study is a quasi-experiment rather than an experiment (Campbell and Stanley, 1963), particularly since sampling procedures were not purely random. Nevertheless, tests of hypotheses can be made and

inferences offered as long as some special considerations are followed in applying the statistical techniques (for example, see Kenny, 1975a).

Hypotheses about social support have been tested in this data set in a number of ways because we had multiple measures of social support and both cross-sectional as well as longitudinal data sets for testing. In order to infer which variables were antecedent and which were consequent, the use of cross-lagged correlational techniques have been used. Chapter 4 presents the findings using these techniques and describes the techniques at the beginning of the chapter.

For all analyses of the data, an IBM 370/168 computer was used in conjunction with MIDAS (Fox & Guire, 1973) and OSIRIS (Institute for Social Research, 1973) statistical software packages.

### Measures

This section presents the criteria used for selecting measures. The measures were of the following types: (1) questionnaire self-report, (2) records kept by the physicians on each patient, and (3) physiological measures, namely, blood pressure obtained by the nurses during questionnaire administration. Table 3-8 lists the questionnaire measures, their item length, and the estimated reliabilities of multi-item indices. When a measure was administered both at pre- and posttest, reliabilities for both times were computed. Appendix E presents the content of these measures. The estimated reliability for each index was derived from a formula (see Note, Table 3-8) which bases reliability on the cross-sectional average intercorrelation among all the items in the index and the number of items in the index. Both of these factors positively increase index reliability. However, the amount of increase in reliability attained by adding items with the same average intercorrelation to an existing index yields diminishing returns with each added item. The index of reliability ranges between 0 (completely unreliable) to 1.00 (completely reliable). One hopes for moderately high reliabilities between .60 (36 percent shared variance among the items) and .90 (81 percent shared variance among the items). Should one obtain a reliability as high as 1.00, then there are problems. In such a case the items account for all of

Table 3-8  
Index Reliability

| Measures                          | Number<br>of items | Pretest<br>Reliability | Posttest<br>Reliability |
|-----------------------------------|--------------------|------------------------|-------------------------|
| I. Strain                         |                    |                        |                         |
| A. Somatic Complaints             | 13                 | .864                   | .871                    |
| B. Depression                     | 4                  | .866                   | .914                    |
| C. Anxiety                        | 3                  | .840                   | .775                    |
| D. Irritation and Anger           | 3                  | .834                   | .815                    |
| E. Positive Affect                | 3                  | .658                   | .461                    |
| F. Self-esteem                    | 5                  | .709                   | .672                    |
| G. Interference with Activities   | 5                  | .900                   | .851                    |
| II. Adherence                     |                    |                        |                         |
| A. Intake of Sodium               | 1                  | -                      | -                       |
| B. Intake of Sugar                | 1                  | -                      | -                       |
| C. Intake of Alcohol              | 1                  | -                      | -                       |
| D. Intake of Saturated Fats       | 1                  | -                      | -                       |
| E. Filling Prescriptions Promptly | 1                  | -                      | -                       |

Table 3-8 (continued)

| Measures                                                                   | Number<br>of items | Pretest<br>Reliability | Posttest<br>Reliability |
|----------------------------------------------------------------------------|--------------------|------------------------|-------------------------|
| F. Refilling Prescriptions Promptly                                        | 1                  | -                      | -                       |
| G. Adherence in Taking Medication                                          | 1                  | -                      | -                       |
| H. Discrepancy between # of pills taken and<br>prescribed (self-report)    | 1                  | -                      | -                       |
| I. Discrepancy between # of pills taken and<br>prescribed (medical record) | 1                  | -                      | -                       |
| J. Adherent Self-View Vignettes                                            | 2                  | .1                     | .808                    |
| III. Knowledge of High Blood Pressure and Its Control                      |                    |                        |                         |
| A. Knowledge of Medical Regimen                                            | 6                  | .745                   | .613                    |
| B. True-False Test                                                         | 10                 | .2                     | .2                      |
| IV. Stresses Caused by Demands of the Medical Regimen                      |                    |                        |                         |
| A. Demands of the Regimen                                                  | 8                  | .816                   | .823                    |
| B. Changes in Eating and Living Habits                                     | 2                  | .706                   | .403                    |

Table 3-8 (continued)

| Measures                                              | Number<br>of items | Pretest<br>Reliability | Posttest<br>Reliability |
|-------------------------------------------------------|--------------------|------------------------|-------------------------|
| V. Utility of Source Specific Determinants of Ability |                    |                        |                         |
| A. Competing Motives                                  | 4                  | 1                      | .770                    |
| B. Help in Adhering of Others' Concern                | 2                  | 1                      | .870                    |
| C. Tangible Support of Health Care System             | 7                  | 1                      | .870                    |
| D. Consequences of Nonadherence                       | 1                  | 1                      | -                       |
| VI. Motivation for Adherence                          |                    |                        |                         |
| A. Others-Mediated Motivation for Adherence           | 2                  | 1                      | .872                    |
| B. Self-Mediated Motivation for Adherence             | 2                  | 1                      | .887                    |
| VII. Social Support                                   |                    |                        |                         |
| A. Number of Friends and Social Visits                | 3                  | .606                   | .493                    |
| B. Social Support of Boss                             | 1                  | -                      | 1                       |
| C. Social Support of Spouse                           | 1                  | -                      | 1                       |
| D. Social Support of Best Friend                      | 1                  | -                      | 1                       |
| E. Social Support of Physician                        | 1                  | -                      | 1                       |
| F. Supportive Behaviors                               | 4                  | 1                      | .874                    |



Table 3-8 (continued)

| Measures                            | Number<br>of items | Pretest<br>Reliability | Posttest<br>Reliability |
|-------------------------------------|--------------------|------------------------|-------------------------|
| G. Concern of Others                | 4                  | <sup>1</sup>           | .670                    |
| H. Ability to Give Social Support   | 4                  | .911                   | .891                    |
| I. Ability to Accept Social Support | 4                  | <sup>1</sup>           | .894                    |
| J. Trust in Others                  | 3                  | .735                   | <sup>1</sup>            |

Note: Reliability was measured by the formula  $r_{kk} = \frac{k \bar{r}_{ij}}{1 + (k-1)\bar{r}_{ij}}$  where k = the number of items and  $\bar{r}_{ij}$  = their average intercorrelation (Nunnally, 1967, p. 193).

<sup>1</sup> Not administered at this time.

<sup>2</sup> Index constructed on a priori grounds independent of item intercorrelations.

the variance in the index measure and by definition no other variables (such as predictors or dependent variables) can possibly be related because there is no residual variance in the index to be explained by other measures. Statisticians rarely worry about such possibilities, however, because few indices, particularly in social science, come close to approximating perfect reliability.

The reliabilities for the multi-item indices in this study ranged between .40 and .90. For basic research, reliabilities of  $\geq .60$  are considered adequate by some authorities (Nunnally, 1967). Only three reliabilities out of 34 were below this figure; 20 were above .80.

The patient records were usually available although there were cases when the treating physician would not release them because they were in process or when the records department had released the records to another physician and was unable to get them back in time to meet the deadlines for gathering the data.

#### *Criteria for Selecting Measures*

An attempt was made to use established measures of adherence, of psychological attitudes about health care, of life stresses and psychological and somatic strain, and of other variables relating to the hypotheses of the study. A search of the literature on health care and adherence showed that measures of social-emotional support which fit our particular definition, of self-reported adherence, and of health care attitudes either did not exist or were of questionable reliability. Consequently, the design of measures for the study became a major task. Unless otherwise noted, the measures were developed specifically within the context of this project.

On the other hand, measures of anxiety, depression, somatic complaints, and anger-irritation were available from other studies in which their reliability and validity had been demonstrated amply.

Length of questionnaire. Although we started with a large list of variables that we hoped to assess through questionnaires, some of these had to be eliminated in order to keep the questionnaires at a reasonable length. We decided that each questionnaire should take no more than 30 minutes, on the average. On the basis

of timing from pilot tests at the sites, estimates of the completion time per item were made and the length of the questionnaire was designed accordingly. The final versions of the questionnaires had estimated times of 33 minutes per questionnaire for a relatively slow reader.

### *Construction of Indices*

The construction of multi-item indices used the following criteria: (1) The item should be significantly correlated .20 or higher with all other items purporting to measure the same construct. (2) The item should be more highly correlated with the items in its index than with items in other indices. This latter criterion provides evidence of discriminant validity. (3) The items should not be part of an index unless they were so considered on theoretical, a priori grounds.

The index construction was performed on the total sample of respondents, regardless of treatment group. The pretest questionnaire was used for this purpose except where there were new measures introduced in the posttest questionnaire. In the latter case, cross-sectional item analyses were performed on the posttest sample for the total sample of patients.

Ordinarily the construction of new indices is performed on a sample other than the one upon which data will be gathered for study, or else on a random half of the sample with cross-validation on the other half. The size of the total sample was not large enough for this purpose. Consequently there is some possibility that the actual reliabilities of the measures in another sample might be somewhat lower, and therefore, that the relationships among measures in another sample might also be somewhat lower. There were generally more than ten persons per each item for each index, an acceptable rule of thumb. Therefore, the reliabilities of the new indices should not drop too much when applied to another similar sample of patients. The reliabilities of previously established indices held up very well in this study, and there is no reason to expect them to drop in a similar sample.

### *Description of the Measures*

This section provides a brief, general description of the measures in this study.

Blood pressure. Systolic and diastolic pressure measurements were obtained by the nurses when the patients completed their questionnaires and accordingly had been seated at least 15-20 minutes. The nurses took resting blood pressures in the following manner:

Blood pressure was recorded in the left arm with a baromanometer unless there was some health reason which necessitated taking the reading from the right arm (the case with one patient). A seat with an arm rest designed at Henry Ford Hospital was used at City to provide standardized measuring conditions. The arm rest assures that the forearm rests on a flat surface, palm facing upward, with the upper arm at heart level. The mercury gauge was read at eye level in good lighting. The cuff was applied one inch above the bend in the arm, and the cuff size was appropriate for the size of the arm. The cuff was deflated at a rate of two mm Hg./second and read to the nearest calibration. Readings were recorded at the beginning and disappearance of the Korotkoff sounds. A diaphragm stethoscope was used with eartips pointed face forward. The accuracy of the nurses' readings had been checked against the readings of other nurses and physicians and was judged accurate.

Psychological and somatic indicators of strain. Somatic Complaints, Anxiety, Depression, Irritation-Anger, and Positive Affect were measured by questionnaire. Somatic Complaints was derived from scales used in the nation-wide study, Americans View Their Mental Health (Gurin et al., 1960), and by psychiatric research by Langner (1962). The index of Depression overlaps with that developed by Zung (1965) and Spielberger, Gorsuch, and Lushene (1970). The measures of Depression, Anxiety, and Irritation were further validated by the research of Cobb (1970), and the first four measures showed relationships to occupational stresses in a study of 2,010 employees from 23 occupations (Caplan, Cobb, French,

Harrison, & Pinneau, 1975). Although items measuring Positive Affect (I feel good, I feel cheerful, I feel calm) were previously embedded in measures of anxiety and depression in the above studies, in this study they clearly stood apart as a separate cluster and so were treated as a separate index. All of these indices used the same length response scale. They were oriented toward the measurement of states rather than traits.

It is possible to measure state anxiety rather than trait anxiety by simply changing the time perspective in the stem for the items (Spielberger, 1972) from a vague time referent (e.g., "How do you generally feel") to a present time referent (e.g., "How have you felt during the last two days" or "six weeks," et cetera). Trait anxiety would tap a personality disposition. We were interested, however, in anxiety that varied as a function of the health-care environment. Consequently the stem was worded to reflect how the person felt nowadays rather than how the person generally felt: "When you think about yourself and your daily life nowadays (or at posttest 'during the last six weeks'), how much of the time do you feel this way?" Similar wording of the stem was used in measuring Somatic Complaints so that we would be most likely to tap symptoms which had arisen lately: "How often have you experienced any of the following in the last month?"

The measure of Somatic Complaints included a variety of symptoms (e.g., sweating palms, upset stomach, loss of appetite, heart beating faster than usual) which have been observed in persons suffering from neuroses or from severe psychological stress (bankruptcy, failure in an examination, disasters, learning one has a potentially threatening illness, and so forth).

The measure of Anxiety included items referring to nervousness and being jittery and fidgety. Depression contained items such as feeling depressed, sad, blue, and unhappy. The items assessing Irritation included being angry, aggravated, and irritated or annoyed.

Self-esteem was measured by five items which were derived from a large number of indices of self-concept (none of these indices had any apparent superiority over all others; Robinson & Shaver, 1969). According to self-identity theory (French & Sherwood, 1963), a person's self-concept is not unitary. People have various

identities and an esteem associated with each one of them. The person who feels high esteem in the role of chef of a restaurant may suffer low esteem in the role of homemaker after work. Consequently, to measure esteem, one should have some idea of the role or self-identity which is to be tapped. In our case we were interested in patient-role esteem. Consequently some of the items were directly tied to this role: "Value myself enough to want to keep in the best health," and "Capable of taking care of my health." Other items were meant to be more encompassing of all roles: "Successful in efforts," "Able to help others," and "Value myself highly. All these items were intercorrelated and, by our criteria, were formed into a single index of esteem.

Behavioral indicators of strain. Respondents were asked to indicate the extent to which their high blood pressure was interfering with or preventing them from engaging in a number of normal activities such as going to movies or a restaurant, visiting friends, and working. The five items in the scale formed a single index referred to as Interference with Activities.

Adherence. The study includes both objective and subjective (self-report) measures of adherence. The objective measures included: (1) the percentage of meetings attended by persons in the social support and lecture group treatments, (2) changes in blood pressure, and (3) whether or not people returned to complete the posttest questionnaire. The latter is not adherence with the regimen, per se, but it may reflect adherence. If so, it should have the same motivational determinants.

The subjective or self-report measures of adherence are probably a function of two variables: the extent to which the patient believes that adherence is or is not taking place, and the extent to which the patient is willing to share this belief with others. We did not have enough space in the questionnaire to add measures of defensive response tendencies so we can only speculate as to the relative contributions of these two variables.

Several subjective measures of adherence were obtained.

(1) Persons were asked to report the types of dietary restrictions expected of them and were also asked to report how many servings or helpings of various categories of food they consumed in a day on the average. The definition of a serving was intentionally left

vague and remains problematic. It is unlikely that patients could be accurate even if one specified the serving size in ounces or grams. These variables turned into essentially dichotomous measures of the following type: either the person reports no such servings, or the person reports one or more servings. The distribution of scores indicated any other type of scaling would be expecting more from the data than it could provide. Since violations of different dietary restrictions did not intercorrelate very highly, each was left as a separate measure of adherence.

(2) We asked people to report on their habits with regard to filling and refilling prescriptions. Did they fill (and refill) the prescription before it ran out, when it ran out, or afterwards? Several time intervals were specified, yet most people reported perfect adherence. They indicated filling or refilling their prescriptions either on the first day of the start of the prescription or just before it ran out, if it was a refill. Again, we have effectively a dichotomous scale: those who filled their prescriptions on time and those who were slightly late. We have no objective basis for judging if the respondents were mostly conscientious because we did not examine the date of refills on the bottles of medication in this study. If one assumes that response biases systematically cause people to put themselves in a good light on a questionnaire, then the reports of refilling may represent relative adherence rather than the absolute degree. This relative quality may be adequate for our analyses because we are concerned with predicting relative adherence rather than presenting population norms even though we would have preferred to have the actual dates of filling from the prescriptions.

(3) Respondents also indicated whether or not they were adherent in Taking their Medications (I never miss, I rarely miss, I take it when I feel like it, and so forth). Again the majority of persons at pretest reported that they never miss (53.9 percent) and the remaining people largely indicated they rarely miss. Consequently, this measure was effectively a dichotomous variable that is most likely to indicate the relative degree of adherence rather than the absolute amount.

(4) Persons were also asked to indicate the number of pills from all their medications for high blood pressure that they were

supposed to take in "the past three days" and the number of pills they actually took.\* The discrepancy provides a possible measure of subjective adherence.

The patient reports of the number of pills they had actually taken was also checked against the amount prescribed in the patient medical record as another measure of adherence. It is conceivable that many patients believed that they were adherent because they were doing what they thought they were expected to do. Nevertheless many of the same patients could be objectively nonadherent because they misunderstood what they were supposed to do.

We encountered occasional difficulties in deriving expected pill counts from the medical records. Dosages were often recorded only in milligrams without noting whether or not the pills were going to be purchased in sizes of full or fractional dosage. We followed a rule of thumb because we did not have access to pharmacy records nor to the pill bottles in many instances: if the patient's report could agree with one of the pill sizes, we gave the patient the benefit of the doubt. Consequently we may have overestimated adherence in an absolute sense. This decision rule was applied to all persons in the social support, lecture, and control groups.

Although tranquilizers may be prescribed for some patients who are also hypertensive, they are not considered antihypertensive medication nor does any research indicate that they have a clinically significant effect on blood pressure. We decided not to count tranquilizers in patients' reports of the medications they were supposed to take for high blood pressure. This policy was followed regardless of whether or not the patients' physicians felt that tranquilizers would reduce blood pressure and regardless of whether or not the physicians told the patients this would be the case in order to set the patients at ease (no information on either of these practices was available). The effects of tranquilizers

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\*Although pills and tablets are technically different, patients appear to think of them as the same and to think of pills as referring to both pills and tablets. The term "pills" was used in the questionnaires to refer to both. Potassium supplements in liquid form, however, were not covered by such terminology.



were discussed in the lecture and social support treatment groups. So patients who had been given tranquilizers would not stop taking their diuretics or antihypertensive drugs when they suddenly felt calm and collected due to the tranquilizer, they were told that tranquilizing drugs are not considered antihypertensive drugs by either the Task Force on High Blood Pressure of the National Heart and Lung Institute or by other respected authorities.

(5) We also had patients rate themselves on a two-item Adherent Self-View scale on the extent to which they saw themselves, overall, as adherent or not. One item consisted of a pair of vignettes, one member of the pair describing a patient who did not give much thought to his high blood pressure as a health problem, and the other describing someone who was very concerned. Persons rated the extent to which they saw themselves as like one or the other of these persons. A second item presented a single vignette describing two persons, both of whom were very interested in doing something to lower their blood pressure, but one of whom was forgetful at times about medications and the other of whom was very careful and systematic in adhering. Patients rated the extent to which they were like one or the other of these patients. These items may be more effective as subjective predictors of objective adherence than the preceding measures because they may arouse less defensiveness. The vignettes do not force patients to tell all about specific adherence behaviors but merely to indicate "the extent to which" they are like one or the other patient.

Knowledge of high blood pressure and its control. Two measures were used here. The first was a six-item index assessing the extent to which patients could correctly report the requirements of their own medical regimens. This included the name of one medication that they were supposed to take for their high blood pressure, its color, the dosage, and the number of times per day that they were supposed to self-administer it. They were also asked the total number of different medicines and the total number of pills from all of them which they were supposed to take in a three-day period. The accuracy of this knowledge was determined by checking prescriptions recorded in the patient medical record.

In rare instances the nurses suspected that the patient was correct and the record was in error. It was not feasible to check this possibility with the particular physician so the doctor was always given the benefit of the doubt. (A few patients showed potentially dangerous misunderstandings of their regimens. The nurses took immediate steps to put these patients in contact with their physicians.) All these items of information formed a single index called Knowledge of Regimen.

Second we prepared a True-False Test of information covered in both the lecture and social support conditions. The item content drew largely from information patients with high blood pressure should know according to the National High Blood Pressure Education Program (Hypertension Information and Education Advisory Committee, 1973). A separate form of the test was used in the posttest questionnaire. Consequent analyses examined the pretest-residualized change in standardized scores from pretest to posttest in experimental groups, using the change in scores in the control group as the baseline.

Stresses caused by demands of the medical regimen. The person was asked to indicate whether or not the physician recommended restricting the intake of various types of foods: salty foods, foods with sugar (sweets), alcohol, and foods with saturated fats. The patient also indicated whether or not weight reduction was part of the regimen. Self-reports of the number of different medications and the total number of pills prescribed for high blood pressure were also obtained. Accurate or not, these self-reports represent a measure of the perceived demand of the regimen. Finally one additional item asked the patient to rate how difficult it was to do all that the doctor had asked. These items all constituted a single index referred to as Demands of the Regimen. Since these items used very different response scales, the index score was computed from the standardized scores rather than the raw scores for each item at Time 1. At Time 2 a "quasi-standardization" for each item was performed using the mean and standard deviation for the corresponding item at Time 1. The item scores were then averaged to form the index. This procedure preserved the differences between the pretest and the posttest scores without allowing items with extended scales to dominate the indices.

A separate index was formed of two other items which asked the patient to rate the extent to which changes in eating and living habits requested by the physician presented the patient with more, less, or about as much as the patient wanted to do. Patients who indicated that the physicians had not asked them to make any such changes were excluded in analyses of this index.

Utilities and motives as determinants of adherence. Although there has been much good thought put into the subjective expected utility of an act as a determinant of if that act will take place (e.g., Lawler, 1971; Vroom, 1964; Atkinson & Feather, 1966), the idea has been rarely discussed and studied in the area of health care. (Exceptions include the work of Rosenstock and colleagues [1966; Becker, 1974] and a study of quitting smoking by Mausner, 1973.) As a result, little in the way of instruments has been developed for studying the adherence behavior of patients. Generally the subjective expected utility of a behavior such as adherence is expected to be a function of the probability that the act will or will not lead to improved health, the probability that not doing the act will or will not lead to improved health, the value of improved health, and the value of goals other than improved health which might be competing. In an already overburdened questionnaire, there was no space for the independent assessment of these factors for a wide variety of facets in the health care system. Consequently some compromises were made. The compromises involved directly asking respondents the extent to which various aspects of the health care environment had been helpful to them in leading to the control of high blood pressure. The following measures were assessed in the posttest questionnaire only.

Patients were asked to rate the adequacy of the following in helping them reach the goal of controlled blood pressure: information from the physician and from other sources, overall service provided by the clinic, the medicines received for high blood pressure, and the physician's knowledge about the treatment of high blood pressure. These items form an index referred to as Tangible Support of Health Care System.

As an overall assessment of the perceived instrumentality of all of the physician's recommendations to patient, the patient was asked to rate the extent to which not following these recom-

mendations would lead to consequences scaled from (1) "It won't affect my health," to (3) "It will be somewhat bad for my health," to (5) "It will eventually kill me."

Patients were asked about whether or not certain potential outcomes or rewards of treatment had any effect on their ability to "strictly follow" their doctors' advice. Two of these outcomes deal with rewards which are under the patient's control or are self-mediated (intrinsic): (1) the possibility of avoiding a heart attack or stroke, and (2) the possibility of lengthening your life. The other two outcomes deal with rewards which are under the control of others or are other-mediated (extrinsic): (1) gaining your doctor's approval, and (2) gaining your spouse's approval (if no spouse, a close relative or friend).

The extent to which each of these possible outcomes or goals has increased the patient's ability to adhere may be taken as an indication of the value of the goal multiplied by the expectancy that adherence will lead to the goal. As such each item indicates whether or not it is a source of motivation for the patient.

Although all four items were significantly intercorrelated, the correlations between the two self-mediated items and among the two other-mediated items was markedly higher than that among self-mediated and other-mediated items. This pattern of correlations indicates the discriminant validity of distinguishing between the two sources of motivation for adherence. Consequently the two sets of items were maintained separately for study and were referred to as Self-Mediated Motives for Adherence and Other-Mediated Motivation for Adherence. Wherever both indices behaved in the same manner in analyses, they were combined and referred to as Motivation for Adherence.

Patients were asked whether or not various potentially competing goals had reduced their abilities to "strictly follow your doctor's advice?" These Competing Motives included liking certain foods, having to spend money and time on other things besides health care, and having to think about other things besides one's high blood pressure. Other items directly asked the patients to what extent other facets of the health care environment had either increased or decreased their ability to follow the physician's

advice. These facets dealt with the interest and concern shown by the doctor and by the spouse (or, if no spouse, a relative or close friend). In order to estimate just how much interest and concern was provided by the physician and spouse, the patient was asked for ratings of these dimensions. In addition, measures of social support which dealt specifically with support from physician and spouse were obtained and these are described below.

Social support was measured in a variety of ways in addition to membership in the experimental treatment of social-emotional support. First we developed a measure referred to as Friends and Social Visits which is composed of self-reports of the number of persons the patient talked to about his or her high blood pressure, the number of close friends within 45 minutes travel, and the number of times any of these friends was visited.

A second measure of social support presented two vignettes, one of a warm, friendly, supportive person, and one of a cold, unfriendly person. These vignettes were based on our definition of social support presented in Chapter 2. Patients then rated the extent to which (1) their supervisor at work, (2) their spouse (if not married, their closest relative), (3) their best friend or acquaintance within 45 minutes drive, and (4) their doctor who treats their high blood pressure, were like either one or the other vignette. These sources of potential support (or lack of it) are not necessarily related to one another. In fact, the average intercorrelations of these items was only .11 suggesting that each source of social support provides a unique input into a patient's life. The items were not combined into an index but were left as single item indicators of social support. Uncorrelated sources of social support could still be combined in a single index if they acted as substitutes for one another rather than covariates. Subsequent analyses, however, indicated that there was no evidence of substitutability among the items. As a test of concurrent validity, the analysis considered whether or not the sum of the items as well as the individual items would predict to other indices of social support, such as number of friends. These analyses are discussed in Chapter 4.

Patients were also asked to rate the frequency with which others did socially supportive things for them during the six week

period preceding the posttest. These acts included showing warmth and friendliness, being listened to attentively, being given encouragement or approval, and being given understanding when upset or irritable. This set of items formed an index referred to as Supportive Behaviors.

Traits and dispositions. Ability to Give Social Support was measured by asking people to rate how often they acted towards others in the manner described by the preceding index. Ability to Accept Social Support was measured along the same dimensions but the stem now asked how comfortable the respondents felt when others acted towards them in these supportive ways. The items for the three preceding indices were all more highly correlated within indices than across indices providing evidence of discriminant validity. Ability to Accept Support was measured only at one point in time since it was assumed that it was relatively stable aspect of the personality.

Trust in Others, a measure developed by the Survey Research Center with demonstrated reliability in national samples, was also assessed as an indicator of capacity to receive social support (and perhaps as an indicator of received trust in the past). It was assumed that people who did not trust others might not be able to receive such support because they might view kindness as potentially machiavellian.

A measure that failed to materialize. We noted in Chapter 2 that previous attempts to demonstrate a link between internal-external control and adherence had a miserable track record. We felt that the reason for the poor track record was the the Rotter (1966) measure confounded political efficacy with ability to control one's social environment. Furthermore, we believed that one could obtain a link between internal-external control and adherence if the measures of control dealt with health related variables, such as "Health is a matter of fate--some are born with it, some are not." Unfortunately we overlooked one format characteristic of the Rotter measure which, in hindsight, we find rather distasteful. People are presented with the task of choosing between two statements--one dealing with internal control and the other with external control ("Pick the one statement from each pair which is most true for you."). The following is an item pair

we developed using this format: "Good health is a natural thing that happens to some and not to others" versus "A person has to work at it constantly to have good health." People who believe that both items are equally true of them (or, for that matter, equally untrue) are caught in a bind. If they have any sense of propriety, they should refuse, rightly, to answer such potentially leading questions. If that way out of the bind is not apparent, then they might pick one of the pair at random. For those who answered the four pairs of items in this study, random choice seems to be what occurred. At least there were no significant correlations among any of the four-item pairs. We believe the following format would be an improvement: have each item in the pair rated separately with a stem and response scale--such as the following: "To what extent to you believe the following is true for you? Good health is a natural thing that occurs to some and not to others. Not at all true, slightly true, somewhat true, very true."

#### Summary

A comparison of the mean values on predictors and indicators of adherence for persons in the three treatment groups and persons who were omitted from analyses of these groups indicates that there were few significant differences. Persons who qualified for the longitudinal sample by attending more than half the meetings (if they were in the social support or lecture treatment) and who completed both the pre- and posttests tended to be slightly more adherent. The significant differences, however, were slight and about the number one would expect purely due to chance. Consequently the treatment groups appeared largely to be matched at the time of the pretest.

With regard to the indices, the multi-item measures demonstrated acceptable and often high estimated reliabilities. Consequently they appear suitable for use in testing hypotheses. Single item measures of adherence in taking medicine and filling and refilling prescriptions tended to have distributions which were highly skewed with most respondents reporting perfect or near perfect adherence. Consequently, the amount of variance for study with these measures is rather limited.

The next chapters examine the relationships among the measures, as various hypotheses about adherence and its predictors are tested. Then treatment differences in predictors of and indicators of adherence are examined.



## Chapter 4

### RELATIONSHIPS AMONG PREDICTORS AND INDICATORS OF ADHERENCE: MAIN EFFECTS

Before attempting to examine the effects of the experimental treatments on adherence (presented in Chapter 6), it is important to know whether or not the measures of social support and the other hypothesized predictors of adherence, as well as the indicators of adherence, have any predictive validity. This can be discovered by examining the interrelationships among all of these variables -- a task which is dealt with in this chapter and partly in Chapter 5. In addition, the analyses in Chapters 4 and 5 allow us to test some of the hypotheses set forth in Chapter 2.

This chapter examines the first order relationships among the hypothesized predictors of adherence and between them and indicators of adherence. The analyses are correlational. In some cases where there are both pretest and posttest measures of the correlates, four correlations can be examined; the relationship between the correlates cross-sectionally at pretest and at posttest and the lagged correlations between each variable measured at pretest with the other variable measured at posttest. In some cases variables were measured only at one point in the study limiting the number of time-lagged correlations that are possible.

#### Use of Cross-lagged Correlations: Inferring Causality

Before the findings are examined we would like to discuss the use of cross-sectional and time-lagged correlations as a method for inferring the extent to which one variable is antecedent and the other is consequent in a sequence. Figure 4-1 depicts a lagged model similar to that described by Pelz and Andrews (1964). In this particular hypothetical example, the question of whether

or not the patient's knowledge of health care determines pill-taking is examined.

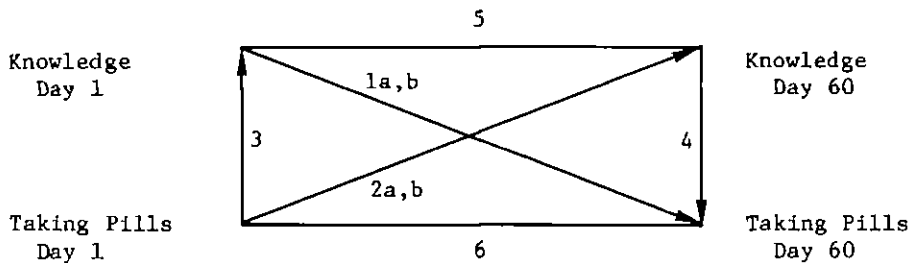


Figure 4-1. Cross-lagged and cross-sectional relationships for two variables at two points in time.

There are several competing hypotheses in this model. The following enumerates them:

- Arrow 1: (a) Increases in knowledge increase taking pills (with a lag of 60 days).  
(b) Increases in knowledge decrease taking pills (with a lag of 60 days).
- Arrow 2: (a) Increases in taking pills increase knowledge (with a 60 day lag).  
(b) Increases in taking pills decrease knowledge (with 60 day lag).

Untangling these competing hypotheses is not easy. For one thing, the methods allow us to examine only one hypothesis at present, and a global one at that: Are the two lagged correlation coefficients significantly different from one another? Another difficulty with the tests for cross-lagged relationships is that they are not very sensitive (Kenny, 1975b). By sensitivity we mean the ability of a statistical test to detect an effect when one is present. Kenny notes that sensitivity is particularly poor even when the sample is moderate in size (between 75 and 300 persons). Our sample is moderate in size.

The lag time in these analyses needs to be emphasized because it is the key to detecting causal processes. Although causality is theoretically always an instantaneous process, there is some lag before the results of the process are detectable by whatever measuring instruments one is using. For example, the taking of a

pill for high blood pressure starts the process of reducing risk of coronary heart disease almost immediately -- yet our measuring instruments may not be good enough to detect such immediate changes in the entire cardiovascular system, so studies with lags of 10-15 years are sometimes required to obtain the necessary morbidity and mortality data.

If one uses a time lag which is either too short or too long, then one essentially misses the chance to detect some causal relationship even if one really exists in nature. This makes the use of lagged analyses problematic because we understand little about the optimum time intervals to use between measurements of the predictor and dependent variables. Returning to the example in Figure 4-1, suppose that the taking of medicine is really a function of immediate health care knowledge rather than knowledge 60 days prior. Then the lagged relationship depicted by arrow 1 should be zero, and the two simultaneous correlations (lines three and four) should be positive. If the two simultaneous correlations are positive, however, we are stuck with the original dilemma posed by nonlongitudinal, cross-sectional data -- how does one separate a cause-effect relationship from a purely correlational finding? The statistical methods do not provide a satisfying answer to this problem.

Lines five and six in the model represent the test-retest or repeat reliabilities of the measures. These reliabilities are used for estimating the strengths of the other coefficients in the model when they are corrected for attenuation due to differences in the reliabilities of the measures. Appendix F contains a table of repeat reliabilities used in these tests.

In summary, the technology of detecting causality from cross-lagged correlation and cross-sectional relationships is neither a simple matter nor a well-developed one at this point. The ability to make good use of this technique is largely dependent on one's ability to understand the complete process that underlies the relationship between some selected antecedent variable and a consequent or dependent variable. In most cases in science, that process is incompletely understood. Consequently the interpretation of a pattern of relationships such as those depicted in Figure 4-1 must rely largely on our a priori theories of which are

the most and least plausible relationships.

Now let us turn to the findings. Only the significant relationships are presented because of the large number of predictions that were examined for first-order relationships (14 percent of the correlations on the average were significant at  $p < .05$ ; over twice what one would expect by chance). Furthermore, only relationships in which at least one finding had a correlation of .25 (6.25 percent of the variance) or higher are considered, even if correlations below this value might be significant. There seemed to be no appealing reason in most instances for discussing findings where only three or four percent of the variance was explained, even if the result was statistically significant, because of the possibility that most of this variance might be confounded with other measures. The longitudinal sample of persons who filled out both questionnaires has been used for the cross-sectional as well as the lagged analyses even though a much larger  $n$  was available for the cross-sectional analyses. The use of the longitudinal sample insures that the cross-sectional and lagged coefficients are based on largely the same patients. In some instances correlations based on the total sample have also been examined when these provided additional information about the measures; these latter correlations, however, were not used in the cross-lagged analyses.

### Main Effects

The findings are organized by panels of variables. First the predictors of blood pressure are considered. Next the additional correlates of adherence are considered. Then additional variables are examined. Where there are multiple predictors of the same variable, multiple regression analysis has been used to examine the relative contributions of the predictors. For a variable to be used as a predictor, it had to be a predictor in the theoretical sense rather than be a mere statistical correlate. At the end of this section, an interpretive diagram is presented which summarizes all the first-order relationships.

### *Systolic and Diastolic Blood Pressure*

Blood pressure, of course, is the most important dependent variable in the study. Measures of self-reported adherence and hypothesized predictors of adherence can be assumed to be valid to the extent to which they are inversely related to blood pressure. These empirical relationships are quite important to this study because so many of the measures are newly developed, and their predictive validity is unknown.

The findings are presented in Table 4-1. Systolic and diastolic blood pressure were correlated .61 ( $p < .001$ ) at pretest ( $t_1$ ) and .64 ( $p < .001$ ) at posttest ( $t_2$ ). Correlations of this magnitude between systolic and diastolic of blood pressure are commonly found. For example, in a study of 253 white collar professionals at NASA (Caplan, 1971) the correlation was .68, and in another study of 383 white and blue collar workers (Caplan, Cobb, French, Harrison, & Pinneau, 1975) the correlation was .60. Consequently findings relating to systolic blood pressure should tend to be mirrored by findings relating to diastolic blood pressure and vice-versa.

Before analyses were conducted, we examined the relationship between age and blood pressure to see if any statistical corrections for age might be necessary. Systolic blood pressure was weakly correlated .24 ( $p < .01$ ) with age at pretest and was similarly, but nonsignificantly, correlated with age at posttest ( $r = .20$ , n.s.). Diastolic blood pressure was uncorrelated with age at either point in time ( $r$ 's = .03 and -.10, respectively).

The conditions under which age and blood pressure should be related are unclear. Some studies find a relationship; others do not. The correlations of systolic and diastolic blood pressure with age in the NASA sample were .15 (n.s.) and .28 ( $p < .05$ ), respectively. In the study by Caplan, et al. (1975), the respective correlations were .06 (n.s.) and .15 ( $p < .05$ ). Henry and Cassel (1969) reported that age and blood pressure were correlated in some cultures (particularly high stress ones) and not in others.

Why age was weakly correlated with systolic blood pressure in this study and uncorrelated with diastolic blood pressure is not known. At any rate, the pretest systolic blood pressure values

Table 4-1

## Correlates of Systolic and Diastolic Blood Pressure

| Correlate                      | Systolic/Diastolic |                  |
|--------------------------------|--------------------|------------------|
|                                | $t_1$ (pretest)    | $t_2$ (posttest) |
| <u>Indicators of Adherence</u> |                    |                  |
| Take Medicines $t_1$           | -.18/-.03          | -.16/-.27*       |
| $t_2$                          | .06/.14            | -.01/-.03        |
| Adherent Self-View $t_2^1$     | .21/.04            | -.30*/-.29*      |
| <u>Demands of Regimen</u>      |                    |                  |
| Reported # pills $t_1$         | .24*/.41*          | .31*/.28*        |
| $t_2$                          | .23*/.39*          | .31*/.37*        |
| Obj. # of pills $t_1$          | .24*/.43*          | .25*/.31*        |
| $t_2$                          | .47*/.61*          | .46*/.43*        |
| <u>Knowledge of Disease</u>    |                    |                  |
| TF Test $t_1$                  | -.01/-.05          | .01/-.02         |
| $t_2$                          | -.14/-.11          | -.31*/-.19       |
| Knowledge of Regimen $t_1$     | -.23*/-.29*        | -.20/-.23        |
| $t_2$                          | -.31*/-.39*        | -.49*/-.41*      |

Table 4-1 (cont'd.) Correlates of Systolic and Diastolic Blood Pressure

| Correlate                       | Systolic/Diastolic |                  |
|---------------------------------|--------------------|------------------|
|                                 | $t_1$ (pretest)    | $t_2$ (posttest) |
| <u>Motivation</u>               |                    |                  |
| Consequences of Nonadher. $t_2$ | -.03/-.00          | -.26*/.08        |

Note:  $N = 75$  with some variation due to missing data. Asterisked coefficients,  $p < .05$ . Systolic and diastolic blood pressure correlate .51 at pretest and .69 at posttest. Systolic blood pressure was correlated .24 ( $p = .01$ ) with age at  $t_1$  and was not significantly correlated at  $t_2$  ( $r = .20$ , n.s.). Diastolic blood pressure was unrelated to age. Age-corrected  $t_1$  systolic blood pressure scores were used in the analyses. The underlined, lagged coefficients are significantly ( $p > .05$ ) higher than their corresponding diagonal coefficients according to cross-lagged correlational analyses (tested by the method described by Rozelle and Campbell, 1969).

<sup>1</sup>Only the cross-sectional  $t_2$  coefficient for persons forming the total sample were significant, and these are the coefficients reported here.

were residualized to remove the significant effects of age. Age was not a confounding variable for the coefficients presented in Table 4-1, however, because it was unrelated to the predictors of blood pressure.

Two indicators of adherence showed negative relationships to blood pressure: Taking Medicines and Adherent Self-View Vignette. Taking Medications was one of the two indicators of adherence for which the control patients had lower scores than the social support and lecture patients. The index of Taking Medications, however, was significantly related only to diastolic blood pressure and only for the lagged correlation of Taking Medicines  $t_1$  to diastolic blood pressure  $t_2$ . There was a similar, nonsignificant, trend for systolic blood pressure. This pattern of coefficients suggests that "taking medicines adherently" precedes a lower blood pressure rather than the reverse, providing support for the predictive validity of the self-report measure of Adherent in Taking Medications. The Adherent Self-View was significantly correlated with both systolic and diastolic blood pressure. It accounted for 8.4 to 9.0 percent of the variance in blood pressure -- a respectable amount considering the difficulty of measuring adherence by self-report.

A second class of predictors of blood pressure turned out to be the self-reported number, as well as the actual number, of pills the patient was supposed to take for high blood pressure per three-day period. Self-reported and actual number of pills correlated .86 at  $t_1$  and .86 at  $t_2$ . This suggests that the self-report is moderately accurate. The correlations between number of pills and blood pressure were positive. With regard to the reported number of pills, the cross-sectional and lagged coefficients were significant, ranging from .24 to .41. It is implausible to suggest that the medicines lead to high levels of blood pressure; consequently, the data appear to suggest that the higher the level of blood pressure, the more likely a large number of pills were prescribed. When objective, rather than self-reported, number of pills were correlated with blood pressure, a clearer cross-lagged picture emerged. The lagged coefficients from blood pressure at  $t_1$  to number of pills at  $t_2$  were the highest, suggesting what we already know on the basis of common sense, namely, that high levels of



blood pressure lead to increases in the number of pills and tablets prescribed for the patient.

The third set of significant correlates of blood pressure in Table 4-1 were measures of patient knowledge about the disease. Knowledge was inversely related to blood pressure level. General knowledge about blood pressure, measured by the True-False Test, showed only one significant relationship and that was cross-sectionally at Time 2 with diastolic blood pressure. Knowledge of one's Regimen, however, showed significant negative cross-sectional and lagged relationships with both forms of blood pressure. This latter form of knowledge would appear to be much more important in determining the eventual lowering of blood pressure. Although a general knowledge of high blood pressure and its treatment might be helpful in the sense of giving the patient an overall view of the purpose of treatment, knowledge of one's specific regimen would appear to be far more important because, without such knowledge, the patient could not take the medications as prescribed. Knowledge of the Regimen is not related to measures of adherence. It is more reasonable to assume that the measures of adherence used in this study are simply not sensitive enough to show such a relationship rather than to assume that no such relationship exists in reality.

The last finding in Table 4-1 showed that perceived Consequences of Nonadherence to health was negatively correlated with systolic blood pressure but was unrelated to diastolic blood pressure, a finding suggesting caution in accepting the significant relationship. Consequences of Nonadherence was only measured at  $t_2$ , so that the only lagged relationship one can study is the effect of blood pressure at  $t_1$  on Consequences of Nonadherence at  $t_2$ . This lagged relationship was nonsignificant.

If the negative relationship of Consequences of Nonadherence to systolic blood pressure is a real one, it might occur by the mechanism of motivating patients to take their medicines and adhere. Table 4-2, which will be discussed shortly, indicates that perceived Consequences of Nonadherence is indeed positively associated with self-reported Taking of Medicine and the Adherence Self-View Vignettes. However, the former measure of adherence was unrelated to systolic blood pressure and the latter was unrelated

to either type of blood pressure. We must assume again that our measurements were not sensitive enough to detect the effects of perceived Consequences of Nonadherence on measures of adherence which in turn affect blood pressure levels.

To summarize the information in the preceding table, we computed multiple regressions of those variables which, both on theoretical and empirical grounds, appear to be predictors of blood pressure. These analyses showed that the self-report measures of adherence and other psychological variables accounted for 35 percent ( $R = .59$ ) of the variance in systolic blood pressure and 27 percent ( $R = .52$ ) of the variance in diastolic blood pressure.\* Variance in systolic blood pressure was accounted for primarily by reported Taking of Medicine (partial  $r = .24$ ,  $p = .11$ ) and by Knowledge of Regimen (partial  $r = -.56$ ,  $p < .001$ ). The fact that the measures of Adherent Self-View and perceived Consequences of Nonadherence were not significant in this multivariate analysis suggests that the former is not independent of the measure of reported Taking of Medicine (the two correlate  $.49$ ,  $p < .001$  at  $t_2$ ) and that perceived seriousness of nonadherence has its effects primarily by determining adherence, a hypothesis that will be tested shortly. Knowledge of Regimen, and reported Taking of Medicine similarly, accounted for most of the variance in diastolic blood pressure (respective partial  $r$ 's being  $-.24$ ,  $p = .11$ , and  $-.46$ ,  $p = .001$ ).

These findings appear impressive to us, given that the predictor measures are far from perfect in their item content and response distributions. Knowledge of Regimen, of course, is a relatively objective measure because it is based on a comparison of the self-reported regimen and the regimen recorded in the medical record. Consequently it is relatively free of reporting biases; this may be why it is a more powerful predictor of blood pressure than the self-reported Taking of Medicine.

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\*For persons unfamiliar with percent of variance accounted for it can be thought of as follows: Scores on any dependent variable vary over some range. This variance represents 100 percent of the variance which potentially could be accounted for by its predictors. The better one's predictors, the more of this variance one can account for. Squaring either correlation coefficients or multiple regression coefficients gives the percent of variance in the dependent variable accounted for by the predictors.

Finally, it may be significant that there were no other main effects relating to blood pressure. This may be what should be expected. According to our theoretical model presented in Chapter 2, other factors such as emotional state, feelings of competence and esteem, and social support should be factors in determining adherence but they should not necessarily affect blood pressure directly, except perhaps through psychosomatic mechanisms or as a statistically derived relationship.

### *Correlates of Adherence*

Data was presented in the preceding section showing that a substantial percentage of the variance in systolic and diastolic blood pressure could be accounted for by self-reports of adherence and by how much the person knew about what was required to adhere. Now we move back a step in the model of adherence, depicted in Figure 2-3, and examine the types of variables which determine adherence itself. Table 4-2 presents these correlates of adherence.

First, the table shows that the adherence self-view measured by the vignettes was positively correlated with the self-report of Adherence in Taking Medicine and an objective measure of adherence -- percent of the meetings attended for persons in the social support and lecture groups. Thus there is evidence of concurrent validity for the vignette measures and the measure of Taking Medicine. The fact that these self-report measures of adherence correlated with attending patient-education meetings, suggests that adherence can be trans-situational, relating to more than one category of patient behavior. No a priori assumptions were made about trans-situational adherence, and this is an area which requires more thought.

The other correlates of the vignette measure indicated that the adherent patients (1) had high self-esteem, (2) tended to report few motives or goals which were in competition for the time, money, and energy that had to be spent on taking care of their high blood pressure, and (3) perceived the health consequences of nonadherence as serious. We lack lagged data for these measures. It is assumed that esteem leads to adherence, and that adherence

Table 4-2

## Additional Correlates of Adherence Indicators

| Correlate                                    | <u>Indicators of Adherence</u>       |       |
|----------------------------------------------|--------------------------------------|-------|
|                                              | $t_1$                                | $t_2$ |
| <u>Indicators of Adherence</u>               | <u>Adherence Self-View Vignettes</u> |       |
| Take Medicine $t_1$                          | --                                   | .37*  |
| $t_2$                                        | --                                   | .49*  |
| % of Meetings Attended                       | --                                   | .28*  |
| <u>Perceived Competence</u>                  |                                      |       |
| Self-esteem $t_1$                            | --                                   | .20*  |
| $t_2$                                        | --                                   | .27*  |
| <u>Motivation</u>                            |                                      |       |
| Competing Motives $t_2$                      | --                                   | -.31* |
| Consequences of Nonadherence $t_2$           | --                                   | .26*  |
| <u>Perceived Competence</u>                  | <u>Take Medicine</u>                 |       |
| Self-esteem $t_1$                            | .24*                                 | -.13  |
| $t_2$                                        | .13                                  | .24*  |
| Tangible Support of Health Care System $t_2$ | .27*                                 | .17   |
| <u>Motivation</u>                            |                                      |       |
| Consequences of Nonadherence $t_2$           | .40*                                 | .40*  |
| <u>Strain</u>                                |                                      |       |
| Somatic Complaints $t_1$                     | -.13                                 | -.29* |
| $t_2$                                        | -.22                                 | -.16  |

Table 4-2. (Cont'd.) Additional Correlates of Adherence Indicators

| Correlate                   | Adherence Indicator           |       |
|-----------------------------|-------------------------------|-------|
|                             | $t_1$                         | $t_2$ |
| <u>Knowledge of disease</u> |                               |       |
|                             | <u>Refill Rx Promptly</u>     |       |
| % of meetings attended      | .08                           | .29*  |
| Knowledge of Regimen $t_1$  | -.17                          | .36*  |
| $t_2$                       | -.23                          | .05   |
| <u>Strain</u>               |                               |       |
| Depression $t_1$            | .07                           | -.23* |
| $t_2$                       | .12                           | -.10  |
| <u>Strains</u>              |                               |       |
|                             | <u>% of Meetings Attended</u> |       |
| Depression $t_1$            |                               | -.23* |
| $t_2$                       |                               | -.25* |
| Irritation $t_1$            |                               | .00   |
| $t_2$                       |                               | -.27* |
| <u>Motivation</u>           |                               |       |
| Competing Motives $t_2$     |                               | .29*  |
| Extrinsic Motives $t_2$     |                               | .15   |
| Intrinsic Motives $t_2$     |                               | .30*  |
| <u>Knowledge of Disease</u> |                               |       |
| TF Test $t_1$               |                               | .10   |
| $t_2$                       |                               | .44   |

Note: Asterisked coefficients significant at  $p < .05$ ; sample size = about 75 with some variation due to missing data.

provides feedback to the individual which increases self-esteem. On the other hand, it is assumed that competing motives detract from adherence rather than vice-versa and that the belief that non-adherence will have serious health consequences produces adherence.

When Self-esteem (partial  $r = -.05$ , n.s.), Competing Motives (partial  $r = -.34$ ,  $p = .003$ ), and perceived Consequences of Nonadherence (partial  $r = .35$ ,  $p = .002$ ) were jointly considered as predictors of the adherence vignettes, they accounted for 21 percent of the variance ( $R = .46$ ) in the measure of adherence. As can be seen, Competing Motives and perceived Consequences of Nonadherence were the most important predictors of the adherence self-view vignettes.

Reported Adherence in Taking Medicine was also positively associated with Self-esteem. The cross-sectional coefficients tended to be higher than the lagged coefficients suggesting that esteem and adherence have immediately measureable links rather than being connected by a longer process. This measure of adherence was also positively correlated with patient perceptions that the tangible resources of the hospital were very adequate. Perhaps adherent patients have the ability to see the good things in hospital and clinic systems and/or the good things in such systems spur patients on to adherence.

We should expect to find a derived relationship between Self-esteem and diastolic blood pressure because Self-esteem was positively correlated with Taking Medicine, and Taking Medicine was associated with low levels of diastolic blood pressure. As was already noted, however, there was no relationship between Self-esteem and diastolic blood pressure ( $r$ 's range from  $-.09$  to  $.10$ ).

There are two possible interpretations for this lack of a derived relationship. First Self-esteem may have determined proportions of variance in adherence which were different from those which had an effect on blood pressure. Second, the relationship between Self-esteem and adherence and between adherence and blood pressure were weak to begin with. Consequently, any derived relationship between Self-esteem and blood pressure would be likely to be so weak as to be statistically nonsignificant.

The final significant correlate of Taking Medicine in Table 4.2 was Consequences of Nonadherence on health. This posttest-only

measure correlated .40 with adherence both at pretest and at post-test. This finding provides evidence of construct validity for the self-report measure of Taking Medicines, because we would expect that those persons who believed nonadherence was most harmful would be the most likely to adhere.

The final correlate of Taking Medicine is Somatic Complaints. All the correlations were negative, but only the lagged relationship of Somatic Complaints at  $t_1$  to Taking of Medicine at  $t_2$  was significant. Interpreting this set of findings, unfortunately, is very difficult. To what extent does this measure of Somatic Complaints represent psychosomatic indicators of strain -- a purpose for which the measure was originally designed and for which it has been validated (Caplan et al., 1975; Gurin, Veroff, & Feld, 1960; Langner, 1962) -- and to what extent does the measure represent side effects of the medications? The signs of the relationships do not help answer this question. Somatic Complaints may have been related to poor adherence because the medicines produced side-effects in the form of such complaints, which then led to poor adherence. One could also obtain the same relationship if psychological stresses produced psychosomatic reactions, or somatic complaints, which then led the person to stop adhering. In the latter case, the patient could mistakenly conclude that the somatic complaints were side effects of the medication when in fact they were not.

Attempting to develop an interpretable measure of somatic complaints is an extremely important issue because adherence behavior may receive the undeserved brunt of the patient's reactions to somatic complaints unless the patient can discriminate among side effects caused by the medication, "side-effects" of the stresses of daily life, and "side-effects" of having to adjust to the fact that one has entered a sick role.

There is a way to untangle these competing hypotheses about the meaning of side effects. There needs to be a study of both the psychological stresses and the somatic complaints of persons taking known dosages of medications which vary in known ways in terms of the side effects that they produce. Then it may be possible to estimate that part of the variance in somatic complaints which is psychosomatic and related to nonpharmacological stress

and that part of the variance which is related to pharmacological stress.\* One must remember that this is a problem in interpreting the causes of somatic complaints as well as other strains, such as depression, which can also result from medications. Unfortunately the data from this study do not allow us to tease out these different sources of variance although we hope to examine this problem in future research.

When the main predictors of Adherence in Taking Medicine were entered into a multiple regression analysis, they accounted for 33 percent of the variance in this measure of adherence ( $R = .58$ ,  $p < .001$ ). The predictors had the following partial correlations: Somatic Complaints,  $-.33$  ( $p = .007$ ); Self-esteem,  $-.35$  ( $p = .004$ ); Tangible Support of Health Care Systems,  $.16$  (n.s.); and perceived Consequences of Nonadherence,  $.39$  ( $p = .001$ ). Consequently perceived seriousness of nonadherence remained the most important predictor. This finding should not be taken as a license, however, to scare the heck out of patients. Whether or not fright is a useful motivating emotion for adherence would require data beyond the bounds of this study.

The third measure of adherence considered in Table 4-2 were self-reports of how promptly the patient refilled prescriptions. This measure was positively correlated with an objective measure of adherence, Percent of Meetings Attended. The correlation was highest for the correlation between Percent of Meetings Attended and the posttest, rather than pretest, measure of how promptly prescriptions were refilled. This pattern of coefficients suggests that adherence increased as a result of attending the meetings and that attendance was not a mere co-indicator of trans-situational tendencies to adhere.

Refilling promptly was also positively correlated with the patient's Knowledge of the Medical Regimen. All coefficients were nonsignificant except for the lagged correlations between Knowledge of Regimen, measured at  $t_1$ , and refill adherence, measured at  $t_2$ . This correlation was positive and suggests that Knowledge of the

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\*Should the medication and characteristics of the patient interact, then variance in somatic complaints might be attributed to the interaction and not separately to the medication and patient characteristics.



Regimen tends to precede this type of adherence.

Refilling Prescriptions Promptly also tended to be related to low levels of Depression. The relationship was only significant for the lagged coefficient with Depression measured at  $t_1$  and adherence measured at  $t_2$  ( $r = -.23$ ,  $p < .05$ ). The other three coefficients were lower ranging from  $-.10$  to  $.12$ . This suggests that depressed states may result in failing to refill promptly. Depressed persons may believe that they are in a helpless state and that they cannot master their environment. They may consequently devalue their own abilities and the value they place on themselves (self-esteem). There is some support for this in that Depression was weakly correlated with Self-esteem cross-sectionally ( $r_{t_1} = -.13$ , n.s.;  $r_{t_2} = -.24$ ,  $p < .05$ ). The lagged correlations showed that antecedent Depression was correlated negatively with consequent Self-esteem ( $r = -.24$ ,  $p < .05$ ) but that antecedent Self-esteem was unrelated to consequent Depression ( $r = .02$ ). This pattern of lags suggests that depression may determine self-esteem rather than vice-versa. There was no evidence, however, of any relationship between level of self-esteem and promptness of refilling prescriptions in the data. Consequently, even if depression does produce a devaluation of self and a reduced premium on taking care of one's health, the measure of Self-esteem was not able to help explain the process.

When the major predictors of adherence in Promptly Refilling Prescriptions were entered into a multiple regression analysis, they accounted for 23 percent of the variance in refill adherence ( $R = .48$ ,  $p = .006$ ). The partial correlation coefficients for the individual predictors were as follows: percent of health education meetings attended,  $.37$  ( $p = .01$ ), Knowledge of Regimen,  $.11$  ( $p = .46$ ); and Depression,  $-.16$  ( $p = .28$ ). Consequently the main predictor of refilling prescriptions was the percent of attendance at the patient meetings in the study.

The final measure of adherence considered was the Percent of Meetings Attended, a measure which is, of course, completely objective. We have already noted that this measure was positively associated with the Adherence Self-View Vignette. Both Somatic Complaints and Depression were negatively correlated with the Percent of Meetings Attended. The coefficients which were based on

pretest, rather than posttest, measures of these strains were slightly higher suggesting that the strains interfered with the patients' abilities or willingness to attend patient education classes.

Attendance at Meetings was also related to patient motivation. Persons who attended meetings were less likely to be motivated by rewards controlled by others -- that is by extrinsic rewards of approval from one's spouse and physician. Nevertheless there was evidence that such patients were more likely to be motivated by intrinsic rewards, even though the two measures of motivation were correlated .55 ( $p < .01$ ). The data were examined for possible explanations of why the two measures of motivation had different relationships to Percent of Meetings Attended. No convincing explanations were found, however.

The last finding in Table 4-2, although weak, is informative. It shows that the pretest score on the True-False Test of knowledge about high blood pressure was unrelated to Percent of Meetings Attended ( $r = .02$ ), whereas the posttest score was positively related ( $r = .23$ ,  $p < .05$ ). These data suggest that the knowledge of the disease and its treatment were a result of the meetings and that attendance at the meetings was not due to the self-selection of patients who already knew a lot about the disease.

When the main predictors of Attendance at Meetings were analyzed by multiple regression, they accounted for 16 percent of the variance in attendance ( $R = .40$ ,  $p = .035$ ). The partial correlation coefficients for these predictors were as follows: Depression,  $-.16$  ( $p = .23$ ); Competing Motives,  $-.29$  ( $p = .03$ ); Extrinsic or other-mediated Motivation,  $.02$  ( $p = .88$ ); and Intrinsic or self-mediated Motivation,  $.13$  ( $p = .31$ ). The partial correlation values indicate that the measure of Competing Motives accounted for most of the common variance of the other predictors with Attendance at the Meetings.

To summarize this section, the findings in Table 4-2 provide several evidences of construct validity for the measures of adherence. Given the rather poor response distributions for the indices of Taking Medicines and Refilling Prescriptions, and given their probable low reliabilities and possible vulnerability to distortion and bias in self-reporting, the magnitude of the relationships to other measures is often surprising. One might

suspect, accordingly, that the positive effects on adherence of perceived self-competence, awareness of the consequences of non-adherence, attendance at health education classes, knowledge of one's regimen, and freedom from somatic complaints and depression may be greater than is suggested by the statistical magnitude of these findings.

#### *Correlates of Patient Motivation*

We have already examined the variables which were directly associated with low and high levels of blood pressure in this sample of patients. One of these variables was adherence. Then we moved back in the causal chain to examine some of the predictors of adherence. One of these predictors is motivation. This section considers the types of social-psychological correlates of patient motivation.

As noted before, the data suggested that patients who report that there are other goals competing for their resources to adhere may be most likely to report that they see themselves as less adherent. They may also tend to be low on extrinsic motivation to adhere. This suggests that patients who adhere primarily for the rewards of approval of others, rather than for the sheer satisfaction of improving their health, are more likely to see other goals in life as ones which are in competition, rather than in peaceful coexistence, with goals of adherence. This is an important point because it suggests that other goals do not necessarily have to compete with health care. The extent to which other motives do compete may depend more on the patient's attitude about health care and its importance than on the extent to which the other goals are really important ones. The present study cannot determine the extent to which persons might be persuaded to view health care as a compatible rather than competing goal, but this question seems worth pursuit in studies of patient education and behavior.

Table 4-3 presents additional findings relating to measures of motivation. As is shown, Self-Mediated (Intrinsic) and Other-Mediated (Extrinsic) Motivation were both correlated with perceived Consequences of Nonadherence on one's health. These

Table 4-3

## Additional Correlates of Motivation

| Correlate                                   | Motive                                 |                                |
|---------------------------------------------|----------------------------------------|--------------------------------|
| <u>Motives</u>                              | <u>Intrinsic t<sub>2</sub></u>         | <u>Extrinsic t<sub>2</sub></u> |
| Consequences of Nonadherence t <sub>2</sub> | .33*                                   | .44*                           |
| <u>Perceived Competence</u>                 |                                        |                                |
| Self-esteem t <sub>1</sub>                  | .19                                    | .10                            |
| t <sub>2</sub>                              | .25*                                   | .28*                           |
| <u>Social Support</u>                       |                                        |                                |
| Support of: Best Friend t <sub>1</sub>      | .23*                                   | .14                            |
| Spouse t <sub>1</sub>                       | .22                                    | .41*                           |
| M.D. t <sub>1</sub>                         | .19                                    | .36*                           |
| Supportive Behaviors t <sub>2</sub>         | .51*                                   | .56*                           |
| <u>Strains</u>                              | <u>Competing Motives t<sub>2</sub></u> |                                |
| Somatic Complaints t <sub>1</sub>           | .23*                                   |                                |
| t <sub>2</sub>                              | .37*                                   |                                |
| <u>Demands</u>                              |                                        |                                |
| Demands of Regimen t <sub>1</sub>           | .33*                                   |                                |
| t <sub>2</sub>                              | .38*                                   |                                |
| Reported # of pills t <sub>1</sub>          | .30*                                   |                                |
| t <sub>2</sub>                              | .22*                                   |                                |
| Objective # of pills t <sub>1</sub>         | .20                                    |                                |
| t <sub>2</sub>                              | .18                                    |                                |

Table 4-3 (Cont'd.) Additional Correlates of Motivation

| Correlate                    | Motives                                  |
|------------------------------|------------------------------------------|
|                              | <u>Competing Motives</u> $t_2$           |
| Diet demands $t_1$           | .33*                                     |
| $t_2$                        | .26*                                     |
| <u>Social Support</u>        | <u>Seriousness of Nonadherence</u> $t_2$ |
| Social Support of M.D. $t_1$ | .41*                                     |
| Concern of Others $t_2$      | .28*                                     |

Note: Asterisked coefficients  $p < .05$ .  $N = 75$  with some variation due to missing data.

correlations provide evidence of concurrent validity because persons who are highly motivated to take care of their health, particularly for intrinsic motives of maintaining good health, may be expected to believe that nonadherence would have serious health-related consequences.

On the other hand, the measures of Extrinsic and of Intrinsic Motivation were unrelated to Competing Motives. It may well be that Competing Motives are as much related to the objective income and employment status of the person (that is having to spend money and time on nonadherence matters) as to subjective attitudes about the value of taking care of blood pressure. A low income person, just as much as a person who simply did not like to spend money on health regardless of income, could report that having to spend money on other things competed with ability to take care of health. Consequently, the lack of a relationship between Competing Motives and Intrinsic and Extrinsic Motivation may be the result of unassessed economic factors.

Both the Extrinsic and Intrinsic Motivations to adhere were positively correlated with Self-esteem. The lagged coefficients suggest that motivation to adhere affects esteem rather than the reverse. This could be the case if motivation led to adherence which then boosted the person's feelings of self-accomplishment and self-esteem. As noted, esteem and Motivation were both correlated with some measures of adherence and not others. Nevertheless there are no mutual relationships among esteem, Extrinsic and Intrinsic Motivation, and any specific index of adherence.

Extrinsic and Intrinsic Motivation were also correlated with a number of measures of social support in this study. Social Support of Best Friend was weakly correlated with Intrinsic Motivation and Extrinsic Motivation, with only the former coefficient being statistically significant. Support of Spouse and Support of Physician were positively correlated with Extrinsic, but not Intrinsic, Motivation. All three of these measures of social support were obtained at pretest only so each represents a lagged relationship to the measures of motivation which were obtained at posttest only.

These findings regarding support of spouse and physician provide evidence of predictive validity for the measures of social

support and motivation. They suggest that social support from the spouse and the physician may increase the motivation of the patient to adhere in order to please these two sources of support, but that such support may not necessarily increase the motivation of the patient to adhere purely for the sake of improving one's health. Alternatively, persons who are motivated to adhere for the sake of winning social approval may succeed in receiving such support because they value it as a goal or reward. Patients who are motivated mainly for the sake of improving their health may not necessarily succeed in receiving social support from spouse and physician simply because such support is not a valued reward.

Intrinsic and Extrinsic Motivation was also correlated with the social support of others ( $r_{t2} = .51$  and  $.56$ , respectively). As with the preceding findings, this pattern of relationships shows that adhering to please others is more strongly related to social support than adhering for the sake of improving one's health.

The presence of Competing Motives was previously shown to be related to low adherence measured by the Self-View Vignettes. In addition, Table 4-3 shows that Competing Motives was positively related to Somatic Complaints. The following process may be involved here: The presence of somatic complaints, regardless of whether they are side effects of medication or strain reactions to social stresses, may become associated with taking medicine for one's blood pressure. Since high blood pressure is generally asymptomatic, the patient may mistakenly label the complaints as being the result of adherence rather than nonadherence and then rationalize away subsequent nonadherent coping behavior (coping with somatic complaints by cessation of medications) by saying "I have too many competing things to do so I can't be bothered with taking my pills, seeing the physician, and so forth." To confirm this hypothesis, it would need to be pursued more systematically in a full-scale study designed to examine the processes by which competing motives grow and decline.

Table 4-3 also shows that the index of Competing Motives was positively correlated with Demands of the Regimen both as measured by the index and by the patient's report of the number of pills supposed to be taken during a three-day period. Objective number

of prescribed pills showed similar correlations with Competing Motives but the coefficients were slightly lower and nonsignificant. It is likely that as demands of a regimen increase, the probability that they encounter resistance by interfering with the pursuit of other goals increases. The slightly higher correlations between subjective, rather than objective, number of pills and Competing Motives suggests that the patient's perceptions of how demanding the regimen is may be a better indication of the resistance to adherence than any objective coding of the demands in terms of pill counts or related indices. Other studies have demonstrated related phenomena indicating that it is often what the person perceives, and not the objective reality, which determines human reactions to the environment (French & Caplan, 1972; Kraut, 1965).

The final indicator of patient motivation in Table 4-3 are perceived seriousness of the consequences to health of nonadherence. It was noted that Consequences of Nonadherence was associated with high Extrinsic and Intrinsic Motivation and with high adherence as measured by the Self-View Vignette. The findings in Table 4-3 show that perceived Consequences of Nonadherence was also positively correlated with Social Support from the Physician (measured at pretest only) and Concern of Others (measured at posttest only). There were no possible lagged coefficients to help us untangle the nature of the association. It is likely, however, that the perceived social support and concern of these persons helped the patients take their health problems seriously.

Although Social Support from the Physician and Concern of Others both showed first-order relationships to perceived Consequences of Nonadherence, only Social Support of Physician (partial  $r = .28$ ,  $p = .01$ ) remained significant in the multiple correlation analysis. It apparently explained the effect of Concern of Others (partial  $r = .08$ ,  $p = .46$ ) because the two measures of support correlated .37. Eleven percent of the variance ( $R^2 = .33$ ) was explained by the two predictors.

The findings on motivation, in summary, suggest that the more highly motivated patients perceive nonadherence to have serious health consequences, tend to have high self-esteem, and report a good deal of social support particularly from the spouse



and physician. The presence of competing motives is most likely to be found among patients with somatic complaints who perceive high demands of their regimen. The competing motives may enhance their views that the regimen is demanding. Finally patients who believe that nonadherence would have serious consequences for their health are patients who report high levels of social support from their physician. These results suggest that part of the drive of a patient may be significantly affected by social relations with physician and spouse and by feelings of esteem or competence.

#### *Health Care Information*

Earlier we noted findings suggesting that knowledge of one's regimen was an important negative correlate of blood pressure and also of self-reported adherence. This is consistent with the hypotheses set forth in Chapter 2 which suggested that knowledge would be an important requirement for adherence and the control of blood pressure, although by no means the only requirement. Table 4-4 presents additional correlates of health care knowledge. These provide some idea of both the determinants of this knowledge and the effects of such knowledge.

We see first of all that the score on the True-False Test of knowledge about high blood pressure was positively correlated with correct Knowledge of one's Regimen. The cross-sectional and lagged coefficients were of approximately equal magnitude ( $r$ 's ranging from .31 to .48). These findings provide evidence of concurrent validity for the two measures of learned health care information.

The True-False Test score was negatively related to Somatic Complaints with all correlations significant except the  $t_2$  cross-sectional coefficient. It is likely the low education of people suffering from somatic complaints makes it difficult for them to learn what they need to know about care of high blood pressure. Examining  $t_1$  data where the findings were strongest, persons with low levels of education tended to report more Somatic Complaints ( $r = .32$ ,  $p < .01$ ) and tended to score low on the True-False

Table 4-4

## Additional Correlates of Health Care Knowledge

| Correlate                    | $t_1$                       | $t_2$        |
|------------------------------|-----------------------------|--------------|
| <u>Health Care Knowledge</u> | <u>TF Test Score</u>        |              |
| Knowledge of Regimen $t_1$   | .43*                        | .31*         |
| $t_2$                        | .35*                        | .47*         |
| <u>Strains</u>               |                             |              |
| Somatic Complaints $t_1$     | -.38*                       | -.35*        |
| $t_2$                        | -.29*                       | -.19         |
| <u>Demands of Regimen</u>    | <u>Knowledge of Regimen</u> |              |
| Reported # of pills $t_1$    | -.28*                       | <u>-.52*</u> |
| $t_2$                        | -.18                        | -.46*        |
| Objective # of pills $t_1$   | -.23*                       | -.54*        |
| $t_2$                        | -.31*                       | -.61*        |
| Demands of Regimen $t_1$     | -.31*                       | -.26*        |
| $t_2$                        | -.28*                       | -.26*        |

Note: Asterisked coefficients  $p < .05$ ,  $N = 75$  with some variation due to missing data. The underlined, lagged coefficients are significantly ( $p < .05$ ) higher than their corresponding diagonal coefficients according to cross-lagged correlational analyses (tested by the method described by Rozelle and Campbell, 1969).

Test ( $r = .54$ ,  $p < .001$ ). The relationship between the True-False Score and Somatic Complaints dropped from  $-.38$  to  $-.23$  (from 14 percent of the variance to 5 percent), when level of education was controlled by partial correlation. Similarly, the relationship between educational level and Somatic Complaints dropped from  $-.37$  to  $-.21$  when score on the True-False Test was controlled. The multiple correlation of the True-False Test and level of education on Somatic Complaints was  $.43$ , not significantly greater than either of the main effects of the predictors.

These findings suggest two hypotheses: (1) knowledge of the disease reduces the likelihood of somatic complaints, and (2) educational level is associated with unmeasured variables, such as general life patterns and quality of life, which determine somatic complaints. It is unlikely that somatic complaints interfered with ability to learn about the nature of the disease, because the relationship between level of education and the True-False Score was hardly reduced when the effect of Somatic Complaints was statistically removed ( $r$  dropped from  $.54$  to  $.46$ ). Level of education appeared far more important than Somatic Complaints as a determinant of the True-False Score. As already indicated in Table 4-1, persons with low scores on the True-False Test tended to have high diastolic blood pressure and persons with low scores on Knowledge of one's Regimen tended to have high levels of both systolic and diastolic blood pressure. Although somatic complaints, by reducing ability to learn one's regimen correctly, may accordingly reduce adherence and ability to lower the blood pressure, the findings do not offer any convincing evidence to support this type of process. Consequently, if such a process does exist, our measures may not be good enough to map it out.

The number of pills in one's regimen was another predictor of Knowledge of Regimen. Both self-reported and objectively recorded number of pills were negatively related to knowledge. It appears that complex regimens lead to patient misunderstanding of the regimen. Educational level of the patient would seem to be a factor because all the measures of regimen and of blood pressure were unrelated to education in our sample of hypertensive patients. So it is unlikely that patients least likely to

understand the regimens were given the most difficult regimens to follow.

In Table 4-1 it was shown that Knowledge of the Regimen was associated with low blood pressure whereas number of pills the person was taking was associated with high blood pressure. We suggested that the latter seemed to be the result of the physician seeing that the blood pressure was high and increasing the dosage by increasing the number of pills. The pattern of lagged and non-lagged correlations between objective number of pills and Knowledge of Regimen suggests that objective number of pills predicts inversely to Knowledge of Regimen rather than the opposite. Figure 4-2 depicts this path and considers the lagged relationship between objective number of pills at pretest and systolic blood pressure at posttest to be a derived relationship due to the intervening effect of Knowledge of Regimen. According to the model in Figure 4-2, as the objective number of pills is increased, the patient should have difficulty maintaining accurate knowledge of the regimen, should fail to take the medication correctly, and the result should be a failure for the blood pressure to decrease. This would produce the derived positive relationship ( $r = .25$ ) between number of pills in the actual regimen and systolic blood pressure. When Knowledge of Regimen was partialled out from this derived relationship, the correlation between pills and systolic blood pressure dropped from .25 (6 percent of the variance in blood pressure) to  $-.01$  (0 percent of the variance), so that the above interpretation was supported.

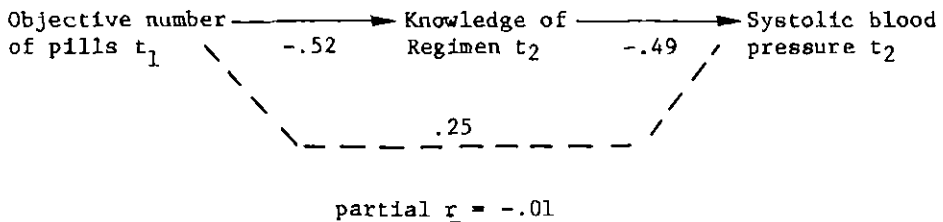


Figure 4-2. Relationships among number of pills, Knowledge of Regimen, and systolic blood pressure. Arrows indicated hypothesized directions of effect.

*Perceived Competence*

In Chapter 2 we hypothesized that perceived competence was an important determinant of the extent to which a person would attempt to adhere. We have already seen support for this hypothesis because Table 4-2 showed that Self-esteem was positively correlated with the patient's self-view of being adherent. In Table 4-3 data was presented suggesting that patients with high self-esteem may be most highly motivated to adhere. These findings suggested that self-esteem may be an important antecedent of adherence. Indeed, if the patient does not value the self, why should there be any motivation to pursue a goal which may lead to preservation of the self -- namely health? Consequently, building self-esteem may be important in building adherence.

Table 4-5 presents some additional correlates of Self-esteem. The findings show that Social Support of Spouse (a pretest-only measure) was positively correlated with Self-esteem measured both at pre- and posttest. Concern of Others (a posttest-only measure) was uncorrelated with pretest Self-esteem but was positively correlated with posttest Self-esteem. The presence of a significant relationship only at posttest may reflect the effect of the experimental treatments preceding the posttest. Those treatments introduced concern by others, particularly the nurse, in some groups and not in others (specifically the controls), thereby potentially increasing sample variance in Concern of Others. None of the other measures of social support showed any relationship to Self-esteem.

Neither of the two significant social support correlates of esteem was measured at enough points in time to provide us with a full set of cross-sectional and lagged correlation coefficients. Consequently the findings do not permit one to draw inferences about causality.

In Chapter 2 psychological strains were hypothesized to reduce people's feelings of self-competence and esteem. Feeling strained should be a message to the self that one was not as good as one could be in terms of mental health and ability to cope with life's stresses. Findings in Table 4-5 show that strain, as measured by the index of Anxiety, was associated with low Self-esteem. The strongest lagged coefficient suggests that low

Table 4-5

## Additional Correlates of Perceived Competence

| Correlate                          | $t_1$                                 | $t_2$ |
|------------------------------------|---------------------------------------|-------|
| <hr/>                              |                                       |       |
| <u>Social Support</u>              | <u>Self-esteem</u>                    |       |
| Social Support of Spouse $t_1$     | .25*                                  | .29*  |
| Concern of Others $t_2$            | .09                                   | .22*  |
| <u>Strains</u>                     |                                       |       |
| Anxiety $t_1$                      | -.19                                  | -.26* |
| $t_2$                              | -.29*                                 | -.38* |
| <hr/>                              |                                       |       |
| <u>Strains</u>                     | <u>Able to Take Care of My Health</u> |       |
| Anxiety $t_1$                      | -.33*                                 | -.16  |
| $t_2$                              | -.36*                                 | -.19* |
| Interference with Activities $t_1$ | -.13                                  | -.05  |
| $t_2$                              | -.32*                                 | -.19  |
| <hr/>                              |                                       |       |
|                                    | <u>Able to Take Care of Others</u>    |       |
| Anxiety $t_1$                      | -.05                                  | -.17  |
| $t_2$                              | -.11                                  | -.37* |
| Interference with Activities $t_1$ | -.10                                  | -.20  |
| $t_2$                              | -.29*                                 | -.28* |
| <hr/>                              |                                       |       |

Note: Asterisked coefficients,  $p < .05$ ,  $N = 75$  with some variation due to missing data. "Able to Take Care of My Health" and "Able to Take Care of Others" are single items within index of Self-esteem.

esteem precedes anxiety rather than the reverse. This pattern is most apparent for an item within the Self-esteem index specifically measuring ability to take care of one's health. We were particularly interested in this item and another item "able to take care of others," which was also negatively related to anxiety, because the social support and lecture groups scored higher on these two items than did the control group whereas there were no between-group differences for the overall index of esteem. Unlike the more general measure of Self-esteem, which includes nonspecific items about the self such as "value myself highly," both of the preceding items deal specifically with independence and autonomy in handling environments. Both of these items were negatively related to patient beliefs that high blood pressure was interfering with the pursuit of normal activities, another indicator of strain.

Ability to take care of one's health, Anxiety, and Interference with Activities were related to one another. The pattern of the lagged relationships between Anxiety and ability to take care of one's health suggested that this measure of health care competence may effect strain rather than vice versa, and that the resultant anxiety might lead to immobility and consequent perceptions that high blood pressure was interfering with normal activities. These relationships are depicted in Figure 4-3. The diagram represents hypotheses that if perceptions of inability to take care of one's health do result in interference with normal activities, then they may operate via the pathway of creating immobilizing states of anxiety. If this is the case, then the first order relationship between ability to take care of health and Interference with Activities should be a derived one which should drop significantly when the intervening variable, Anxiety, is statistically controlled through partial correlation analysis. This turned out to be the case. The correlation between the measure, able to take care of my health, and Interference with Activities dropped from  $-.32$  ( $p < .01$ ) to  $-.22$  (n.s.) as Anxiety, which explained 53 percent of the initial variance, was partialled out of the relationship. As already noted esteem had no direct links to blood pressure in this study even though it was related to other measures which are part of the hypothesized model of

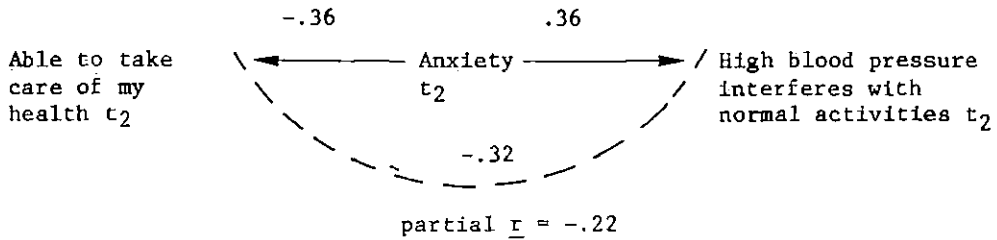


Figure 4-3. Theoretical interpretation of relationships among Anxiety, self-perceived ability to take care of health, and Interference with Activities. (All data is from  $t_2$ .) The broken line represents a hypothesized, derived, and noncausal relationship.

determinants of adherence. It may be that the derived relationship of esteem to blood pressure would simply be too weak to detect in this data set, given the relatively low level of the relationships between esteem and other predictors. There is also the possibility that there are other intervening variables between esteem and blood pressure. Obviously it is also possible that esteem really has no relationship to the eventual changes in blood pressure as a result of adherence. In an exploratory study of this sort, however, the best course would seem to be to reserve judgment. The measures may not be good enough to support our hypothesis and in that case they may not be good enough to refute it either.

In summary, then, the findings presented in Table 4-5 suggest that social support, particularly from the spouse, is an important source of self-esteem among hypertensive patients. These self-competent patients report relatively low levels of psychological strain, particularly anxiety and interference with activities, which appears to be the result of their perceived self-competence. None of these findings directly link esteem, or self-competence, with adherence. Nevertheless, esteem is linked with perceptions that high blood pressure does not interfere with the pursuit of normal life activities. Perhaps this latter attitude is a desirable mental health goal to achieve in one's patients in addition to attempting to control their blood pressures.



*Demands of the Regimen*

In Chapter 2 it was noted that stress and demands are a normal part of life. Such demands come from various sources: work, family, community, and the health care environment. The demands of the health care environment relate specifically to the difficulty of the regimen which is prescribed for the patient. Although more difficult regimens may be theoretically more powerful in controlling high blood pressure, preceding analyses have suggested that from a practical point of view the theoretical gains may be offset by some losses in terms of patient misunderstanding of the regimen and psychological strain. The data also suggested that although high blood pressure may lead the physician to prescribe more pills and tablets, the relationship between more pills and tablets and high blood pressure may also be explained by the inability to adhere correctly as a result of the difficulty of the regimen demand. Data were also presented suggesting that as the regimen demands become more complex, the patients may begin to perceive that being adherent is in competition with other goals they want to pursue with the same limited resources of time, energy, and money.

Table 4-6 presents some additional correlates of Demands of the Regimen. In Chapter 2 high Demands of the Regimen were hypothesized to produce psychological strain reactions just as other life demands of work, family, and community can produce strain. The findings in Table 4-6 support this hypothesis. The overall index of perceived Demands of the Regimen, the reported number of pills, and the objective number of pills from records are all related to Somatic Complaints and to perceptions that high blood pressure was causing interference with normal life activities.

Earlier we pointed out that the extent to which Somatic Complaints reflected psychosomatic, rather than pharmacologic, effects was unclear and that research specifically designed to distinguish between the two effects was needed. We have the same dilemma of interpretation in understanding the correlations between measures of regimen demands and Somatic Complaints. The demands may affect Somatic Complaints by being correlated with the actual amount of medication consumed and hence the probability of somatic side effects. Although the objective number of pills correlates less with

Table 4-6

## Additional Correlates of Demands of Regimen

| Correlate                          | $t_1$                       | $t_2$       |
|------------------------------------|-----------------------------|-------------|
| <u>Strains</u>                     | <u>Demands of Regimen</u>   |             |
| Interference with Activities $t_1$ | .25*                        | .25         |
| $t_2$                              | .30*                        | .42*        |
| Somatic Complaints $t_1$           | .39*                        | .24*        |
| $t_2$                              | .29*                        | .19         |
| <u>Strains</u>                     | <u>Reported # of Pills</u>  |             |
| Interference with Activities $t_1$ | .30*                        | .30*        |
| $t_2$                              | <u>.46*</u>                 | .42*        |
| Somatic Complaints $t_1$           | .37*                        | .28*        |
| $t_2$                              | .31*                        | .15         |
|                                    | <u>Objective # of Pills</u> |             |
| Interference with Activities $t_1$ | .24                         | .34*        |
| $t_2$                              | .26                         | <u>.26*</u> |
| Somatic Complaints $t_1$           | .22                         | .23*        |
| $t_2$                              | .21                         | .14         |

Note: Reported number of pills correlates with objective number of pills .86 at  $t_1$  and .83 at  $t_2$ , both  $p < .001$ . Asterisked coefficients,  $p < .05$ .  $N = 75$  with some variation due to missing data. The underlined, lagged coefficients are significantly ( $p < .05$ ) higher than their corresponding diagonal coefficients according to cross-lagged correlational analyses (tested by the method described by Rozelle and Campbell, 1969).

Somatic Complaints than with reported number of pills, this is not evidence that somatic complaints has its etiology in the subjective, psychological world. Subjective perceptions of the regimen could be better than objective demands as an indicator of the number of pills ingested (although neither is as good an indicator as counting the pills -- which was not done in this study). So the question of interpretation with regard to somatic complaints still remains an open one.

This section was begun by suggesting that more complex regimens, which might be theoretically more effective, have some very real prices which they exact from the patient. The findings presented in preceding sections and those in Table 4-6 support this cautionary note. Patients with complex regimens tend to report higher levels of somatic complaints and more interference with their pursuit of normal activities. The findings raise a question of choice which every patient and physician together need to work out. Specifically, how much daily discomfort, psychological or somatic, is the patient willing to accept in order to prolong his or her life? There is a personal calculus here which must be worked out and which is probably different for every person.

There is another consideration. Despite the fact that our findings show no clear link between demands of the regimen and adherence, it is still likely that as the perception of these demands increase, the ability to adhere properly may decrease. Consequently, the possibility of a decrease in actual adherence, in relationship to the gains hoped for by more complex and more demanding regimen, needs further examination.

### *Social Support*

In Chapter 2, studies were cited which showed that for patients with social support, rates of dropping out of treatment were lower, broken appointments were lower, and adherence appeared to be better. In this section we consider the role of social support in relation to other variables believed to be important in determining adherence. These findings may give us some insight into the ways by which social support might contribute to adherence.

Before turning to these findings it will be useful to ask some questions about interrelationships among the various measures of support that were created for this study.

One basic question is to what extent are all forms of social support intercorrelated? Perhaps persons who receive social support from one person are the types of individuals who generally elicit support from other people in other settings or generally perceive others to be supportive. If so, all sources of support should be correlated. On the other hand, the extent to which people are able to obtain social support may depend on the setting in which the support is being provided and on the relationship of the person providing the support to the person receiving it. If so, not all sources should be interrelated.

A second question is the extent to which the ability to accept social support determines the amount of support received. Third, we can ask whether or not persons who receive support reciprocate by giving it or is it the case that one type of person provides support and another receives it?

A fourth basic question is whether or not the support provided by one person in one setting is substitutable for the support provided by another person in another setting. It may be that it is the total amount of social-emotional support received which is important and not the extent to which support comes from one source rather than from another source. On the other hand, it may well be that support provided by certain persons is unique and cannot be replaced by support from other individuals.

With regard to the first question, an inspection of Table 4-7 shows that support from one source was not necessarily correlated with support from other sources. Social Support from Spouse was correlated with social support from the person's boss and from the person's physician. Social Support from the Boss and from the Physician, however, were unrelated to received Supportive Behaviors, and Social Support from Best Friend was unrelated to any of the other sources of support. The measure of Concern of Others, measured at posttest only, was positively correlated with Social Support from both Spouse and Physician, but this was largely because the index of concern includes items about the physician and spouse, as well as about the nurse and "other persons you know who

Table 4-7

## Correlations Among Measures of Social Support

| Measure                       | 1    | 2    | 3    | 4    | 5    | 6    | 7    | 8    | 9    | 10  | 11   |
|-------------------------------|------|------|------|------|------|------|------|------|------|-----|------|
| 1. Friends $t_1$              | ---  |      |      |      |      |      |      |      |      |     |      |
| 2. Friends $t_2$              | .67* | ---  |      |      |      |      |      |      |      |     |      |
| 3. Social Support of:<br>Boss | .21  | .21  | ---  |      |      |      |      |      |      |     |      |
| 4. Spouse                     | .23  | .24  | .36* | ---  |      |      |      |      |      |     |      |
| 5. Best Friend                | -.20 | .01  | .17  | .04  | ---  |      |      |      |      |     |      |
| 6. Physician                  | .14  | .14  | .06  | .32* | .09  | ---  |      |      |      |     |      |
| 7. Support Behavior           | .30* | .30* | .07  | .29* | .14  | .19  | ---  |      |      |     |      |
| 8. Concern of Others          | .17  | .28  | .02  | .38* | .07  | .37* | .38* | ---  |      |     |      |
| 9. Gives SS $t_1$             | .06  | .26  | -.04 | .02  | .19  | -.05 | .21  | -.06 | ---  |     |      |
| 10. Gives SS $t_2$            | .13  | .19  | -.02 | -.00 | .04  | .05  | .46* | .03  | .54* | --- |      |
| 11. Accepts SS $t_1$          | -.09 | -.04 | .39* | .21  | .38* | -.18 | .15  | -.09 | .05  | .09 | ---  |
| 12. Trust in Others           | -.09 | -.09 | .00  | -.11 | -.20 | .12  | -.10 | -.09 | -.10 | .12 | -.14 |

Note: N = 65 except for correlations with social support of boss where the employed sample is about 40 persons. Asterisk coefficients,  $p < .05$ .

have high blood pressure."

Contact with friends was unrelated to social support from any of the specific sources of support, even Support from Best Friend. This merely suggests that the number of friends a person sees is not necessarily an index of the quality of relationships that occur with either a best friend or anyone else for that matter. Frequency of social contacts may indicate the extent to which the person is physically isolated or in contact with other people but does not necessarily indicate the extent of psychological isolation (or contact). On the other hand, contact with friends was related to measures of social support which did not measure specific sources -- the indices of Concern of Others and social support from an unspecified source (Supportive Behavior).

The fact that Social Support from the Physician and from the Spouse were positively correlated suggests that these two sources may both provide support with regard to health care, and that support from other persons may not be directed at helping the patient achieve good health (although other goals may be the object of support from others).

As part of the study, we asked persons to indicate how comfortable they feel when others (unspecified) act towards them in a manner which we defined as supportive in Chapter 2. This Ability (or capacity) to Accept Support was positively correlated with Support from the Boss and from Friends but was unrelated to Support from Spouse and Physician. If anything, there was a slightly negative relationship between Ability to Accept Social Support and received support from the patient's physician.

Ability to accept social support may be unrelated to the amount of support that is received from the spouse for a number of reasons. Spouses may assume that because of their intimate relationship they have the right to be freely supportive or non-supportive as they like, regardless of the other person's ability to receive such support. If the patient appears reluctant to receive support, the spouse may nevertheless persist in the belief that such support is really for the good of the patient or in the belief that there is a role obligation in marriage to be supportive. On the other hand, a patient may have a high capability to receive support and be married to a spouse who is unable to pro-

vide such support. Such variations between the ability of the patient to receive support and the extent to which the spouse will provide support could cause the two variables to be unrelated to one another. In friendship and work relationships, by contrast, obligations may be more tenuous and support may, accordingly, be built to a large extent on reciprocal relationships.

Physicians, in terms of their role, may have a formal obligation to use clinical counseling skills in order to get their patients to adhere. In fact, they may tend to be most supportive with patients who appear to have a difficult time accepting social support. Such patients, in their judgment, may require more reassurance than the patient who can accept support graciously and therefore, as the data suggests, probably has supportive relationships with friends and other people. This would produce a negative relationship between Ability to Accept Social Support and the amount provided by the physician. The fact that the relationship was so weak in this study may indicate that doctors, like other humans, find it difficult to be supportive with persons who resist such attempts, and/or that the work load of the physicians is so great as to severely limit the extent to which the physician can show patience with every client and particularly with the more resistant clients.

Consequently, it would appear that some social support is provided as part of a social relationship in which the giver perceives that the other person is willing to accept the help. Some social support, however, is provided as part of a professional role relationship in which help is given because the giver perceives that the person needs such help to accomplish a task, regardless of how comfortable the person feels about accepting such help.

As part of the study we also asked people to indicate how often they had shown supportive behavior towards others. The Ability to Give Support and to Receive it were uncorrelated. This suggests that we may eventually be able to come up with different types of individuals in the study of social support in health care roles: (1) those who can receive support but cannot give it, (2) those who can give support but cannot receive it, (3) those who can both give and receive it, and (4) those who can

do neither (for whom a program emphasizing social support among co-patients might be ineffective). Of course any person might fall into two or more of these four categories when measured with respect to two or more sources of support.

The Ability to Give Support was also uncorrelated with the amount of support received from boss, friends, doctor, and spouse although it was related to the number of friends seen. This further suggests that relationships involving social support by one person do not necessarily represent relationships in which such support is mutually exchanged. The index, Trust in Others, was unrelated to any of the measures in Table 4-7.

To summarize Table 4-7, the findings indicated that not all sources of social support are correlated with one another, that the ability to give is not necessarily related to the ability to receive support, that the frequency of contact with friends is not necessarily a predictor of the quality of support provided by one's best friend or by others, and that some forms of support appear to be given because the other person indicates a capability to accept such support in social relationships whereas other forms of support are given because the giver feels a social role obligation which is independent of the person's capability to accept such support. The physician as giver may fall in this latter category.

Now let us consider the extent to which social support from one person is substitutable for social support from another in the sense that all sources of support have similar effects on hypothesized dependent variables. Evidence bearing on this question has already been cited in the preceding tables. Social Support of Physician, of Spouse, and of Friends all tended to be related to Motivation to Adhere. Social Support of Spouse, however, showed the strongest effects of any of the three sources of support. Social Support from Boss was unrelated to Motivation to Adhere. This finding is partly due to the item content of Motivation to Adhere since half the items emphasized the value of approval from one's spouse and physician.

Social Support of Physician was related to perceived Consequences of Nonadherence but Social Support of Spouse, Best Friend, and Boss were not related. Concern of Others was also related to



perceived Consequences of Nonadherence but the correlation was not as high. This would suggest that the person in the position of expertise with regard to health, the physician in this case, would be the one whose social support would have the greatest effect of convincing the person of the importance of adhering. Since we did not measure social support of nurse independently, we cannot say how important the nurse's support would be, particularly, if she/he dealt with patients in a nurse-clinician role.

Social Support of Spouse was positively associated with health-care related self-esteem, but Social Support from Physician, Best Friend, and Boss were unrelated to Self-esteem. Again it appears that not all sources of support have substitutable effects.

In Table 4-8 we present additional correlates of social support which have not been discussed until now. It can be seen that contact with friends and Social Support of Spouse were associated with high Positive Affect. Social Support from Friends, however, and social support from all other sources were unrelated to Positive Affect.

Social Support of Spouse was negatively related to Depression but Social Support of Friends, Boss, and Physician had no relation whatsoever. Social Support of the Physician, on the other hand, was related positively to patients' perceptions of their high blood pressure interfering with their normal activities and to Somatic Complaints. It is possible that the physician's social support was not causing the interference and the complaints, and that the reports of interferences and somatic complaints were perhaps being communicated to the physician to elicit support -- and the physician was complying. The lagged correlations that are available are unfortunately not helpful in either confirming this interpretation or rejecting it.

One notable lack of findings is that there was no relationship between any of the measures of social support and adherence. Nor were there any first-order relationships between social support and blood pressure. Yet the literature reviewed in Chapter 2 suggested that support was important in improving overall adherence as well as in reducing patient dropout from treatment. Furthermore, in Chapter 6 data is presented showing that the most adherent treatment groups -- the social support and lecture

Table 4-8

## Additional Correlates of Social Support

| Correlate                          | $t_1$                         | $t_2$ |
|------------------------------------|-------------------------------|-------|
| <u>Strain</u>                      | <u>Contact with Friends</u>   |       |
| Depression $t_1$                   | -.09                          | -.20  |
| $t_2$                              | -.21                          | -.30* |
| Positive Affect $t_1$              | .20                           | .22*  |
| $t_2$                              | <u>.30*</u>                   | .20   |
| <u>Strain</u>                      | <u>Support of Spouse</u>      |       |
| Depression $t_1$                   | -.33*                         | --    |
| $t_2$                              | -.18                          | --    |
| Positive Affect $t_1$              | .34*                          | --    |
| $t_2$                              | .11                           | --    |
| <u>Strain</u>                      | <u>Social Support of M.D.</u> |       |
| Interference with Activities $t_1$ | .32*                          | --    |
| $t_2$                              | .09                           | --    |
| Somatic Complaints $t_1$           | .21*                          | --    |
| $t_2$                              | .36*                          | --    |

Note: Asterisked coefficients,  $p < .05$ .  $N = 75$  with some variation due to missing data. The underlined, lagged coefficients are significantly ( $p < .05$ ) higher than their corresponding diagonal coefficients according to cross-lagged correlational analyses (tested by the method described by Rozelle and Campbell, 1969).

groups -- were high on reported social support as well as information about health care. The lack of across-persons relationships does not support the contention that the high mean adherence in the lecture and social support groups was due to the social support that was provided. The primary mechanisms by which social support was hypothesized to work, however, were interactions with other variables, such as interactions with demands of the regimen to determine level of strain and interactions with health care information to determine the extent to which the patient puts that information to use. Such effects are considered in the next chapter.

#### *Trust in Others*

As was noted, this measure was unrelated to other measures of social support. Nevertheless, it was correlated with affective states much in the same way that measures of social support were related to affect. These findings are presented in Table 4-9.

Trust in Others was negatively correlated with Depression, Irritation-Anger, and with reported interference of one's high blood pressure with normal activities. Trust in Others was only measured at pretest so we have only one lagged correlation possible -- from it to any measure at posttest. The cross-sectional correlations were much higher than the lagged correlations. This suggests that low Trust in Others may either be a noncausal correlate of these strains or possibly a result of them, but not necessarily a cause of them.

#### *Strains*

A number of the previously discussed findings have involved measures of strain in one way or another. Somatic Complaints appeared to interfere with adherence in Taking Medicines and with attendance at patient education meetings. These complaints were related to high levels of Competing Motives and were positively correlated with high subjective as well as objective Demands of the Regimen. Somatic Complaints were also positively related to Social Support from the Physician although the data gave no insight into what was cause and what was effect in this association.

Table 4-9

## Additional Correlates of Trust in Others

| Strain                             | Trust in Others $t_1$ |
|------------------------------------|-----------------------|
| Depression $t_1$                   | -.45*                 |
| $t_2$                              | -.23*                 |
| Irritation $t_1$                   | -.27*                 |
| $t_2$                              | -.26*                 |
| Interference with Activities $t_1$ | -.34*                 |
| $t_2$                              | -.17                  |

Note: Asterisked coefficients,  $p < .05$ .  $N = 75$  with some variation due to missing data.

Another strain, Depression, was found to be related to poor adherence in Refilling Prescriptions Promptly, to low attendance at health education meetings, to low Social Support from Spouse, and to mistrust of others.

High levels of Anxiety were found among persons with low Self-esteem, particularly those who did not feel they were able to take care of their health or help others. Reports that high blood pressure was interfering with the patient's ability to carry out normal activities, also a measure of strain, was associated with low ability "to take care of my health" and to take care of others, to high perceived and objective Demands of the Regimen, and to high Social Support of the Physician, the latter probably a result of strain rather than a cause of it. Interference with Activities was also positively related to low Trust in Others and Social Support of the Physician.

Table 4-10 presents additional correlates of strain not already discussed. All of these are intercorrelations among measures of strain. As can be seen, practically all of the measures of strain were significantly intercorrelated with one another. Furthermore, the lagged coefficients usually were not markedly different from the cross-sectional coefficients and often tended to be lower. This suggests that if any of the strains do precede one another in time, the time lag is probably very short and certainly less than the lag between pre- and posttest in this study. The interrelations among these strains closely parallels findings from other research on nonhypertensive populations (e.g. Caplan et al., 1975), and suggests that there may be a depression syndrome of anxiety, low self-esteem, and interference with normal activities.

Throughout the preceding tables Somatic Complaints appeared a number of times. Multiple regression analyses were performed to determine the most important predictors of this variable.

Five predictors of Somatic Complaints were chosen for the multiple regression, and these accounted for 48 percent of its variance ( $R = .69$ ,  $p < .001$ ). The partial correlation for the predictors are as follows: Social Support of the Physician, .31 ( $p = .01$ ); Anxiety, .47 ( $p < .001$ ); Depression,  $-.07$  ( $p = .57$ ); Irritation-Anger, .14 ( $p = .25$ ), and Demands of the Regimen, .34

Table 4-10

## Intercorrelations Among Strain Variables

| Correlate                                   | t <sub>1</sub> | t <sub>2</sub> |
|---------------------------------------------|----------------|----------------|
| <u>Somatic Complaints</u>                   |                |                |
| Anxiety t <sub>1</sub>                      | .58*           | .57*           |
| t <sub>2</sub>                              | .37*           | .58*           |
| Depression t <sub>1</sub>                   | .43*           | .31*           |
| t <sub>2</sub>                              | .33*           | .36*           |
| Irritation t <sub>1</sub>                   | .43*           | .39*           |
| t <sub>2</sub>                              | .40*           | .30*           |
| Positive Affect t <sub>1</sub>              | -.10           | -.05           |
| t <sub>2</sub>                              | -.32*          | -.26*          |
| Interference with Activities t <sub>1</sub> | .57*           | .37*           |
| t <sub>2</sub>                              | .40*           | .35*           |
| <u>Anxiety</u>                              |                |                |
| Depression t <sub>1</sub>                   | .56*           | .24*           |
| t <sub>2</sub>                              | .28*           | .43*           |
| Irritation t <sub>1</sub>                   | .53*           | .35*           |
| t <sub>2</sub>                              | .42*           | .57*           |
| Positive Affect t <sub>1</sub>              | -.28*          | -.21           |
| t <sub>2</sub>                              | -.36*          | -.28*          |
| Interference with Activities t <sub>1</sub> | .26*           | .22            |
| t <sub>2</sub>                              | .28*           | .36*           |

Table 4-10 (Cont'd.) Intercorrelations Among Strain Variables

| Correlate                          | $t_1$        | $t_2$       |
|------------------------------------|--------------|-------------|
| <u>Depression</u>                  |              |             |
| Irritation $t_1$                   | .41*         | .41*        |
| $t_2$                              | .37*         | .58*        |
| Positive affect $t_1$              | -.26*        | -.28*       |
| $t_2$                              | -.35*        | -.39*       |
| Interference with Activities $t_1$ | .21          | .26*        |
| $t_2$                              | .11          | .18         |
| <u>Irritation</u>                  |              |             |
| Positive Affect $t_1$              | -.15         | -.21        |
| $t_2$                              | <u>-.31*</u> | -.19        |
| Interference with Activities $t_1$ | .22          | <u>.32*</u> |
| $t_2$                              | .16          | .19         |
| <u>Positive Affect</u>             |              |             |
| Interference with Activities $t_1$ | .05          | -.03        |
| $t_2$                              | -.14         | -.13        |

Note: Asterisked coefficients,  $p < .05$ .  $N = 75$  with some variation due to missing data. The underlined, lagged coefficients are significantly ( $p < .05$ ) higher than their corresponding diagonal coefficients according to cross-lagged correlational analyses (tested by the method described by Rozelle and Campbell, 1969).

( $p = .005$ ). The nonsignificant effects of Depression and Irritation were probably due to their intercorrelations with Anxiety as shown in Table 4-10.

#### Putting the Main Effects Findings Together: Discussion

In Chapter 2 a map was presented. It was noted that the map was not intended to serve as a guide for those who needed a reliable rendering of the shortest routes to various health care goals, but rather as a sketch left behind by an exploring expedition in the hope that other people would add to it and correct its mistakes as they too tried to chart the "terra incognita" of patient adherence. Now we are ready to add a second map in exactly the same spirit. It is presented in Figure 4-4.

Figure 4-4 summarizes the findings presented in this chapter. Arrows between panels indicate likely cause-effect relationships as suggested by the pattern of lagged and cross-sectional findings that were examined. If no lagged findings were available or if lagged and cross-sectional coefficients were of about equal magnitude, then the arrows represent our hypotheses about the nature of the relationships. There are a couple of dotted lines in the figure. These represent derived relationships -- relationships which are probably the result of processes intervening between the panels so connected. In some cases the lines are double-headed suggesting some sort of reciprocating cause-effect mechanism.

Only a few of the lines or arrows connect directly with blood pressure. For example, although adherence is associated with low blood pressure, the predictors of adherence are, for the most part, not related to blood pressure in our data set. We have already suggested that the effects of these other predictors may be too weak to produce these derived relationships between predictors of predictors and blood pressure. Certainly the cross-sectional reliabilities of these predictors, further removed from blood pressure in the model, are not the problem. Chapter 3 shows that all of them are adequate. So we must conclude that this is a map in which the findings are of the following form in logic: B is found to be related to A. C is found to be related to B.



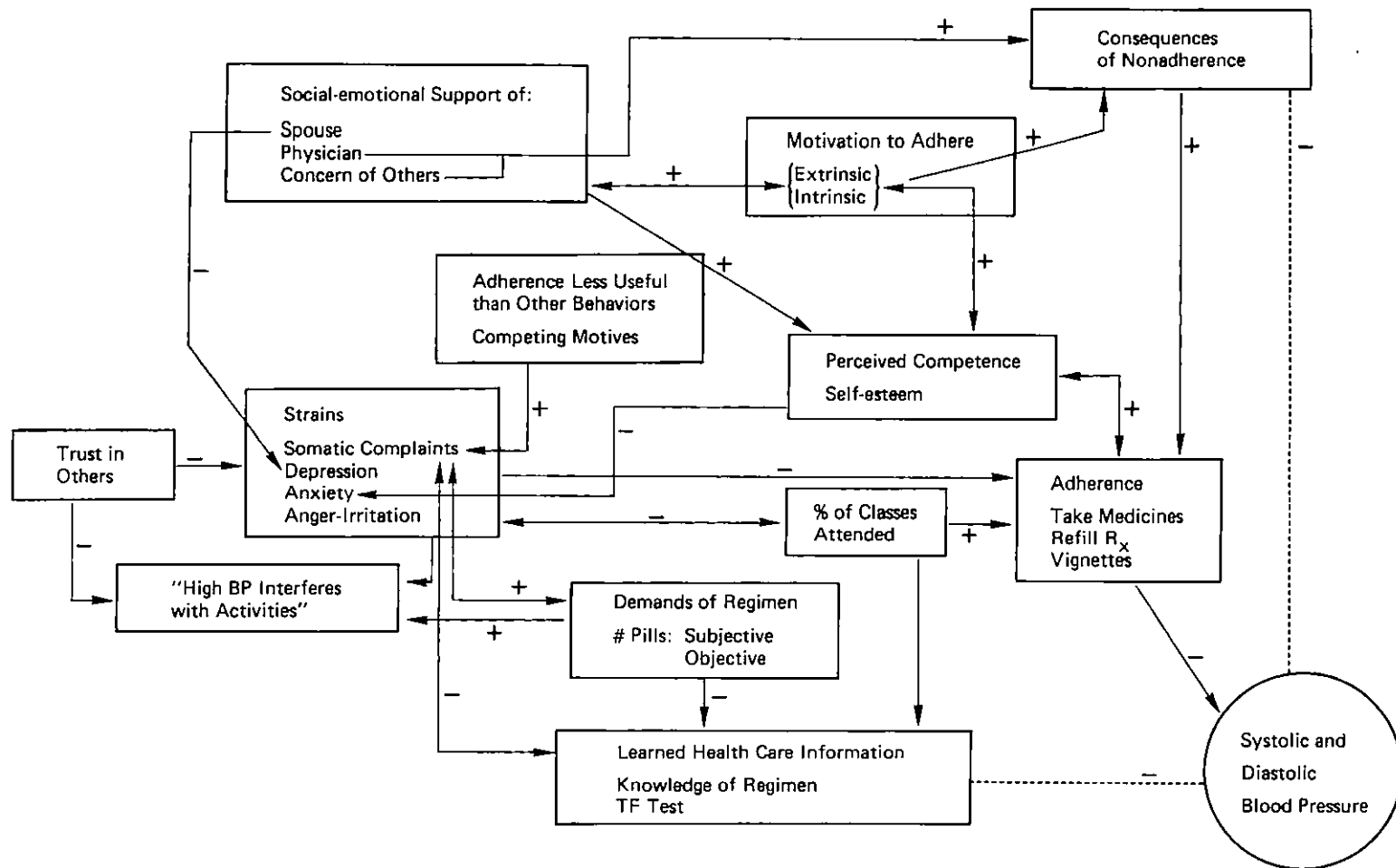


Figure 4-4. Interpretation of the main effects among variables used to test a model of adherence. (Arrows indicate the direction of hypothesized causal relationships. Double headed arrows suggest a reciprocal causality. Dotted arrows indicate a derived rather than direct effect. The signs indicate the direction of the obtained correlations. Arrows entering a panel refer to a specific variable within the panel.)

But C and A are not found to be related. Hopefully further research can strengthen the links between the A's and the C's, through improvements in theory and methodology and in the identification and measurement of variables which may be masking some of the relationships.

Now let us examine the findings summarized in Figure 4-4 in terms of their potential use. Adherence, perceived consequences to health of nonadherence, and learned health care information were all related to low blood pressure. These results indicate predictive validity for the self-report measures of adherence which were newly developed for this study. The negative relationship of perceived consequences of nonadherence and health care knowledge to blood pressure suggest that these two variables could be used (1) to identify persons whose blood pressures will drop as a result of adherence, and (2) to identify other persons for whom further health care instruction might be warranted. Before these measures could be used in such a manner, norms would need to be developed. An exploratory study of this sort cannot provide reliable norms for such purposes.

The findings also show that adherence to medical regimens was related to the patient's self-esteem, perceived consequences of nonadherence, low level of psychological strains including somatic complaints, and the percent of classes attended. All but the latter variable may prove helpful eventually, as tools for determining if patients are getting enough of these suggested preconditions for adherence. Percent of attendance at meetings could prove of use to health care educators who wish to determine whether or not nonattenders may be in trouble with regard to other forms of adherence and may desire some supplementary help.

The balance of the model goes on to suggest that people's motivations to adhere are a function of the demands made on them by the regimen and the social support they receive. Their motivation may play a role in determining the extent to which they see themselves as competent to adhere and may determine the extent to which they see nonadherence as serious. If health is not an important goal in their motive structure, then nonadherence will not be seen as very serious.

Besides affecting patient motivation, social support, particularly from the spouse, has an impact on states of depression, and social support from the physician has an effect on perceived consequences of nonadherence. Both the spouse and the physician remain as important inputs into the patient's world of motives and affects. Social support from spouse is associated with low levels of depression. Social support from physician is associated with patient perceptions that nonadherence would be serious to health. Social support from both spouse and physician are associated with high motivation to adhere.

Demands of the regimen play an important role in the set of relationships discussed. As the complexity of the regimen increases, strain in the form of somatic complaints may appear, and the patient may begin to see the requirements of health care in competition with other life demands and goals. The patient with a lot of demands of the regimen, both perceived and objective, is more likely to see high blood pressure as interfering with normal activities -- activities which should not be ordinarily affected by high blood pressure (going to movies, visiting friends, working, going somewhere, and eating at a restaurant -- the latter can be directly related to dietary restraints). These findings would seem to suggest that if medical science and technology will allow, the regimen should be kept as simple as possible.

It is instructive to compare the main effects in Figure 4-4 with related predictions from Figure 2-3, the theoretical model presented in Chapter 2. Many of the same boxes are linked as were predicted by the model: adherence relates to blood pressure, competence relates to adherence, social support relates to psychological strain, demands of the regimen relates to psychological strains. There are also some new links in Figure 4-4 that were not depicted in Figure 2-3 -- for example, the relationship between demands of the regimen and competing motives, and between perceived consequences of nonadherence and adherence.

There are also relationships predicted in Figure 2-3 which do not appear in Figure 4-4. Social support does not show any relationship with self-esteem. Part of the problem may be that the social support items are not specific enough in referring to esteem-related content of social support. Another part

of the problem may be that the measure of Self-esteem does not include enough of the attributes of the self which are strongly influenced by support. Studies of determinants of self-esteem clearly indicate that communicated esteem from others can raise esteem or lower it depending on whether the communication is positive or negative (Sherwood, 1962), so that a causal relationship between social support and self-esteem still remains likely.

Similarly no direct relationship was found between psychological and somatic strains and blood pressure, although there is a growing literature relating psychosocial stress and strain to risk of coronary heart disease. Such links may be difficult to obtain in this sample because the variance in blood pressure is restricted by the hypertension of the sample and because error variance can be introduced by medication.

There are some variables not measured in this study but which were included in Figure 2-3 because they seem important considerations in understanding the determinants of adherence. These variables include the nature of goals patients set, the process by which such goals are set, and other stresses of life besides the regimen. These stresses would include the demands of work, of family, and of community (for example, urban stress).

Finally, there are some effects predicted in Figure 2-3 which represent interactions rather than main effects. Data on some of these interactions are considered in the next chapter.

## Chapter 5

### RELATIONSHIPS AMONG PREDICTORS AND INDICATORS OF ADHERENCE: INTERACTION EFFECTS

Sometimes Nature proceeds in terms of additive effects. The analyses in the preceding chapter were limited to testing for such additive effects and demonstrated a number of relationships among variables related to the study of adherence.

Sometimes, however, additional understanding is gained by considering nonadditive, interactive relationships among variables. For example, although Demands of the Regimen was shown to be positively correlated with a number of strains, it is possible for this relationship to vary as a function of other variables. Thus we might ask if demands of the regimen are more likely to be associated with perceived strain for people who lack inadequate health care knowledge or lack social support than for persons who have these resources?

There are a large number of interaction effects which will eventually be studied in this data set and reported on elsewhere. Two main sets of interaction effects, out of all the possible sets, have been selected for presentation here for a number of reasons: there were already expected main effects for these relationships, the findings illustrate a number of hypotheses worth pursuing in future studies, the findings appear to be of general interest to persons interested in application, and the findings appear to lend themselves to interpretation.

Figure 5-1 depicts the sets of interactions examined in this chapter. Roman numeral one represents the hypothesized effects of conditioning variables on the relationship between demands of the regimen and strain. Roman numeral two represents the hypothesized effects of these same conditioning variables on the relationship between perceived self-competence and adherence. The rationale

for these hypotheses follows, after which there is a description of the methods used for testing the hypotheses, and a presentation of the findings.

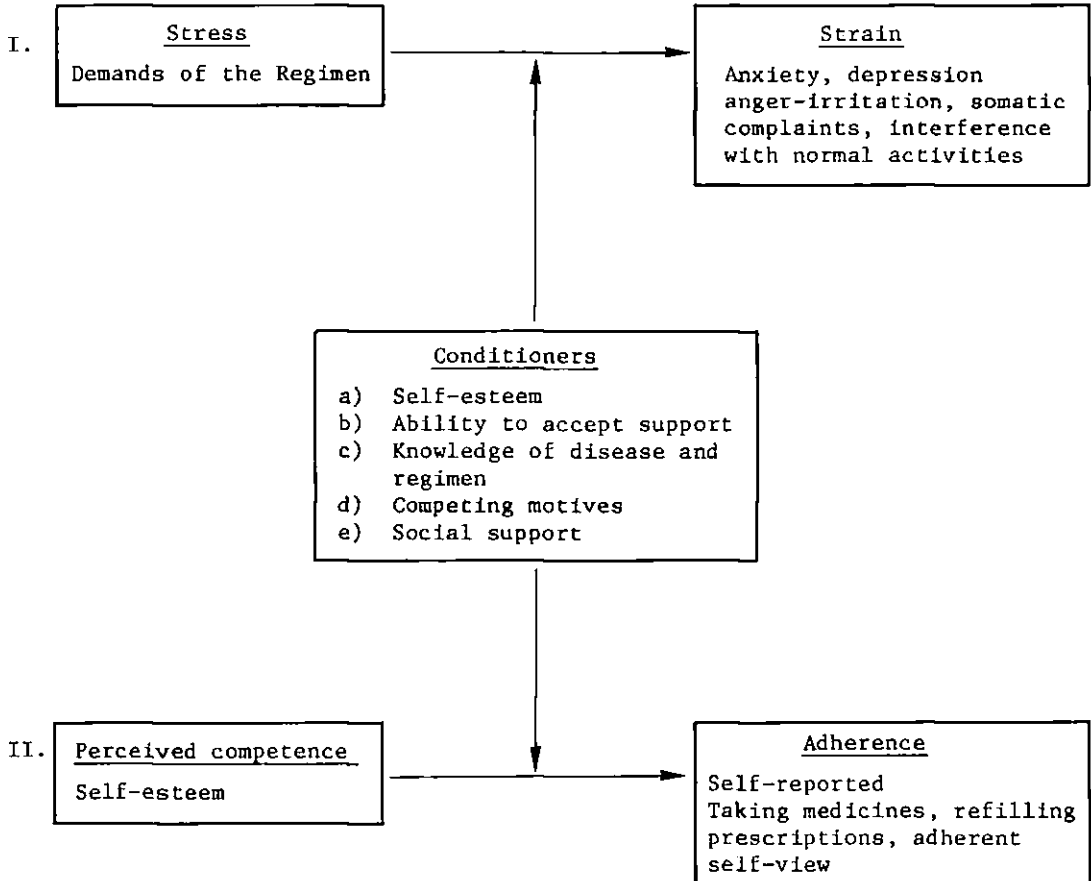


Figure 5-1. Hypothesized conditioners of the effects of demands of the regimen on strains (I) and of self-competence on adherence (II). (Self-esteem is not examined as a conditioner of II).

### Interaction Hypotheses

Each of the conditioners in Figure 5-1 has a plausible hypothesis associated with it. Self-esteem is expected to buffer or ameliorate the effects of demands of the regimen on strain. Having the self-confidence to know one can meet such demands may prevent the person from becoming emotionally and behaviorally overwhelmed by the regimen that is demanded. In a sense, the person who feels

self-competent perceives a potentially good fit between personal abilities and the demands of the health care environment.

Knowledge of the disease and of the regimen represent another set of conditioners. Such knowledge may make an important difference in the extent to which demands of the regimen lead to strain. A patient who knows what to do and understands the nature of the illness may be less likely to be emotionally and functionally overwhelmed by a complicated regimen than a person without such knowledge.

Such knowledge should also have effects on how perceived competence to adhere affects adherence. When such knowledge is absent, perceived competence should be unrelated to adherence. Both being confident and knowing what to do would seem to be necessary for confidence to lead to adherence.

Competing motives might greatly accentuate the effects of demands of the regimen on emotional and functional strain. The absence of competing motives might buffer the effects of the demands on strain because the person would feel highly motivated to meet the demands of the regimen.

Such motives might also reduce the likelihood that competence to adhere will be related to adherence. A person might say "I know I have the ability to adhere, but I have too many other goals to pursue which are more important."

Social support, as was already suggested in Chapter 2, may buffer the effects of demands of the regimen on strain. Consequently demands may be associated with strain only for persons low in social support.

If, however, support has the effect of threatening peoples' sense of autonomy and independence, buffering may not occur. A recent study of stress and strain at work suggests that such effects are possible (Pinneau, 1975).

The findings from the preceding chapter suggest that different sources of social support are not necessarily substitutable for one another. We should expect to find similar evidence for the interaction effects in that support of spouse and physician may be more important conditioners than support of friend.

Although perceived competence should lead to adherence, it may be that the lack of social support from others may seriously

interfere with the translation of such competence into actual adherence behavior. Consequently social support is seen as a potentially important conditioner of the effects of competence on adherence.

Ability to accept social support is added here primarily as a possible indicator of received social support on the argument that the higher the ability, the more likely that the person has accepted the support. As a more specific hypothesis, it has been suggested that the effects of social support as a conditioning variable in Figure 5-1 are really dependent on the ability of the person to accept such support (French, 1975). This is a plausible hypothesis. If, for example, a person rejects support or finds it threatening to needs for independence, then support should not have the hypothesized beneficial effects.

The possibility of effects of a triple interaction between ability to receive social support, received social support, and a stress variable, such as demands of the regimen, on strain or adherence, was explored in a set of analyses. In these analyses, we considered five different models of interaction effects of ability to accept social support. These models, the analyses, and their results are described in Appendix G.

These analyses show that the models which assume that our measures of ability to accept social support measure need for support, rather than capacity for support, are the poorest predictors. This suggests that the measures of ability to accept support probably tap capacity to accept support aside from the person's need. The analyses further suggest that weighting the effect of social support by ability to accept support does not enhance the predictive power of social support. We should not assume that ability to accept social support is irrelevant. Rather, it is likely that the measures of social support already tap the effects of the capacity to accept social support.

#### Methodology for Testing for Interaction Effects

This section describes the methods used to test and present the data in the rest of this chapter.



*Analyses of Variance Tables*

The traditional manner of testing for interactions involves construction of an analysis of variance table. One predictor variable, such as social support, has its scale distributed across the columns, and the other predictor variable, such as demands of the regimen, has its scale distributed across the rows. Table 5-1 is an example. The cells represent the combinations (interactions) of specific columns and rows or values on the column variable and values on the row variable. The means in the cells represent dependent variables, and the pattern of means indicates the extent to which the variance in the dependent variable is due to each of three effects:

- (1) The main effect of one predictor (such as social support),
- (2) The main effect of the other predictor (such as demands of the regimen), and
- (3) The nonadditive interaction effect of these two predictors.

It is possible empirically to obtain any combination of main and interaction effects ranging from the presence of all three effects to the absence of all three. Whether or not one should theoretically expect both main and interaction effects, however, is quite another matter, and depends on one's hypotheses about how the dependent variable is affected by other variables.

TABLE 5-1

Hypothetical Example of an Interaction of Demands  
of Regimen and Social Support on Strain

| <u>Demands</u> | <u>Support</u> |             |
|----------------|----------------|-------------|
|                | <u>Low</u>     | <u>High</u> |
| Low            | .6             | .6          |
| Medium         | .7             | .6          |
| High           | .8             | .6          |

$$F_{\text{interaction}}(2,50) = 3.75, p < .05, SSI/SST = .15.$$

The hypothetical data in Table 5-1 illustrates one pattern of interaction. Strain increases in mean value with demands of the regimen for persons with low social support but shows no change in mean value for persons with high social support. At the bottom of the table is an  $F$  test of the significance of the interaction effect. The numbers in parentheses indicate the statistical degrees of freedom for the test.  $SSI/SST$  (sum of the squared deviations from the mean of the dependent variable for the interaction divided by the total sum of the squared deviations from the mean) represents the percent of variance in the dependent variable explained by the interaction effect independent of the main effects of the predictors. In the example the value is .15 or 15 percent of the variance.

Although the conditioning variables, such as social support, and the other predictors, such as demands of the regimen, are usually treated as continuous variables, in these analyses the conditioning variable was split as close to the median of its distribution as possible. The other predictor was split as close to the tertiles of its distribution as possible. This produced a six-celled analysis of variance table (two columns by three rows) as a way of trying to insure that the sample size for each cell was somewhere between ten to thirty patients. Splitting the predictor variables on a greater number of points would have distributed the sample among too many cells and would have tended to produce unreliable cell means because of the small  $n$  in each cell. In some cases a measure could not be easily split into tertiles and a two-point, rather than three-point, distribution had to be accepted.

#### *Testing for Interactions Through Multiple Regression*

The equivalence of multiple regression and analysis of variance for testing main and interaction effects has been discussed elsewhere (Cohen, 1968; Darlington, 1968). Multiple regression rather than analysis of variance was chosen because the computer programs for the former were more economical to run. (We used the REGRESSION program of Fox & Guire's [1973] MIDAS statistical software package.) Dummy variable regression (which is described by Cohen and will not be described here) was used to represent

a two-level by three-level interaction term and respective main effects. An F test was used to determine the significance of the interaction independent of the main effects. For those interactions which were statistically significant, tables of means were generated so that the actual data could be inspected and presented. In essence, then, tests were made only for interaction effects and not for main effects. The main effects, of course, have already been presented in Chapter 4 and will be referred to again whenever appropriate.

In the preceding chapter lagged as well as cross-sectional additive relationships were examined. Certainly one might consider analyzing interaction effects as well by the use of cross-lagged relationships to determine which variables were antecedent and which were consequent. Given that one has at least two predictors, rather than one, however, the number of competing hypotheses which would have to be examined would increase rapidly. For example, if demands of the regimen and social support are hypothesized to interact as predictors of psychological strain, cross-lagged analyses would require that we consider (1) the cross-sectional relationships at pre- and posttest of all three variables to each other, (2) the lagged relationship of demands of the regimen to social support and psychological strain, (3) the lagged relationship of social support to demands and strain, and (4) the lagged relationship of strain to social support and demands. We were unprepared in terms of hypotheses and in terms of statistical procedures to consider ways in which these complexities of lagged analyses might be examined and interpreted.

Consequently, the analyses are meant only to be exploratory in the sense of suggesting further avenues for research. We will not be able to provide as compelling a set of explanations of the findings as one might wish because of the lack of the methodology and theoretical understanding to do so. Accordingly, the reader should examine the following findings more as an exploratory poking at the data rather than as an attempt to work hypotheses through to full understanding.

### Conditioners of the Relationship Between Demands of the Regimen and Strain

These findings concentrate primarily on one indicator of strain -- reported interference of one's high blood pressure with the pursuit of everyday, normal activities (going to the movies, visiting friends, eating out, watching television, and so forth). This indicator of strain has been selected because (1) there are a relatively large number of interaction effects relating to it, (2) the findings tend to be relatively consistent rather than contradictory so that we can have some modicum of confidence in interpreting the results (overall, 24 percent of the interactions between demands of the regimen and the conditioners were significant at  $p < .10$  -- more than twice what one would expect by chance), and (3) there are a variety of types of conditioning variables which were revealed, thereby providing an opportunity to consider the variety of dynamics that might link demands of the regimen with strain.

#### *Role of Social Support*

Table 5-2 presents the effect of Social Support of Spouse  $t_1$  on the relationship between Demands of the Regimen  $t_2$  and Interference with Normal Activities  $t_2$ . As noted in Chapter 4, Demands of the Regimen was directly related to Interference. Social support was unrelated to Interference or Demands of the Regimen.

Turning to the pattern of interaction, Interference, as expected was lowest for patients with low to moderate Demands of the Regimen and high Social Support. Contrary to expectation, Interference was highest for persons with high Demands of the Regimen and high Social Support. For these persons received Social Support may have been overnurturant rather than helpful. Such persons with high Demands may have been perceived by the spouse as being very sick (all the myriads of pills and bottles). The spouse may have overresponded and may have become overnurturant, hindering the patient's autonomy. Under such conditions Social Support could begin to instill a sick role in the patient which severely restricts the performance of normal activities ("I don't

TABLE 5-2

Effects of Social Support of Spouse  $t_1$  on the  
Relationship Between Demands of Regimen  $t_2$  and  
Interference with Normal Activities  $t_2$

| Demands of<br>Regimen $t_2$ | Social Support of Spouse $t_1$ |         |
|-----------------------------|--------------------------------|---------|
|                             | Low                            | High    |
| Low                         | 1.2 (17) <sup>1</sup>          | 1.0 (7) |
| Medium                      | 1.4 (18)                       | 1.0 (7) |
| High                        | 1.3 (19)                       | 2.1 (8) |

Note:  $F_{\text{interaction}} (2,70) = 6.13$ ,  $p = .004$ ,  $SSI/SST = .14$ .

<sup>1</sup>Cell  $n$ .

want you to watch that TV program because the excitement from it might affect your blood pressure.").

The possibility that the patients with high Demands of the Regimen and high Social Support may have been strained by the Social Support is reinforced by Table 5-3. In this table Anxiety was substituted for Interference as the dependent variable. The lowest level of Anxiety was found among persons with high Social Support and low Demands of the Regimen. On the other hand, the highest level of Anxiety was found among patients with high Social Support and high Demands of the Regimen. Interference and Anxiety correlated .36 at Time 2 so that the two interaction effects are not completely independent, but they only share 13 percent common variance for that matter.

When Demands of the Regimen  $t_1$  was substituted for Demands of the Regimen  $t_2$  there were similar but nonsignificant interaction effects of the  $t_1$  measure and Social Support of Spouse on both Anxiety and perceived Interference of high blood pressure with normal activities. When the dependent variables were measured at  $t_1$ , however, there were no such effects.

Table 5-4 shows the interaction effects of reported Supportive Behavior from others (measured at Time 2 only) and Demands of the Regimen on Interference. The measure of Supportive Behavior asked the respondents about the amount of supportive behaviors others showed towards them in the past six weeks (listening, encouraging the patient, et cetera). This interaction effect was weak ( $F(2,79) = 2.64$ ,  $p = .08$ ), but tended again to show some negative effects of support. The highest level of reported Interference with Normal Activities was among persons with high Demands of the Regimen and a high score on received Supportive Behavior. Because the "someone" providing the support was unspecified in the questionnaire measure, one cannot easily tell if support of spouse or of other sources (doctor, friend) was being tapped by the item. An inspection of the intercorrelations among the various measures of support (Table 4-7) suggests that the measure of Supportive Behavior may have primarily tapped social support of spouse rather than of other sources. (1) Social Support of Spouse was correlated .30 ( $p < .05$ ) with Supportive Behavior whereas Social Support of Best Friend, Boss, and Physician were unrelated.

TABLE 5-3

Effects of Social Support of Spouse  $t_1$  on the  
Relationship Between Demands of the Regimen  $t_2$   
and Anxiety  $t_2$

| Demands of<br>the Regimen $t_2$ | Support of Spouse $t_1$ |         |
|---------------------------------|-------------------------|---------|
|                                 | Low                     | High    |
| Low                             | 2.0 (19) <sup>1</sup>   | 1.3 (8) |
| Medium                          | 2.0 (20)                | 1.8 (8) |
| High                            | 1.7 (18)                | 2.4 (7) |

Note:  $F_{\text{interaction}} (2,74) = 5.88$ ,  $p = .004$ ,  $SSI/SST = .14$ .

<sup>1</sup>Cell n.

TABLE 5-4

Effects of Supportive Behavior  $t_2$  on the  
Relationship Between Demands of Regimen  $t_1$   
and Interference with Normal Activities  $t_2$

| Demands of<br>Regimen $t_1$ | Supportive Behavior $t_2$ |          |
|-----------------------------|---------------------------|----------|
|                             | Low                       | High     |
| Low                         | 1.2 (18) <sup>1</sup>     | 1.0 (15) |
| Medium                      | 1.4 (13)                  | 1.5 (15) |
| High                        | 1.2 (12)                  | 1.8 (12) |

Note:  $F_{\text{interaction}} (2,79) = 2.64$ ,  $p = .08$ ,  $SSI/SST = .06$ .

<sup>1</sup>Cell n.



(2) Although other measures of social support were related to Supportive Behavior (Contact with Friends  $t_1$  and  $t_2$ ), the measures produced no such interaction effects. (3) When Social Support of Spouse was partialled from Supportive Behavior and the interaction effect was recomputed using the partialled or residualized variable, the  $F$  test value dropped from 2.64 ( $p = .08$ ,  $SSI/SST = .06$ ) to .26 (n.s.,  $SSI/SST = .01$ ). This indicates that the conditioning effects of Social Support of the Spouse measured at Time 1 only were largely being replicated by similar effects present in a Time 2 measure of support. The consistency of these effects on Interference and Anxiety, and the tendency for the relationships to replicate when Time 2 rather than Time 1 measures of social support were used, suggests that the pattern of findings may not be due merely to chance.

It may well be that social support is helpful in some instances, and in other instances, it is a hindrance to the patient. How this all occurs is quite another question. Do givers of support overreact when they see a patient with high demands of a regimen? Perhaps the qualitative nature of given support remains the same, but patients with high demands of the regimen become more threatened by the provision of such support and perceive it as non-helpful or are unable to accept it. The fact that Ability to Accept Support and Trust in Others were unrelated to Demands of the Regimen ( $r$ 's range between .03 and .07) suggests, however, that Ability to Accept Support is not necessarily hindered by increases in the complexity of the regimen.

Although the high levels of strain among persons with high demands of the regimen may result from overnurturance, one can entertain an alternative explanation. Namely, persons who present themselves to others as having high demands of the regimen and high interference of their normal activities elicit high levels of social support. The pattern of findings, however, tends to suggest that Interference with Normal Activities follows, rather than precedes, Social Support and Demands of the Regimen because there are no effect on  $t_1$  measures of Interference, so that the support for this latter explanation is not as apparent in the data. Nevertheless, it is an alternative explanation.

*Role of Self-perceived Competence*

Table 5-5 presents the effects of Self-esteem  $t_1$  on the relationship between Demands of the Regimen  $t_1$  and Interference with Normal Activities  $t_1$ . Self-esteem had no first-order relationship to either perceived Demands of the Regimen nor to Interference with Normal Activities. As can be seen, Interference with Normal Activities showed a steady, mean increase with increases in Demands of the Regimen among persons low in Self-esteem. The highest mean Interference was reported by persons with both the highest perceived Demand of the Regimen and with low Self-esteem. On the other hand, there was no clear change in Interference with the regimen for persons with high scores on Self-esteem. These findings suggest that esteem is important in enabling the patient to handle demands of the regimen particularly when those demands are quite high. Table 5-6 presents similar findings using  $t_2$  measures. Significant lagged interaction effects did not appear in the data.

Tables 5-7 and 5-8 present tests of similar interactions using the single item from the index of Self-esteem which most clearly describes competence in sick role behavior -- "able to take care of my health." As in Tables 5-5 and 5-6, Demands were associated with Interference only for persons with low Self-esteem. The pattern of the interaction was more well-defined than in Tables 5-5 and 5-6 and this is reflected by the fact that the  $F$  levels were somewhat higher in Tables 5-7 and 5-8.

The above findings are consistent with predictions that follow from Self-Identity Theory (French & Sherwood, 1963). According to this theory, people have different sub-identities such as patient, parent, employee, and so forth. The esteem of a person varies according to which sub-identity one references. Perceived self-competence as patient may differ considerably from perceived competence in other roles. Our general measure of Self-esteem asked about self-competence with regard to a variety of aspects of the self. Some of the aspects are specific to health, such as "able to take care of health," and some of them are nonspecific, such as "value myself highly." A general measure of self-esteem should show weaker effects on health-specific relationships than a measure of self-esteem which is nonspecific to the subidentity

TABLE 5-5

Effects of Self Esteem  $t_1$  on the  
Relationship Between Demands of Regimen  $t_1$  and  
Interference with Normal Activities  $t_1$

| Demands of<br>Regimen $t_1$ | Self Esteem $t_1$     |          |
|-----------------------------|-----------------------|----------|
|                             | Low                   | High     |
| Low                         | 1.1 (29) <sup>1</sup> | 1.3 (20) |
| Medium                      | 1.3 (19)              | 1.2 (21) |
| High                        | 1.6 (21)              | 1.3 (29) |

Note:  $F_{\text{interaction}} (2,133) = 2.76, p = .07, \text{SSI/SST} = .04.$

<sup>1</sup>Cell n.

TABLE 5-6

Effects of Self Esteem  $t_2$  on the  
Relationship Between Demands of Regimen  $t_2$  and  
Interference with Normal Activities  $t_2$

| Demands of<br>Regimen $t_2$ | Self Esteem $t_2$     |          |
|-----------------------------|-----------------------|----------|
|                             | Low                   | High     |
| Low                         | 1.1 (12) <sup>1</sup> | 1.2 (19) |
| Medium                      | 1.3 (17)              | 1.2 (19) |
| High                        | 2.0 (13)              | 1.4 (21) |

Note:  $F_{\text{interaction}} (2,95) = 2.64, p = .08, \text{SSI/SST} = .04.$

<sup>1</sup>Cell n.

TABLE 5-7

Effects of Ability to Take Care of Own Health  $t_1$  on the  
Relationship Between Demands of Regimen  $t_1$  and  
Interference with Normal Activities  $t_1$

| Demands of<br>Regimen $t_1$ | Ability to Take Care of<br>Own Health $t_1$ |          |
|-----------------------------|---------------------------------------------|----------|
|                             | Low                                         | High     |
| Low                         | 1.1 (23) <sup>1</sup>                       | 1.2 (25) |
| Medium                      | 1.5 (14)                                    | 1.2 (29) |
| High                        | 1.7 (21)                                    | 1.2 (28) |

Note:  $F_{\text{interaction}} (2, 134) = 3.12$ ,  $p = .05$ ,  $SSI/SST = .04$ .

<sup>1</sup>Cell n.

TABLE 5-8

Effects of Ability to Take Care of Health  $t_1$  on the  
Relationship Between Demands of the Regimen  $t_2$  and  
Interference with Normal Activities  $t_2$

| Demands of<br>Regimen $t_2$ | Ability to Take Care<br>of Health $t_1$ |          |
|-----------------------------|-----------------------------------------|----------|
|                             | Low                                     | High     |
| Low                         | 1.2 (9) <sup>1</sup>                    | 1.1 (15) |
| Medium                      | 1.4 (8)                                 | 1.2 (19) |
| High                        | 2.1 (8)                                 | 1.2 (17) |

Note:  $F_{\text{interaction}} (2, 70) = 3.97$ ,  $p = .02$ ,  $SSI/SST = .08$

<sup>1</sup>Cell n.

of patient according to self-identity theory. The above tables suggest this is the case. The single item measure, "able to take care of my health" did as good or better as a conditioning variable than the multiple item index of Self-esteem although the percent of variance explained by each interaction was still quite low. Even though the multi-item measure had more reliability than the single item measure as an index, the former appeared to suffer from lower content relevance.

#### *Role of Competing Motives*

Tables 5-9 and 5-10 present the conditioning effects of Competing Motives (measured only at  $t_2$ ) on the relationship between Demands of the Regimen,  $t_1$  and  $t_2$ , and Interference with Normal Activities  $t_2$ . Competing Motives, as noted in the preceding chapter, had a significant positive relationship with Demands of the Regimen ( $r$ 's with  $t_1$  and  $t_2$  measures of Interference = .33 and .38 respectively; both  $p < .05$ ) probably because Demands represent a set of conflicting needs. In both tables, when Demands of the Regimen was low, there was little or no difference in the level of reported Interference of high blood pressure with normal activities among persons with low and high levels of Competing Motives. When Demands of the Regimen was medium to high, however, then the presence of Competing Motives appeared to interact with these demands. At these upper levels of Demands, patients with low levels of Competing Motives showed little or no increase in Interference with Normal Activities. On the other hand, persons with high levels of Competing Motives showed high levels of reported Interference of their high blood pressure with normal activities.

From these findings, two hypotheses can be stated for future investigation. First, the presence of competing motives may enhance the likelihood that increases in the regimen demands will lead to physiologically unjustified sick role disability. The second hypotheses follows from social reactance theory (Brehm, 1966). According to this theory, when you deprive a person of the opportunity to pursue some positively valued goal, the value of that goal is likely to increase. In the case of the above findings it is conceivable that increasing demands of the regimen led patients to feel that certain goals (such as salty foods or ciga-

TABLE 5-9

Effect of Competing Motives  $t_2$  on the  
Relationship Between Demands of Regimen  $t_1$   
and Interference with Normal Activities  $t_2$

| Demands of<br>Regimen $t_2$ | Competing Motives $t_2$ |          |
|-----------------------------|-------------------------|----------|
|                             | Low                     | High     |
| Low                         | 1.1 (23) <sup>1</sup>   | 1.1 (7)  |
| Medium                      | 1.1 (16)                | 1.9 (9)  |
| High                        | 1.3 (9)                 | 1.6 (16) |

Note:  $F_{\text{interaction}} (2,74) = 2.88$ ,  $p = .06$ ,  $SSI/SST = .06$ .

<sup>1</sup>Cell n.

TABLE 5-10

Effect of Competing Motives  $t_2$  on the  
Relationship Between Demands of Regimen  $t_2$   
and Interference with Normal Activities  $t_2$

| Demands of<br>Regimen $t_2$ | Competing Motives $t_2$ |          |
|-----------------------------|-------------------------|----------|
|                             | Low                     | High     |
| Low                         | 1.1 (22) <sup>1</sup>   | 1.2 (5)  |
| Medium                      | 1.2 (21)                | 1.3 (13) |
| High                        | 1.2 (14)                | 2.0 (18) |

Note:  $F_{\text{interaction}} (2,87) = 4.11$ ,  $p = .02$ ,  $SSI/SST = .07$ .

<sup>1</sup>Cell n.

rettes) had become inaccessible (interfering with their pursuit). Consequently, there may have been an increase in both the value of these goals and the strength of the (competing) motives to pursue those goals as opposed to goals of adherence.

#### *Role of Knowledge of Regimen*

There were no striking conditioning effects of Knowledge of Regimen. Table 5-11 presents suggestive data. The data show that Interference with Normal Activities had its highest value for persons with high Demands of the Regimen and low scores on Knowledge of Regimen. There was no consistent increase in Interference with Normal Activities for persons with high scores on Knowledge of Regimen; rather there was a curvilinear change in Interference which is not in line with our predictions. When  $t_2$  rather than  $t_1$  data were used, the same pattern of interactions appeared although they were not statistically significant. The findings provide weak support for the hypothesis that Knowledge of Regimen may buffer effects of demands of the regimen on strain. The fact that general knowledge about high blood pressure as a disease had no such significant effect suggests that knowledge about one's own regimen is likely to be more valuable to the person, than knowledge about the physiology and treatment in general, as an aid in coping with the regimen.

#### Determinants of the Relationship Between Perceived Self-Competence and Adherence

In Chapter 2 perceived competence to adhere was hypothesized to be one of the most proximally antecedent predictors of adherence. Believing that one has the competence to adhere, however, is not the same as adhering. Motivation and other factors, such as the encouragement and support of others, may determine whether the patient turns that competence into adherence or decides that there are more important things to do with the energies at hand. A selective set of findings follows, suggesting possible hypotheses for further study with regard to self-competence.

TABLE 5-11

Effects of Knowledge of Regimen  $t_1$  on the  
Relationship Between Demands of Regimen  $t_1$   
and Interference with Normal Activities  $t_1$

| Demands of<br>Regimen $t_1$ | Knowledge of Regimen $t_1$ |          |
|-----------------------------|----------------------------|----------|
|                             | Low                        | High     |
| Low                         | 1.2 (11) <sup>1</sup>      | 1.1 (26) |
| Medium                      | 1.2 (11)                   | 1.5 (21) |
| High                        | 1.7 (12)                   | 1.2 (23) |

Note:  $F_{\text{interaction}} (2,98) = 3.25, p = .04, SSI/SST = .06.$

<sup>1</sup>Cell  $\bar{n}$ .



*Role of Social Support*

Table 5-12 shows the effect of Social Support of Spouse on the relationship between Self-esteem  $t_1$  and Adherence in Taking Medicine  $t_2$ . As reported in Chapter 4, Self-esteem correlated positively with Adherence in Taking Medicine cross-sectionally ( $r = .24$  at both  $t_1$  and  $t_2$ ) but was unrelated in lagged relationships. The table shows reported Adherence in Taking Medicine was highest when Self-esteem was moderate to high but only when Social Support of Spouse was also high. Oddly, however, the level of adherence decreased with Self-esteem for persons with low Social Support. This finding was unexpected. It may well be that persons with perceived high ability to adhere and a lack of support from spouse may become discouraged -- "What will adherence get me if no one really cares whether or not I live?" It is possible that this discouraged outlook becomes more intense with higher levels of perceived self-competence because the patient experiences successively higher feelings of frustration at having an increasingly higher capability to adhere but no concomitantly appreciative audience for whom to perform capably the sick role behavior. Obviously new studies will be required to test these hypotheses.

Table 5-13 shows a similar analysis of data, this time using the single item measure of "able to take care of my health" from the Self-esteem index. The same pattern of results is again apparent. The single item measure of competence did as well as its larger parent index as a predictor.

The conditioning effect of Social Support of the Physician on relationship between competence and adherence is examined next. There was no main effect of Social Support of the Physician -- only an interaction as shown in Table 5-14. Here the pattern of results is quite different from preceding findings. The lowest degree of adherence (Adherent Self-View) was found for those persons with low Self-esteem and high Social Support from the Physician. We suspect that high Social Support of Physician was not a cause of low adherence. Rather, social support may have been the physicians' response to patients believed to be lacking the self-confidence to adhere and therefore not adhering. The physicians might then have made a special effort to be supportive.

TABLE 5-12

Effects of Social Support of Spouse  $t_1$  on the  
Relationship Between Self-Esteem  $t_1$  and  
Adherence in Taking Medicine  $t_2$

| Self-Esteem<br>$t_1$ | Social Support of Spouse $t_1$ |          |
|----------------------|--------------------------------|----------|
|                      | Low                            | High     |
| Low                  | 4.6 (21) <sup>1</sup>          | 4.0 (4)  |
| Medium               | 4.3 (14)                       | 4.8 (9)  |
| High                 | 3.6 (17)                       | 4.9 (11) |

Note:  $F_{\text{interaction}} (2,70) = 4.04$ ,  $p = .02$ ,  $SSI/SST = .09$ .

<sup>1</sup>Cell n.

TABLE 5-13

Effects of Social Support of Spouse  $t_1$  on the  
Relationship Between Ability to Take Care of Health  $t_1$   
and Adherence in Taking Medicine  $t_2$

| Ability to Take<br>Care of Health $t_1$ | Social Support of Spouse $t_1$ |          |
|-----------------------------------------|--------------------------------|----------|
|                                         | Low                            | High     |
| Low                                     | 4.7 (21) <sup>1</sup>          | 4.5 (8)  |
| High                                    | 3.8 (32)                       | 4.8 (17) |

Note:  $F_{\text{interaction}} (1,74) = 5.05$ ,  $p = .03$ ,  $SSI/SST = .06$ .

<sup>1</sup>Cell n.

TABLE 5-14

Effects of Social Support of Doctor  $t_1$  on the  
Relationship Between Self-Esteem  $t_1$  and  
Adherent Self-View  $t_2$

| Self-esteem $t_1$ | Social Support of Doctor |          |
|-------------------|--------------------------|----------|
|                   | Low                      | High     |
| Low               | 4.4 (18) <sup>1</sup>    | 3.4 (6)  |
| Medium            | 4.5 (14)                 | 4.8 (10) |
| High              | 4.4 (16)                 | 4.5 (15) |

Note:  $F_{\text{interaction}} (2,73) = 3.93$ ,  $p = .02$ ,  $SSI/SST = .09$ .

<sup>1</sup>Cell n.

On the other hand, one could argue that perhaps the social support of the physician was actually harming adherence among persons with low self-esteem. From theories of cognitive dissonance (Festinger, 1954) and balance (Heider, 1946), one might predict that patients with low self-esteem decided that the support of their physician was inconsistent with their self-view because support should be given only to those who are worthy of it. The social support would then be conflicting with the person's self-view, and if the patient was unable to resolve the conflict (such as by changing the self-view to a good one or by denying that the physician was being supportive), then considerable tension might result and actually interfere with ability to adhere.

When the single item "ability to take care of health" was substituted for the overall measure of Self-esteem, the pattern of results was similar to that in Table 5-12, although the findings were nonsignificant ( $F_{\text{interaction}}(1,79) = 2.94, p = .09, \text{SSI/SST} = .03$ ).

Despite the ambiguities of interpreting the conditioning effect of Social Support of the Physician, such support was like Social Support of the Spouse in one way. Reported adherence tended to be highest for patients with a combination of moderate to high Self-esteem and high Social Support from the Physician.

Similar analyses, using the single item measure of competence, "able to take care of my health," showed no significant interaction effect of Social Support from the Physician and competence on reported Adherence in Taking Medicines. See Table 5-15. There was an effect, however, on the Adherent Self-View Vignette measure. The pattern of the findings is very similar to that presented in Table 5-14, and the percentage of variance explained is about the same. It is unclear why the results should be significant only for the vignette measure, so caution is required in interpreting the findings.

An additional table is now presented which represents several of the preceding effects of social support. Table 5-16 shows the conditioning effects of the measure of Supportive Behaviors ("How often did someone [unspecified] do the following" supportive behaviors?), on the relationship between ability to take care of health and Adherence in Refilling Prescriptions  $t_1$ . Ability to

Table 5-15

Effects of Social Support of Physician  $t_1$  on the  
Relationship Between Ability to Take Care of Health  $t_2$   
and Adherent Self-View  $t_2$

| Ability to Take<br>Care of Health $t_2$ | Social Support of Physician $t_1$ |          |
|-----------------------------------------|-----------------------------------|----------|
|                                         | Low                               | High     |
| Low                                     | 4.4 (16) <sup>1</sup>             | 3.7 (13) |
| High                                    | 4.4 (38)                          | 4.8 (23) |

Note:  $F_{\text{interaction}} (1,86) = 10.81, p = .002, \text{SSI/SST} = .10.$

<sup>1</sup>Cell n.

Table 5-16

Effects of Supportive Behaviors  $t_2$  on the  
Relationship Between Ability to Take Care of My Health  $t_2$   
and Adherence in Refilling Prescriptions  $t_2$

| Ability to Take<br>Care of My Health $t_2$ | Supportive Behaviors $t_2$ |          |
|--------------------------------------------|----------------------------|----------|
|                                            | Low                        | High     |
| Low                                        | 4.9 (13) <sup>1</sup>      | 4.6 (10) |
| High                                       | 4.2 (23)                   | 5.0 (24) |

Note:  $F_{\text{interaction}} (1,66) = 4.02, p = .05, \text{SSI/SST} = .05.$

<sup>1</sup>Cell n.

take care of health and the Adherent Self-View were only weakly correlated ( $r_{t_2} = .20$ ,  $p < .05$ ) suggesting that the former may weakly determine the latter as a main effect, but that they are not necessarily measures of the same phenomenon. The lowest level of adherence appeared for persons with high self-competence who lacked social support, a pattern seen in the tables on the effects of the Social Support of the Spouse. The highest adherence appeared for persons reporting high ability to care for their health and high Social Support -- a finding common in all the preceding tables. The patients with high Social Support but low esteem had relatively low scores on adherence -- a finding much like that found in the tables examining conditioning effects of support from the physician. Consequently, it is possible that each cell in such an interaction matrix might represent quite different dynamic and motivational processes such as those suggested in the discussion of the effects of support from the spouse and from the physician.

In summary, Tables 5-12 through 5-16 show that the highest levels of adherence occurred for persons who had both high perceived competence and high social support. Taking the tables as a set, there was also a weak tendency for persons with high perceived self-competence but low social support to report the lowest adherence. These findings suggest the hypothesis that persons who feel competent to take care of their health but lack sources of approval for their behaviors may be particularly vulnerable to discouragement and low adherence.

Regarding the sources of social support, the measures of Support of Spouse, of Physician, and of others unspecified (which has been shown to reflect primarily support of spouse and, to some extent, physician) were the main conditioners of the effects of esteem on adherence. Social Support of Friends had either no conditioning effects or no easily interpretable effects. Social Support of Boss could not be analyzed as a conditioner because of the small sample size for this measure. These findings tend to parallel the main effects of social support which were examined in Chapter 4. There it was similarly noted that most of the findings were restricted to Social Support of Spouse and Physician. The importance of these two sources of social support and the relative unimportance of the other sources of support seem to be suggested

by the consistency of these effects. The relative importance of social support from other patients needs investigation, because it was not examined with our survey instruments.

#### *Role of Ability to Accept Social Support*

The findings on conditioning effects were generally inconsistent with one another or not easily interpretable and will not be discussed further here.

#### *Role of Competing Motives*

This measure also did not produce any clearly interpretable interaction effects on adherence.

#### *Role of Consequences of Nonadherence*

The findings using this conditioning variable must be considered as only suggestive. They tend to suggest that low perceived seriousness of the consequences of nonadherence may be an indicator of defensive denial. This is most apparent in the first set of tables which follows. These tables (5-17 through 5-19) deal with the conditioning effects of Consequences of Nonadherence on the relationship between Demands of the Regimen and psychological strains. The second set of tables (5-20 through 5-22) deals with the role of this same conditioning variable on the effects of Self-esteem on adherence and shows weaker conditioning effects.

The first set of tables (5-17 through 5-19) shows that among persons who believed that nonadherence would have serious consequences for their health, the higher were the perceived Demands of the Regimen, and the higher were their levels of Anxiety and Depression. There was a tendency for Anger-irritation to be similarly effected. All three measures of psychological strain were positively intercorrelated ( $r$ 's ranged from .24 to .58) so that the findings are not completely independent of one another.

Perhaps the patients who took the consequences of nonadherence seriously paid a price in terms of worry as the demands of the regimen or the stress of what was required of them increased. High demands may have implied serious illness to them. On the other hand, among persons who tended to deny that nonadherence

TABLE 5-17

Effects of Consequences of Nonadherence  $t_2$  on the  
Relationship Between Demands of the Regimen  $t_2$  and Anxiety  $t_2$

| Demands of Regimen $t_2$ | Consequences of Nonadherence $t_2$ |          |
|--------------------------|------------------------------------|----------|
|                          | Low                                | High     |
| Low                      | 2.1 (14) <sup>1</sup>              | 1.6 (18) |
| Medium                   | 1.8 (15)                           | 2.0 (20) |
| High                     | 1.6 (8)                            | 2.1 (24) |

Note:  $F_{\text{interaction}} (2,93) = 3.23$ ,  $p = .04$ ,  $SSI/SST = .06$ .

<sup>1</sup>Cell n.

TABLE 5-18

Effects of Consequences of Nonadherence  $t_2$  on the  
Relationship Between Demands of the Regimen  $t_2$  and Depression  $t_2$

| Demands of Regimen $t_2$ | Consequences of Nonadherence $t_2$ |          |
|--------------------------|------------------------------------|----------|
|                          | Low                                | High     |
| Low                      | 1.9 (14) <sup>1</sup>              | 1.5 (18) |
| Medium                   | 1.4 (15)                           | 1.8 (18) |
| High                     | 1.6 (8)                            | 1.9 (24) |

Note:  $F_{\text{interaction}} (2,91) = 2.70$ ,  $p = .07$ ,  $SSI/SST .05$ .

<sup>1</sup>Cell n.



TABLE 5-19

Effects of Consequences of Nonadherence  $t_2$  on the  
Relationship Between Demands of the Regimen  $t_2$  and  
Anger-Irritation  $t_2$

| Demands of<br>the Regimen $t_2$ | Consequences of Nonadherence $t_2$ |          |
|---------------------------------|------------------------------------|----------|
|                                 | Low                                | High     |
| Low                             | 2.1 (14) <sup>1</sup>              | 1.6 (18) |
| Medium                          | 1.8 (15)                           | 2.3 (18) |
| High                            | 1.7 (8)                            | 2.1 (24) |

Note:  $F_{\text{interaction}} (2,91) = 4.80$ ,  $p = .01$ ,  $SSI/SST = .09$ .

<sup>1</sup>Cell n.

would have serious consequences to their health, the levels of Anxiety, Depression, and Anger-Irritation tended to decrease. Although this pattern of relationships may appear paradoxical at first glance, the following hypothesis can be offered as to why strain may have decreased for the deniers as mean stress increased: Research suggests (for example, Lazarus' review, 1966) that among persons predisposed to be defensive, increases in the level of stress increase the need to defend and hence to act defensively. This could be the case here with these individuals who score high on a potential measure of denial. The greater the level of stress (Demands of the Regimen), the more denial of psychological strain may occur. This could account for the decreasing scores on strain in the three tables.

The next set of findings in Table 5-20 through 5-22 further suggest that persons who perceived few serious consequences to nonadherence may be using denial as a defense mechanism. These findings, although consistent across the three tables, do not replicate when  $t_1$ , rather than  $t_2$ , measures (or vice versa) are used. The reasons for this nonreplication are not apparent. Consequently the findings may be due primarily to chance.

The tables examine the effect of Consequences of Nonadherence on the relationship between measures of Self-esteem and adherence. The unique and consistent feature across all three tables is that the lowest levels of adherence were reported by persons who had very high Self-esteem and who tended to deny that nonadherence had serious consequences. It may be that defensive processes were involved here. Specifically patients who tended to deny the importance of adherence and who saw themselves as non-adhering may have been defending their self-concept by pointing out that they saw themselves as generally competent and, specifically, able to take care of their own health -- it is just that they did not believe that adherence made much difference to their health.

Taken as a set, all six tables suggest that patient responses to health care may be determined partly by predispositions to cope through worry, through denial, and through asserting one's potential ability to adhere despite one's nonadherence.

TABLE 5-20

Effects of Consequences of Nonadherence  $t_2$  on the Relationship Between Self-esteem  $t_1$  and Filling Prescriptions  $t_1$

| Self-esteem $t_1$ | Consequences of Nonadherence $t_2$ |          |
|-------------------|------------------------------------|----------|
|                   | Low                                | High     |
| Low               | 4.9 (10) <sup>1</sup>              | 4.7 (10) |
| Medium            | 4.7 (9)                            | 4.8 (16) |
| High              | 4.2 (8)                            | 5.0 (20) |

Note:  $F_{\text{interaction}} (2,72) = 2.54$ ,  $p = .09$ ,  $SSI/SST = .07$ .

<sup>1</sup>Cell n.

TABLE 5-21

Effects of Consequences of Nonadherence  $t_2$  on the Relationship Between Self-esteem  $t_1$  and Adherence in Taking Medicine  $t_1$

| Self-esteem $t_1$ | Consequences of Nonadherence $t_2$ |          |
|-------------------|------------------------------------|----------|
|                   | Low                                | High     |
| Low               | 4.2 (10) <sup>1</sup>              | 4.0 (11) |
| Medium            | 4.4 (9)                            | 4.2 (13) |
| High              | 3.7 (7)                            | 4.7 (20) |

Note:  $F_{\text{interaction}} (2,64) = 3.45$ ,  $p = .04$ ,  $SSI/SST = .09$ .

<sup>1</sup>Cell n.

TABLE 5-22

Effects of Consequences of Nonadherence  $t_2$  on the  
Relationship Between Ability to Take Care of My Health  $t_1$   
and Adherence in Taking Medicine  $t_2$

| Ability to Take<br>Care of Health $t_1$ | Consequences of Nonadherence $t_2$ |          |
|-----------------------------------------|------------------------------------|----------|
|                                         | Low                                | High     |
| Low                                     | 4.8 (12) <sup>1</sup>              | 4.7 (15) |
| High                                    | 3.6 (20)                           | 4.6 (33) |

Note:  $F_{\text{interaction}} (1,76) = 4.84$ ,  $p = .03$ ,  $SSI/SST = .05$ .

<sup>1</sup>Cell  $n$ .

### Summary and Discussion

The findings reviewed in this chapter, are selective and subject to replication in other studies. They serve the primary purpose of indicating issues for further research.

The findings suggest that sick role disability is not affected solely by the perceived severity of the demands of the regimen. The presence of competing motives may increase such disability. Disability may be more likely to be decreased when a simple regimen is combined with social support, than when social support is provided alone. Social support combined with a very complex regimen, however, may be interpreted by the patient as babying. Then the patient may assume more of an infantile, passive role. We need to know more about the extent to which too much support is primarily a phenomena in the eyes of the receiver and the extent to which there are useful supportive behaviors which can be determined by the giver of support.

The findings suggest that different sources of social support are not always substitutable for another. The spouse and the physician appear to be the two most important sources of such support; the other sources have no measureable effect in these data. Furthermore, it would appear that the quality rather than the quantity of social contacts is most important, as the index of quantity of contact with friends showed no effects as a conditioning variable.

Esteem also appears to be important in determining the extent of the interference of demands of the regimen with the patient's pursuit of normal activities. Faith in one's self appears to allow persons, even with complex regimen demands, to report relatively low levels of interference with normal activities.

Knowledge of one's regimen appears to allow the person to handle the demands of regimen more effectively than general knowledge about high blood pressure, its causes, course, and control. According to these findings, persons who lack knowledge of their regimen may experience considerable interference with their normal activities as the demands of their regimen increase.

Although perceived self-competence, or Self-esteem, was shown to have some positive main effects on adherence analyses of other

variables which interact with Self-esteem suggest that the conditions under which self-esteem exists may determine the extent to which it results in adherence. Social support of spouse coupled with high self-esteem appeared to be the most ideal combination with regard to high self-reported adherence.

Finally, these analyses suggest that defensiveness in patients and the perceived consequences of nonadherence may partly determine the extent to which self-competence leads to adherence. The effects of defensive tendencies need further exploration because they may introduce distortion in the self-reports of patient attributes and behaviors.

## Chapter 6

### EFFECTS OF SOCIAL SUPPORT, LECTURE, AND CONTROL TREATMENTS

The preceding chapters have examined potential predictors of adherence and indicators of adherence. The findings, particularly those presented in Chapter 4 and summarized in Figure 4-4, provided various degrees of evidence of both concurrent and predictive validity for many of the measures. With this information in mind, we can proceed with a modest degree of confidence to compare the effects of the two experimental treatments and the control group in this study.

To review briefly, in one treatment patients received a program of social support plus information; in another treatment they received only a lecture (information). The third treatment consisted of patients who received only the standard health care provided by their physicians between pre- and posttests. The details of these treatments have been described in Chapter 3 and in Appendices C and D.

The chapter first presents information on overall changes in predictors of adherences and adherences for the total sample from pre- to posttest. Then the results of the between-group analyses are presented. Finally a discussion of the theoretical versus actual effectiveness of the treatments is presented.

#### *Overall Pretest-Posttest Changes in the Total Sample*

Before comparing groups, some data will be provided on the means of variables at their pretest and posttest measurements for the longitudinal sample. These are variables for which change scores have been created. The mean values for variables measured

only at posttest are presented later when the groups are compared. At that time, however, the groups will be compared on change scores as well, and the reader will be unable to tell the range within which the change took place with only the change score at hand. Hence we provide the following data in Table 6-1.

The first set of measures deal with social support. Number of Friends with whom the patients had contact generally increased for the sample as a whole. Ability to Give Social-emotional Support, however, remained unchanged as might be expected if the measure taps a relatively stable personality trait.

Changes in the number of prescribed pills per three day period, as reported by the patient and as recorded in the clinical record, were examined to determine the extent to which subjective reports agreed with the objective data. Number of pills increased from t1 to t2 for both objectively and subjectively measured pills. The objective and subjective measures, were correlated .89 at pretest and .82 at posttest (both  $p < .0001$ ), and there were no significant differences between objective and subjective mean number of pills at either t1 or t2, suggesting that patients' reports of how many pills they were supposed to take correlated accurately with the prescribed number recorded on their records.

Although Knowledge of the Regimen (the patient's knowledge of the names of the medications prescribed and how often they are to be taken) did not change for the total sample, scores on the True-False Test of knowledge about high blood pressure and its treatment did show an increase from pretest to posttest.

Interference with Normal Activities due to the person's high blood pressure was generally low and remained unchanged over time. Somatic Complaints showed a slight decrease, as did Depression, Anxiety, and Irritation, according to our indices. Positive Affect did not change in mean value, nor did the mean value for Self-esteem.

With regard to indicators of adherence, there were significant decreases in both systolic and diastolic blood pressure from pretest to posttest for the total sample. Systolic blood pressure decreased about six mm Hg and diastolic blood pressure decreased four mm Hg. This may be of clinical significance for a period of six to eight weeks considering that we know nothing from these data



Table 6-1

Means of Variables Measured Both at Pre- and Posttest  
for Longitudinal Sample

| Variable                            | Mean    |          | <u>n</u> | <u>t</u> | p <sup>&lt;</sup> |
|-------------------------------------|---------|----------|----------|----------|-------------------|
|                                     | Pretest | Posttest |          |          |                   |
| <u>Social Support</u>               |         |          |          |          |                   |
| Number of Friends and Social Visits | 5.3     | 5.7      | 71       | -2.18    | .03               |
| Ability to Give Support             | 2.7     | 2.6      | 70       | 1.23     | n.s.              |
| <u>Demands of Regimen</u>           |         |          |          |          |                   |
| Number of Pills: Objective          | 9.2     | 10.3     | 52       | -2.31    | .02               |
| Number of Pills: Subjective         | 8.5     | 10.4     | 66       | -2.39    | .02               |
| Demands of the Regimen              | -.06    | -.07     | 73       | .26      | n.s.              |
| <u>Knowledge</u>                    |         |          |          |          |                   |
| Knowledge of Regimen                | 1.2     | 1.2      | 57       | 1.11     | n.s.              |
| TF Test                             | 7.2     | 8.1      | 72       | -4.44    | .0001             |
| <u>Strain</u>                       |         |          |          |          |                   |
| Interference with Activities        | 1.4     | 1.3      | 62       | .55      | n.s.              |
| Somatic Complaints                  | 1.7     | 1.6      | 61       | 3.11     | .003              |
| Depression                          | 1.7     | 1.6      | 63       | 2.29     | .025              |
| Anxiety                             | 2.0     | 1.8      | 66       | 1.98     | .05               |
| Irritation                          | 2.0     | 1.9      | 64       | -1.46    | n.s.              |
| Positive Affect                     | 2.6     | 2.7      | 63       | 2.20     | .03               |
| Self-esteem                         | 3.5     | 3.6      | 67       | -1.70    | n.s.              |
| <u>Indicators of Adherence</u>      |         |          |          |          |                   |
| Systolic blood pressure             | 140.3   | 134.0    | 50       | 2.04     | .05               |
| Diastolic blood pressure            | 87.7    | 83.7     | 50       | 2.24     | .03               |

Table 6-1 (cont'd.) Means of Variables Measured Both at Pre- and Posttest  
for Longitudinal Sample.

| Variable                       | Mean    |          | <u>n</u> | <u>t</u> | p<   |
|--------------------------------|---------|----------|----------|----------|------|
|                                | Pretest | Posttest |          |          |      |
| <u>Self-Reported Adherence</u> |         |          |          |          |      |
| Filling Initial Prescription   | 4.8     | 4.6      | 74       | 1.44     | n.s. |
| Refilling Prescription         | 4.7     | 5.0      | 57       | -1.72    | n.s. |
| Taking Medicines               | 4.3     | 4.5      | 72       | -1.87    | .07  |

Note: All units correspond to scoring units in the questionnaire (see Appendix E), except for Demands of the Regimen which is reported in standardized score units. Blood pressure is measured in mm Hg.

per se about the proportion of persons who were strictly adhering and who were not. These changes, however, do not take into account how much of a decrease might be expected without medication in a sample preselected because its blood pressure values were at the high end of the total population of all blood pressure values. There is reason to argue, however, that the expected change in blood pressure in this sample, assuming that no medication was taken, should be zero rather than some negative value. One must remember that these patients, unlike a sample of persons taken off the street, entered the study after going through screenings which reliably determined that they had high levels of blood pressure which were stable and not transient fluctuations from some "true score" normal blood pressure.

The other indicators of adherence showed no significant changes from pre- to posttest, although there was a trend for persons to report at posttest greater adherence in taking their medications.

For those variables where changes were observed, did the social support group show greater changes than the other groups? For those variables where changes were not observed, is this because there were changes in one group and not in the others? The group comparisons which follow allow us to pursue these questions.

#### *Changes in Treatment Groups*

The analyses which follow examine the extent to which there were significant differences in predictors of adherence and indicators of adherence among the three treatment groups. The predictors of adherence measure whether or not the intervention occurred; the indicators of adherence measure the changes in adherence only to the extent that the interventions were successful. We have already reported in Chapter 3 that the social support, lecture, and control groups were equivalent, with minor exceptions, on pretest measures of predictors of adherence, indicators of adherence, and a number of demographic characteristics. On the other hand, those patients who dropped out of the social support and lecture groups (but not out of the control group) were less adherent on self-reported Filling of Prescriptions. There

were few other differences however. This is an important finding because it suggests that any treatment differences at posttest are less likely to be due to selective dropping-out of patients and are more likely to be the result of the treatment effects themselves.

Two types of analyses were conducted to test the hypothesis that the social support group was superior to the other two groups. The first of these analyses examined the magnitude of change in predictor and dependent variables between groups by use of F tests. It is possible to obtain changes just because of sampling error in one's measurement during a pretest, aside from any treatment effects. For example, if a person's blood pressure fluctuates about some mean value throughout the day, and we measure the blood pressure when it has happened to fluctuate above the mean, then the probability is increased that the posttest measure will be closer to the true mean of this person than the pretest measure. Similarly, if the person's blood pressure happens to fluctuate downward at the time we deflate the cuff, we may get a pretest reading that is lower than the true mean for that person at pretest--and consequently, a change upward toward the mean at posttest would be likely, aside from any treatment effects. Similarly, treatment groups' initial values might be high or low on certain variables due to sampling error, and this might cause us to over- or underestimate the degree of change because the initial value produced some ceiling effect. This phenomenon, often called the Law of Initial Values, has been discussed in detail by Wilder (1957).

In analyzing changes from pretest to posttest in the study, we decided to control statistically for the effect of initial values on the magnitude and direction of change. This control was carried out by creating change scores which were residualized for the pretest value of each variable. The residual scores were obtained through the use of multiple regression, an appropriate procedure because the relationships between the change scores and the pretest scores were linear functions ( $r$ 's ranging from  $-.41$  to  $-.80$ ). Consequently, when we compared the changes in predictor and dependent variables among treatment groups, we asked, "Was the change greater than might be produced by regression toward the mean from pretest to posttest?"

The second type of analysis compared the three groups on those measures obtained only at posttest. A posttest-only design is a quasi-experiment (Campbell & Stanley, 1963) in that it lacks data at baseline. One has to be willing to assume that the groups were not different from one another at pretest and that no selective dropping out of patients from one treatment group compared to another occurred, in order to accept mean differences at posttest as indication of treatment effects.

Now let us turn to the findings. Table 6-2 summarizes primarily the significant differences among groups. Twelve out of 27 F tests (44 percent) were significant at  $p < .05$ . The table presents (1) the mean for each group along with the F value testing for an overall difference due to treatments, (2) the significance of that test, (3)  $\eta^2$  which is an estimate of the amount of variance in the dependent variable accounted for by the main effect, treatment, and (4) a test for specific differences (contrasts) among particular groups using Scheffé intervals. Scheffé (1959) intervals were chosen for the post hoc comparisons of the various treatment groups because the intervals provide a test that minimizes Type I errors, that is, the error of mistakenly rejecting the null hypothesis that no treatment effect occurred.\*

Almost without exception, the findings show that the social support and lecture treatments were both superior to the control treatment with regard to predictors of adherence and indicators of adherence. Furthermore, there were no significant differences between the social support and lecture treatments. If anything, there were nonsignificant tendencies for the lecture treatment to be slightly superior on many of these predictors compared to the social support treatment, although the cases where the reverse was true may be instructive. The details of these findings will now be discussed. The text will occasionally present trends rather than statistically significant findings. These weak findings are only presented if they suggest hypotheses for further study in subsequent studies or support previously presented significant results.

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\*The method due to Scheffé is applicable to treatment groups of unequal sizes and is known to be relatively insensitive to departures from normality and homogeneity of variance (Hays, 1963, p. 484).

Table 6-2

## Significant Differences by Treatment for the Longitudinal Sample

| Variable                                        | Treatment Group Means         |                        |                        | <u>F</u> | <u>p</u> | eta <sup>21</sup> | contrasts <sup>2</sup> |
|-------------------------------------------------|-------------------------------|------------------------|------------------------|----------|----------|-------------------|------------------------|
|                                                 | 1<br>Social Support<br>(n=35) | 2<br>Lecture<br>(n=21) | 3<br>Control<br>(n=17) |          |          |                   |                        |
| <u>Social-emotional support</u>                 |                               |                        |                        |          |          |                   |                        |
| Concern of Others                               | 3.5                           | 3.6                    | 3.2                    | 2.32     | .11      | .06               | 2>3                    |
| Concern of nurse                                | 3.7                           | 3.5                    | 2.9                    | 3.65     | .03      | .09               | -- <sup>2</sup>        |
| Help of Others' Concern                         | 5.6                           | 6.0                    | 4.5                    | 4.97     | .01      | .13               | 1>3, 2>3               |
| Help of:                                        |                               |                        |                        |          |          |                   |                        |
| physician's concern                             | 5.6                           | 6.2                    | 4.8                    | 4.57     | .01      | .12               | 2>3                    |
| spouse's concern                                | 5.7                           | 5.7                    | 4.5                    | 2.86     | .06      | .08               | -- <sup>2</sup>        |
| Tangible Support                                | 3.3                           | 3.6                    | 2.7                    | 7.23     | .001     | .17               | 1>3, 2>3               |
| Adequacy of:                                    |                               |                        |                        |          |          |                   |                        |
| info from M.D.                                  | 3.2                           | 3.6                    | 2.8                    | 4.27     | .02      | .11               | 2>3                    |
| medical science                                 | 3.0                           | 3.6                    | 2.7                    | 3.43     | .04      | .10               | 2>3                    |
| <u>Motivation to Adhere</u>                     | 3.3                           | 3.6                    | 2.8                    | 4.73     | .01      | .13               | 1>3, 2>3               |
| <u>Consequences of Nonadher.</u>                | 4.6                           | 4.7                    | 3.7                    | 5.96     | .004     | .15               | 1>3, 2>3               |
| <u>ΔTF test<sup>3</sup></u>                     | .34                           | .49                    | -.58                   | 3.45     | .03      | .09               | 1>3, 2>3               |
| <u>ΔAble to take care of health<sup>3</sup></u> | .09                           | .09                    | -.43                   | 3.23     | .05      | .09               | -- <sup>2</sup>        |

Table 6-2. (cont'd) Significant Differences by Treatment for the Longitudinal Sample

|                             | Treatment Group Means         |                        |                        |          |          |                          |                        |
|-----------------------------|-------------------------------|------------------------|------------------------|----------|----------|--------------------------|------------------------|
| Variable                    | 1<br>Social Support<br>(n=35) | 2<br>Lecture<br>(n=21) | 3<br>Control<br>(n=17) | <u>F</u> | <u>p</u> | <i>eta</i> <sup>21</sup> | contrasts <sup>2</sup> |
| <u>Adherence</u>            |                               |                        |                        |          |          |                          |                        |
| ΔTake Medicine <sup>3</sup> | .19                           | .28                    | -.37                   | 3.63     | .03      | .10                      | -- <sup>2</sup>        |
| Adherent Self-View          | 4.6                           | 4.6                    | 3.9                    | 8.04     | .001     | .18                      | 1>3, 2>3               |

Note: Sample sizes vary slightly from one analysis to another due to missing data. Twelve out of 27 F tests (44 percent) were significant at  $p < .05$ . Items not preceded by Δ are posttest only measures.

<sup>1</sup>*Eta*<sup>2</sup>, when multiplied by 100, is equivalent to the percent of variance accounted for.

<sup>2</sup>Scheffé intervals were used as a conservative test of posthoc differences between treatments. The numbers 1, 2, and 3 refer to the social support, lecture, and control groups respectively. The notation 2>3 means that the lecture group, when contrasted with the control group, had a significantly higher mean. Except for "adequacy of medical science", the contrast of the combined social support and lecture treatments against the control treatment ((1,2)>3) was always significant in the tests of the above variables. The contrast was not noted in the far right column to save space. The 95 percent confidence interval was used.

<sup>3</sup>Change scores were residualized for pretest scores and represent deviations from the change scores that would have been predicted on the basis of the pretest scores alone.

Social-emotional support. The increase in Number of Friends reported by the total sample did not differ by treatment. There were, however, other between treatment differences in social support.

Concern of Others showed a nonsignificant trend to be higher for the social support and lecture groups than for the control group. The index is composed of the amount of concern from several sources: spouse, nurse, physician, and other persons the patient knows who have high blood pressure. An inspection of the means for each item showed that only one of these items varied significantly by treatment--Concern of the Nurse was rated higher by persons in the social support and lecture treatments.

At posttest only patients rated the extent to which they felt the Concern of Spouse and of Physician had helped them strictly follow the advice of the physician. As Table 6-2 shows, the social support and lecture groups had the highest mean scores on these ratings. There was a nonsignificant trend (not reported in the table) for these same treatment groups to rate highly their physician's abilities to listen to what they had to say, although there were no treatment differences in ratings of physician knowledge of the treatment for high blood pressure.

Tangible support, such as facilities, information, and medical science were valued more by the social support and lecture patients than by the control patients. Information from the physician was particularly valued by the social support and lecture patients, and medical science was particularly valued by lecture patients as a contributor to the control of their blood pressure.

The education treatments were not dependent on physician instruction. Yet these findings suggest that the patient education programs enhanced patient ratings of the value of information and support from physicians although not ratings of the amount of support received. The groups did not differ in the ratings of overall service provided by the clinic or hospital.

Motivation. In Chapter 4, analyses of Extrinsic (rewards mediated by others) and Intrinsic (rewards mediated by self) Motivation to Adhere indicated that the more highly motivated the person was, regardless of type of motivation, the more likely non-adherence would be perceived as having serious consequences for



health. The more motivated patients were also those with the highest self-perceived competence and those who received the most social support.

In Table 6-2 both forms of motivation were combined into a single index because there were generally no differences in the findings regardless of type of motivation. The patients in the lecture and social support treatments had significantly higher motivation than the patients in the control treatment. One must view this finding with some caution because the measure of motivation was obtained only at posttest and may merely reflect characteristics of patients who remained in treatment. In fact, there was a positive relationship between number of meetings attended by the patients and their Extrinsic Motivation, as reported in Chapter 4. Consequently two hypotheses must be entertained: (1) more motivated patients remained in the social support and lecture treatments and (2) the treatments increased the motivation of patients to adhere.

Perceived Consequences of Nonadherence to the regimen also differed significantly by treatment group. The control patients were the least likely to believe that nonadherence would have any serious consequences for them. Again, this measure may indicate the effect of the three treatments as well as the characteristics of those who remained in the social support and lecture treatments because it was only assessed at posttest.

Knowledge of disease and of regimen. In Chapter 4 findings showed that knowledge of the disease and its treatment as well as Knowledge of one's Regimen were both related to low levels of blood pressure. Of the two types of knowledge, however, knowledge of one's specific regimen had the strongest relationship to blood pressure level.

Table 6-2 shows that there were significant changes in knowledge of the disease as measured by the True-False Test. The social support and lecture groups both showed a relative increase in knowledge whereas the control group showed a relative decrease in knowledge. Knowledge of one's particular regimen showed only a nonsignificant trend to increase for the patients in the social support and lecture groups, however, and its means are not reported in Table 6-2.

These findings suggest that in terms of the success of the treatment manipulation, the social support and lecture treatments were equally effective in providing patients with some basic information about the treatment of high blood pressure in general. The fact that the effects of knowledge of each patient's specific regimen were not stronger means there is still work to be done in that regard, because it is the latter type of information which appeared to be most important as a predictor of level of blood pressure in the analyses of main effects in Chapter 4.

Self-esteem. As was shown in Chapter 3, Self-esteem was positively associated with self-reported adherence, high Motivation to Adhere, and low Anxiety. Although there were no significant treatment differences in the amount of change for the overall index of Self-esteem, there was a significant change in one of the Self-esteem items which appears most relevant to the treatments and to health care. This item asks for a rating of the extent to which the person is capable of taking care of his or her health. The lecture and social support patients showed more of an increase in this rating scale than the controls. Control patients actually showed a decrease in how well they thought they could take care of themselves. There was also a similar but nonsignificant trend, not reported in Table 6-2, for patients in the social support and lecture treatments to show a greater increase in how able they were to help others ( $F_{(2,65)} = 2.19, p = .12, \eta^2 = .06$ ). Again, the controls showed a relative decrease in their change scores on ability to help others. Sometimes we worry about building up dependency and destroying autonomy in patients. The above measures suggest the opposite; independence and autonomy may have been achieved by the interventions.

Other items in the index of Self-esteem showed no differences in the amount of change from pretest to posttest. These items include such aspects of the self-concept as "successful in efforts," "value myself highly," "value myself enough to want to keep in the best health," and "sickly." It would appear that the items that did indicate differences in the amount of change among treatment groups, dealt most directly with whether or not the patients believed that they had acquired new skills for the care of

their high blood pressure. Items which dealt with more general and vague aspects of the self did not show such changes.

Other predictors of adherence for which no significant between-group differences were detected (and which are not presented in Table 6-2). Analyses of the change scores indicated that the following variables did not change any more in the social support and lecture treatments than they did in the control treatments: perceived demands for changes in eating and living patterns, for diet, and for medicines to be taken; Depression; Anxiety; Irritation; Positive Affect; and Somatic Complaints. For Depression there was a tendency for the controls and social support patients to show a slight increase, whereas the lecture group showed a slight decrease ( $F = 2.01$ ,  $p = .14$ ). For Somatic Complaints, the social support and lecture treatments showed a slight decrease, whereas the controls showed a slight increase ( $F = 1.81$ ,  $p = .17$ ).

There were also no significant differences in the amount of change in (1) Interference with Normal Activities caused by the disease, (2) Number of Friends one visited and told about the disease, and (3) Ability to Give Support.

In summary, of 19 measures of pretest-posttest change examined (including the single items in the Self-esteem measure), two (10 percent) of the measures showed significant differences among the treatment groups at  $p < .05$ --slightly more than would be expected by chance. Of eight of the predictors of adherence measured only at posttest, five (63 percent) were significant at  $p < .05$ , which is considerably higher than would be expected by chance. As already noted, these findings are not exactly in the predicted direction since both the lecture treatment and the social support treatment, in contrast to the control treatment, tended to have the higher scores on predictors of adherence.

#### *Differences in Indicators of Adherence*

In Chapter 4 findings were presented indicating that several variables predicted to adherence such as Self-Competence, Consequences of Nonadherence, and Percent of Classes Attended, among those patients in any of the experimental treatments. In addition

evidence was presented showing that self-reported Taking of Medicines and the vignette measures of Adherent Self-View were associated with low levels of blood pressure. These findings suggest that the measures of adherence used in this study had some predictive validity and could be used to evaluate the effectiveness of the different patient education treatments.

We now turn to whether or not the treatment groups showed significant differences in adherence on these measures. The findings are also presented in Table 6-2.

Patients in the social support and lecture groups showed an increase in self-reported adherence in Taking Medications toward the direction of "never forgetting to take my medicines." The control patients showed a decrease toward "I take my medicines if I feel that I need them. It varies from day to day," and "I sometimes go several days without taking my medicine because I forget or am very busy."

Similar findings appeared with the posttest measure of adherence that was based on a set of vignettes about adherent and nonadherent patients. These vignette items produced the strongest differences between the treatment groups. The controls scored lowest, and the social support and lecture groups had equally high scores. The other self-report measures of adherence with regard to changes in filling and refilling prescriptions from pretest to posttest did not differ among the three treatment groups. The vignette measures may have shown the strongest treatment effects because they had the highest reliability. In Chapter 3, we noted that the nonvignette measures of adherence had very skewed distributions with limited variance. Furthermore, the vignette measures may have been less vulnerable to self-report biases such as social desirability because each vignette was intended to present pictures of the adherent and nonadherent patients which were approximately equal in social desirability. (Whether this goal was achieved, however, cannot be determined with this data set as no independent measures of social desirability were obtained.)

The preceding measures of adherence are subjective, in that they are dependent on self-reports. We were limited in the types of objective measures that could be obtained because of the short time span for this study. Accordingly, the only objective

indicators of adherence were changes in systolic and diastolic blood pressure. Even though mean blood pressure decreased for the total sample, there were no differences in rate of decrease by experimental condition. Subsequent analyses by Retha Flowers (see footnote, p. 9) showed, however, that the social support group was superior to the lecture and control groups with regard to the percentage of patients brought into clinical control (less than 140/90). The lecture and control groups were combined to increase the sample size for this analysis and because their results were similar. The analyses used 29 social support patients and 21 patients in the combined lecture plus control group with complete data. The percentages of patients in each outcome category were as follows: 41 percent of the social support group vs. only 24 percent of the lecture plus control groups gained control (that is, moved to less than 140/90 from pre- to posttest); 10 percent vs. 19 percent lost control; 28 percent vs. 33 percent remained uncontrolled; and 21 percent vs. 24 percent maintained control ( $\chi^2 = 13.24$ , d.f. = 1,  $p < .001$  using pretest distribution as expected frequencies).

#### *Were Various Treatment Differences Related to One Another?*

In Chapter 4 findings were presented showing that many of the variables in our model of adherence were related to one another and that some of these were related to adherence. Many of these same variables were shown to differ by treatment in Table 6-2. These findings from Chapter 4 and from Table 6-2, however, are not sufficient evidence to suggest that all of the treatment differences were interrelated. In fact, it is conceivable that some treatment effects were not measured by our indices and that variance in many of the measures in Table 6-2 cannot be accounted for by the other measures in the table.

One way to determine the extent to which the various treatment differences are related to one another is as follows: (1) select those variables which are related to one another in Chapter 4 and which show significant treatment effects, and (2) determine if the variance in one of these variables can be accounted for by the effects of the other variables through partial correlation techniques.

This was the procedure which was followed here. The effect of one variable on another was partialled out and a new dependent variable was created which represented the residualized variance after this partialling had occurred. This residualized variable was then used in an analysis of variance due to treatment effects, just as had been done for the nonresidualized variables in Table 6-2.

The results of this procedure can be briefly summarized. There were three such analyses of variance on residualized variables that could be and were performed. These analyses showed that the higher mean levels of Consequences of Nonadherence for the social support and lecture groups were largely a function of Concern of Others, which tended to be high in these groups. ( $\eta^2$  dropped from .15,  $p = .004$ , to .07,  $p = .11$ , when the effect of Concern of Others was partialled out.) Second, the high levels of Motivation in the social support and lecture groups compared to the controls also appeared to be a function of Concern of Others. ( $\eta^2$  dropped from .13,  $p = .01$ , to .02, n.s.)

Although Motivation to Adhere was a significant correlate of increases in ability to take care of one's health ( $r = .27$ ,  $p = .06$ ), its effect was not strong enough to account for the between-group differences in the latter measure. Other unmeasured factors probably were involved. In addition, all of the other between-treatment differences in Table 6-2 must be assumed to be independent treatment effects that were not accounted for by variance in the other measured treatment differences.

#### *Selective Dropping Out of Patients as a Cause of Between-Group Differences*

It may be that the differences in treatment means were due to selective dropping out of patients. We know from Chapter 3 that the patients who were least adherent in promptly filling first prescriptions tended to drop out of both the lecture and the social support treatments but not out of the control group.

Filling Prescriptions, however, was not related to either of the two indicators of adherence on which the social support and lecture groups had significantly higher means than the controls: the Adherent Self-View Vignettes ( $r = .09$ , n.s.) and Taking

Medicine adherently ( $r = .00$ ). It would appear that the determinants of filling a new prescription on the very day it was written are somewhat different than the determinants of taking one's medicine adherently and refilling prescriptions promptly. The nature of these differences in determinants, however, is not clear from the data.

There were no systematic differences between dropouts and those who remained in treatment for most predictors of adherence (such as social support). Nor were there any differences in Ability to Accept Social Support between dropouts and nondropouts, so it does not appear that the social support treatment or the lecture treatment frightened away shy persons (although we know of one extremely shy person dropping out for this reason). All in all, these findings suggest that most differences between groups were due to treatment effects and were not due to selective dropping out.

### Discussion

A comparison of the social support and lecture patients with the control patients indicates that both predictors and indicators of adherence were higher for the former two groups. The control patients, if we believe that actual treatment effects were present, seemed much riper for dropping out of treatment: they felt their nurses and others were less concerned about them, and they reported that this concern had relatively less positive effect on their ability to adhere. They did not feel that the information provided by their physicians and by medical science was as adequate. They showed lower motivation to adhere and were less likely, anyway, to believe that nonadherence would have serious consequences for their health. Control patients believed they were less able to take care of their own health (the development of dependency rather than independence and autonomy). Over time they presented a relative decrease in the amount of knowledge they had about high blood pressure and its treatment rather than an increase in such knowledge. They also showed a decrease in adherence in taking their medications according to their self-reports (or else they were less defensive about reporting negative changes; but whether or not the patients in the study could remember how they completed the pretest

questionnaire so they could be defensive at posttest is unknown). Finally, control patients tended to characterize themselves as more like the set of vignettes describing nonadherent, rather than adherent, patients.

Flowers (see footnote, p.9) had uncovered the experimental treatment differences in the percentage of patients with controlled blood pressure about five months after the first printing of this publication. Once the experimental differences were uncovered, we went back to the data to see if these differences could be explained by the experimental differences in patient reports of social support, attitudes, and knowledge. We could uncover no such explanatory variables. Consequently, although the social support group and lecture group certainly appear more likely to continue in treatment than the control patients, the superiority of the social support group appears due to variables beyond the sensitivity of our questionnaires.

#### *The Effect of Social-Emotional Support*

We had intended to test the effects of social support on adherence by creating a social support group, a lecture group not emphasizing social support, and controls--patients receiving routinely provided care. As it turned out both the social support and lecture groups reported equally high levels of social support, so that the effect of the social support, in comparison with the effect of a lecture only, could not really be tested. As the data in Table 6-2 show, we evidently failed to produce a higher degree of social support in the social support group than in the lecture group. The patients in the lecture and social support conditions both reported more concern from the nurse in the health care system compared to the control patients. This suggests that both the lecture and social support conditions were supportive.

Although no special attempt was made to provide social support in the lecture condition, the lecture environment may have appeared to be very supportive compared to normal patterns of interaction in the clinic. In the lecture treatment, patients did have an opportunity to ask questions in a relaxed atmosphere.



Furthermore, the patients did get to know one another because they would spontaneously talk to one another during, before, and after the lecture.

As a check on the questionnaire measures, Robert Caplan listened to several taped recordings of the social support and lecture sessions (recorded with the permission of the patients). He felt that the atmosphere in the lecture treatments was warm and supportive despite the heavy emphasis on facts about medicine, diet, and physiology, and the relative de-emphasis on social-psychological aspects of adherence. Accordingly we conclude that we have merely compared two supportive, instructional systems with a control group of patients receiving neither additional support nor instruction.

#### *Theoretical Versus Actual Effectiveness of the Treatments*

In Chapter 2 we pointed out that studies on the effectiveness of medications for the treatment of high blood pressure were based on samples of hospitalized patients who were completely adherent. These studies produced information on the theoretical effectiveness of medications. They did not produce information on the actual effectiveness, that is the effect on mean blood pressure in a sample of patients representative of the adherence habits of the general population. The data which we have reported on the various treatments have also concentrated on what could be considered an adherence sample--persons who attended at least three of the meetings (if they were in the lecture or social support conditions) and who filled out the posttest instrument. Consequently our data tend more to reflect theoretical than actual effectiveness. Before presenting a summary of the findings on the actual effectiveness of the treatments (analysis including persons who attended the treatments plus those who did not attend the minimum number of meetings), we would like to discuss the types of information one can and cannot obtain from data on theoretical and actual effectiveness in a field experiment such as this one.

A measure of the actual effectiveness of a program is very important as a component of evaluation research. Actual effectiveness data tells one whether the experimental program is better, equal to, or worse than an existing program assuming that the

existing program forms the control group. Data on actual effectiveness, however, tells one nothing about how to improve a program. The actual effectiveness data confounds the effects of the treatments as applied to patients who actually received exposure with the contributions to the data made by the patients who were referred but did not receive adequate exposure. Consequently one cannot tell whether improvement is needed mainly in getting patients to attend all the meetings (take all their pills), or in changing the content of the meetings (the composition of the pills), or both. With the findings on theoretical effectiveness we may be able to say that certain variables do seem to change if you can expose people to the total treatment (and, of course get them to complete the posttest). Finding ways of increasing the percentage of referrals who become exposed to the treatment can itself be a matter for research on the theoretical effectiveness of different procedures for patient recruitment.

Actual effectiveness of the treatments. Of 13 differences among the social support, lecture, and control groups presented in Table 6-2, only two differences remained significant when those who did not attend the full treatments were then added.\* These differences are reported in Table 6-3. With the analysis of all patients, rather than the adherence sample of patients, the sample sizes for the social support and lecture groups changed from 35 to 45 and from 21 to 25 respectively. Thus there was an increase in sample size of 29 percent for the social support sample but only 19 percent for the lecture sample. Of course persons not completing the posttest could not be included in this analysis so we probably still end up with an over-estimate of the actual differences between the control group and the other groups.

Despite the fact that most of the between group differences dropped to nonsignificance, it is noteworthy that the two significant measures of adherence--the change score on self-reported Adherence in Taking Medicine and the vignette score (Self-View)

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\*There were 14 differences reported but because of missing data the sample size in each treatment for the change score measure of "Able to take care of my health" was almost identical and its significance remained unchanged.

Table 6-3

## Significant Differences by Treatment for the Total Sample

| Variable                     | Treatment Group Means         |                     |                     | F    | p=  | eta <sup>2</sup> <sup>1</sup> | contrasts <sup>2</sup> |
|------------------------------|-------------------------------|---------------------|---------------------|------|-----|-------------------------------|------------------------|
|                              | 1                             | 2                   | 3                   |      |     |                               |                        |
|                              | Social<br>Support<br>(n = 45) | Lecture<br>(n = 25) | Control<br>(n = 17) |      |     |                               |                        |
| Δ Take Medicine <sup>3</sup> | .15                           | .76                 | -.37                | 2.94 | .06 | .07                           | 1 > 3                  |
| Adherent Self-View           | 4.4                           | 4.5                 | 4.0                 | 3.49 | .03 | .06                           | (1,2) > 3              |

Note: Sample sizes vary slightly from one analysis to another due to missing data.

<sup>1</sup>Eta<sup>2</sup>, when multiplied by 100, is equivalent to the percent of variance accounted for.

<sup>2</sup>Scheffé intervals were used as a conservative test of posthoc differences between treatments. The numbers 1, 2, and 3 refer to the three respective treatments in the table. Notation such as 1>3 means that the mean for the social support group was higher than that for the controls. Confidence intervals of .95 were used for the tests.

<sup>3</sup>The change scores are residualized for the pretest scores and represents deviations from the change that would have been predicted on the basis of the pretest scores alone. In this case, the controls showed a decrease in their reported adherence using these scores.

characterizing the person as adherent or not--still retained their significance although the percentages of variance accounted for by the two indicators of adherence dropped from 10 and 18 to 6 and 7 respectively. Using the measures of subjective adherence as criteria, these data suggest that the patient education treatments were more effective than a control treatment of standard patient care both in theoretical and actual effectiveness.

APPENDIX A  
QUESTIONNAIRE COVER PAGE

THIS QUESTIONNAIRE  
IS  
DEDICATED TO YOUR HEALTH

Your hospital and clinic is working with The University of Michigan to improve health care for persons with high blood pressure. To do this we want to learn about many aspects of people's lives--their work, health, recreation, and family life.

Only you can give us a picture of what your daily life is like.

The information you provide is confidential and anonymous. The information from this questionnaire will be combined with that from hundreds of other questionnaires from persons like yourself. It will be used for statistical research purposes only.

As part of this study we would like to take your blood pressure. After several weeks, we would like to see how you are doing and if anything has changed. We will ask you then to fill out a briefer questionnaire and take your blood pressure.

This study will hopefully allow physicians and nurses to develop better methods of medical care. As a result of this study, we may also be able to improve the training of medical students.

We are extremely grateful for your help and assistance.

Sincerely yours,

Robert D. Caplan, Ph.D.  
Study Director  
The University of Michigan

\*\*\*\*\*

To indicate that you have read the above material, understand it, and would like to participate, please sign your name below. This sheet will be detached from the questionnaire before it is looked at so that your comments will remain anonymous.

I, \_\_\_\_\_, have read the above  
First name (Please print) Last name  
material, understand it, and would like to participate.

\_\_\_\_\_  
(your signature)

\_\_\_\_\_  
(date)

## APPENDIX B

### SAMPLE PATIENT RECRUITMENT MATERIAL

#### Supplementary Instruction in Adherence to High Blood Pressure Regimens is Available Free to Your Patients

TO: Participating physicians  
FROM: [Names of supervising physician and nurse]  
RE: Role of a supporting partner in hypertension control.

Overview: You and other physicians at our hospital are being asked to send any eligible patients with high blood pressure to a set of supplementary classes on high blood pressure and adherence. The referral procedure is described below.

Purpose: Rather than offer such instruction without evaluation, we are trying to determine the effectiveness of two types of instruction on adherence with medication and diet regimens. (1) A Buddy Group will consist of patients meeting once per week, for two hours, for six weeks. Each patient will be paired with another patient as a source of encouragement and emotional support. Health information as well as skills in being a supporting partner will be covered. (2) A Lecture Group will represent a second approach. Patients will meet once a week, for one hour, for four weeks. (3) A Control Group will receive pre- and posttests like the other groups. The controls, however, will not undergo any systematic instruction other than routinely provided by their physician.

Measurement: Pre- and posttest questionnaire measures of various life stresses, personality traits, adherence behavior, and emotional support from others will be obtained. Blood pressure will also be measured. This is a pilot test; hence the study collects data over the short period of a couple of months.

Results: A technical report of the study will be available early next fall. The report will acknowledge all physicians who participate by referring their patients.

#### REFERRAL PROCEDURE (This should require 30-40 seconds of your time per patient.)

To avoid any systematic bias in the study, ALL patients who meet the following criteria should be referred.

- CRITERIA: (A) Initially started on treatment at our hospital within the last year (irrespective of past treatment elsewhere).  
(B) Blood pressure  $\geq$  140/90 on more than one reading.\*  
(C) Literate--must be able to fill out a written questionnaire on health.

(CONTINUED)

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\*Many physicians have asked us how we are taking blood pressure. For your information, we are taking a sitting BP, from the left arm, recorded to the nearest digit.

- (D) No disabling diseases (e.g., terminal cancer) or psychiatric problems (e.g., psychoses). Patients with diseases associated with high blood pressure (e.g., arthritis, diabetes) should be referred unless they are disabled.

#### INSTRUCTIONS:

A pack of letters accompany these instructions. Some are addressed to buddy group participants (they have a "b" in the bottom left corner). Some are for lecture group participants (an "L" in the bottom, left). Others are for control group persons (no mark at bottom). The letters are stapled in a pack in an alternating order.

I) Tear the TOP letter off only and give it to the patient regardless of which letter it is. Neither the patient nor the physician should choose which group the patient will be in. In this manner, the selection of patients should be relatively random.

II) IF THE PATIENT IS TO JOIN THE BUDDY OR LECTURE GROUPS, TELL THE PATIENT...

- A) You want him or her to participate in some classes for people with high blood pressure. It is optional, but you strongly encourage participation. There is no cost. Give patient the letter to read and keep.
- B) Ask patient to take letter to room E-1611 after the patient checks out. There, Mrs. Doe (secretary) or Mrs. Jones (R.N.) will answer any questions that the patient has about the information in the letter.
- C) Write "HYPERTENSION GROUP--DIRECT TO ROOM E-1611" on charge slip under return appointments.

III) TELL YOUR CONTROL GROUP PATIENTS...

- A) City Hospital and The University of Michigan are doing a study to improve the quality of health care for people with high blood pressure. You would like your patient to help by filling out some questionnaire materials. Give the patient the control letter to read and take with him or her.

B & C) Same as B & C above (E-1611 on charge slip).

This is ALL you will be asked to do. Any follow-up on these patients will be handled by the project. You should continue with the investigation and treatment of patients as usual. For example, if you have patients meet with a dietitian for detailed instruction in diet, you should continue to do so. The classes consider adherence with such instruction. The classes will be run by Alice Jones, R.N., and no other physician other than yourself will be involved in the management of your patients.

We thank you for your help and look forward to being able to acknowledge your participation. Hopefully the results of our program will point a way towards improving patient adherence to antihypertensive and other chronic disease treatment programs. This program is funded by the Michigan Association of Regional Medical Programs.

Sincerely yours,

[Name of supervising physician]  
Project Director  
City Hospital

## SAMPLE RECRUITMENT LETTER FOR SOCIAL SUPPORT TREATMENT

City Hospital

Hello!

Your doctor wants you to attend some meetings on high blood pressure. This letter explains what the meetings cover, when they meet, and their cost. When you have read this, walk to room E-1611. There Mrs. Doe or I will answer any questions that you have.

I look forward to meeting you,

Mrs. Alice Jones  
Health Nurse Clinician  
Phone: 567-0123

\* \* \* \* \*

WHAT WILL BE COVERED?

- \*What is high blood pressure.
- \*Medication, effects and side effects of drugs, diet.
- \*Methods for dealing with daily stresses which can interfere with sticking to your doctor's recommendations.
- \*Supportive encouragement to help you handle needs for taking medication and following a special diet if you are on such a diet.

FORMAT:

- \*2-hour meetings once a week for six weeks (list of times below).
- \*Discussion including others who have high blood pressure.
- \*Working with another patient with high blood pressure.
- \*Taught by a nurse specializing in high blood pressure and its control, Mrs. Jones.

There is no charge or fee.

All persons completing the six weeks will receive a certificate that can be noted on their medical record if they wish.

PLACE: City Hospital.

TIME: You can choose one of the two times listed below as long as spaces are open. Please go to room E-1611. Mrs. Doe, the secretary, or Mrs. Jones will be glad to sign you up and answer questions. You will also be given some materials.

Meeting time 1. Wednesdays, 2-4 p.m., Room K-16.  
March 5, 12, 19, 26,  
April 2, 9.

Meeting time 2. Saturdays, 10-12 noon, Room K-16.  
April 5, 12, 19, 26,  
May 3, 10.



## SAMPLE RECRUITMENT LETTER FOR LECTURE TREATMENT

City Hospital

Hello!

Your doctor wants you to attend some meetings on high blood pressure. This letter explains what the meetings cover, when they meet, and their cost. When you have read this, walk to room E-1611. There Mrs. Doe or I will answer any questions that you have.

I look forward to meeting you,

Mrs. Alice Jones  
Health Nurse Clinician  
Phone: 567-0123

\* \* \* \* \*

WHAT WILL BE COVERED?

- \*What is high blood pressure.
- \*Medication, effects and side effects of drugs.
- \*Diet.

FORMAT:

- \*One-hour meetings once a week for four weeks.
- \*Lectures by a nurse specializing in high blood pressure and its control.
- \*Opportunities to have your questions answered.

There is no charge or fee.

All persons completing the four weeks will receive a certificate that can be noted on their medical record if they wish.

PLACE: City Hospital.

TIME: You can choose one of the two times listed below as long as spaces are open. Please go to room E-1611. Mrs. Doe, the secretary, or Mrs. Jones will be glad to sign you up and answer your questions. You will also be given some materials.

Meeting time 1. Saturdays, 1-2 P.M., Room K-16  
April 5, 12, 19, 26

Meeting time 2. Tuesday, 2-3 P.M., Room K-9  
April 29  
May 6, 13, 20

## SAMPLE RECRUITMENT LETTER FOR CONTROL PATIENTS

City Hospital

Hello!

City Hospital is working with The University of Michigan on a study to improve the quality of health care for patients with high blood pressure. We want you to help us by filling out some questionnaire materials.

The questionnaire deals with aspects of daily life and will give us a better appreciation of the needs of people with high blood pressure. It is confidential and anonymous. The information is being used for statistical research purposes only.

Your participation is very important because the study may help us devise better methods for medical care of high blood pressure.

Please go to Room E-1611. There Mrs. Doe or Mrs. Jones will hand you the appropriate materials and answer any questions you might have.

Your help is deeply appreciated. We are grateful for your assistance.

Sincerely,

[Name of supervising physician]  
Project Director  
City Hospital

Robert D. Caplan, Ph.D.  
Study Director  
The University of Michigan

## APPENDIX C

### PROCEDURES USED IN SOCIAL SUPPORT GROUPS

This appendix describes the procedures and techniques used in the social support groups.\* Keep in mind that the findings showed the social support and lecture group interventions to produce the same high levels of perceived social support, although the social support intervention yielded more controlled blood pressures.

The first section describes the general assumptions which guided our social support activities. Next the basic format of class meetings is presented. Then a typical series of six classes is described. Finally some observations are presented on the required characteristics of an ideal leader of such a set of classes.

#### Guiding View of Social-Emotional Supportive Behavior

Social support is defined as any input, directly provided by an individual (or group), which moves the receiver of that input toward goals which the receiver desires. The elements of this definition have already been discussed in Chapter 2. What will be considered here are some sets of behaviors which are assumed to be emotionally supportive. Other forms of support, such as tangible support (such as, giving someone a ride, money, food, etc.) or informational support (e.g., giving directions to find a destination or to solve a puzzle) are not considered within this framework.

Two basic sets of behaviors were considered to be supportive: (1) the communication of confidence and positive, realistic appraisal and (2) the acceptance of the receiver's expressions of negative affect. These two classes of behavior, which will be discussed in more detail below, are seen as occurring within the same social interaction and time frame. One type of behavior may be appropriate at one moment and the other type may be appropriate at the next. The timing of these supportive inputs should be dependent upon the needs of the

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\*This description alone is not sufficient for implementation, as these techniques require some training in group counseling and psychotherapy.

receiver of social-emotional support. Appropriate timing is a matter of clinical skill.

### *Aspects of Support*

Communicating confidence and positive, realistic appraisal are thought to be supportive because they heighten the receiver's sense that the goals are accessible. Such communications probably heighten the receiver's perceptions of self-capability and validate these perceptions by showing the person that they are shared by another person or persons. Consequently these types of behaviors are considered to be supportive, in our definition. Such perceptions of the receiver and others move the receiver closer to receiver-desired goals.

We have hypothesized a number of ways in which these behaviors might be manifested. Expressing confidence and expectations for success and not expressing expectations of failure should increase the receiver's view of goal attainability. Care is required, however. Encouraging the person to pursue unrealistic or unattainable goals would not be supportive, particularly if the result of such encouragement is failure in reaching the goal.

Providing positive appraisal includes both praising the receiver (e.g., "You're a good man, Charlie Brown.") as well as corroborating the receiver's observations of the world (e.g., "That's a legitimate way to view things in your position." or "I think many people share similar concerns."). From research which suggests that people are less anxious when their perceptions of the world are shared, we make the assumption that most people want to believe that their observations are valid. Conversely, we assume that people do not want to believe that their observations and perceptions are inaccurate or invalid.

Accepting the person's negative affect is seen as supportive for the following reasons: negative emotions can be thought of as psychological waste products. Like physiological wastes, they need to be discharged or eliminated from the human system or else the system will eventually shut down (and all goal pursuit will be stopped). Providing a social environment in which these psychological wastes can be discharged is, by definition, supportive because it facilitates the person's efficient pursuit of self-defined goals free from the interference of various negative affective states. Discharge, in this context, means essentially the same as the psychoanalytic term "cathexis."

Acceptance of another's negative affect may be achieved by simply listening. Listening is considered a nonpassive input; the listener must show an interest in the other person by listening carefully, with undivided attention. When a person expresses negative affect, most other behaviors will probably be

nonsupportive because they will tend to interrupt the discharging of the negative emotions. For example, attempted reassurance such as "You shouldn't be so upset; there is nothing to worry about" stops the person from discharging emotional waste products by suggesting that the feelings the person has are inappropriate. The result is that residual tensions are still present to interfere with the pursuit of goals. Such interruption, by definition, would be nonsupportive.

Clearly skill and empathy are needed in providing the support required so that the other person can discharge negative emotions. A lack of skill could lead the person to express negative affect to the point where it did more harm than good. In our social support groups we made a simple translation of this principle of listening by adopting the following practice: When patients were expressing some negative emotion such as worry, sadness, or anger, we tried to avoid interrupting them. Instead, we attempted to listen thoughtfully so the patients could get the feelings off their chests.

When providing both of these classes of behaviors, one can get a pattern of interaction which goes something like this: person expresses some negative feelings (the supporter listens). Person expresses doubts about self (supporter communicates confidence and positive appraisal, after listening awarely but without agreeing with their doubts). Person indicates residual anxieties (supporter listens, then communicates confidence again). The communication of confidence "again" in such an interaction constitutes reassurance.

#### *Some Nonsupportive Behaviors*

The following behaviors are mentioned because common sense often tells people that these are the best ways to be supportive to people. Coddling, pity, and sympathy are three such behaviors. Such inputs may meet the person's self-expressed needs to be treated like a child or to regress psychologically. These inputs, however, would be considered nonsupportive if the person needing support really had a need for self-sufficiency or independence and for high self-esteem. Consequently one must view these inputs as being of questionable social support.

Advice, another such commonly used input, is only supportive when the receiver perceives the support giver as having expertise in the area covered by the advice. Advice on social-emotional matters, is an area that few people are expert in, so that such advice is likely to be seen as wrong ("Oh, I couldn't tell my husband to do that. You don't know him."). Additionally, the fact that most advice of this sort is rejected suggests that it is not supportive.

The context in which social emotional support behavior is provided seems very important in determining the effectiveness of that support. There are three points which seem important here:

1. The person with positive attitudes toward the receiver of support will probably be most comfortable in the role of supporter. These attitudes include feeling that the receiver is to be valued because the receiver is a human being (otherwise, why spend your time with this person?) and that the receiver has the potential to grow and learn (otherwise, why express confidence in this person?). There is nothing to stop a good actor or actress from communicating these attitudes to the receiver of support, but that seems to be a rather joyless way to go about one's work, and the receiver may eventually see through the facade.

2. We hypothesize that the capacity to receive social support varies over time within any one person. Support provided in excess of this capacity may make the receiver feel uncomfortable to the point of being unable to use such support.

People may feel they are receiving too much support for a variety of reasons. A person whose needs for independence and autonomy are very strong may feel that these needs are threatened by excessive inputs of supportive behavior. A person with low self-esteem may feel that support above a certain level is more than that person deserves. An example of the latter case is the status discrepancy between a psychiatrist and a client (the majority of persons in the United States occupy status positions lower than a psychiatrist). Such status discrepancy can produce this sense of inequity in the receiver of support ("I'm not good enough to deserve the help of a psychiatrist.")--a finding documented in numerous studies of patient dropout from psychiatric treatment (see Baekeland and Lundwall's excellent review of the literature, 1975).

In short, the provider of support may need to minimize status discrepancies (perhaps by using counselors with the same status as the receiver) and may need to continually reevaluate the level of social support appropriate for this person at this time. We assume that the capacity to receive social support can grow as the person's self-esteem grows as a result of previous social support. In this case, one should be able, as a general rule, to provide more and more social support over time.

In our social support groups, we tried to minimize status discrepancies between the givers and receivers of support by encouraging persons at the patient's own status level to be supportive (e.g., other patients and friends and relatives who came to the meetings). In addition, we have tried not to

give more support to people than they wanted or push them into more supportive relationships than they could handle.

3. Social support is best provided in an environment where the relationship is one of trust between the giver and receiver. Trust here refers to the feeling of the receiver that the giver of support will not harm the individual. As such, the persons providing support need to be seen as secure and trustworthy, i.e., unlikely to harm one psychologically or physically. It is unlikely that anyone would be willing to express negative emotions or accept confidence and positive appraisal from another person when mistrust and a lack of psychological security in the other exists. The expectation and fear of being harmed would probably be too great.

In the social support groups we specifically worked on trust with the patients by taking what they said seriously, by not attacking or challenging the feelings they expressed, and by being as accepting of each of them as we could. We wanted the classes to be a safe, secure environment in which they would feel safe and comfortable talking freely about their difficulties following a regimen. We believed that in any other environment, we would not be able to get them to bring such matters into the open where they could be dealt with constructively.

We will now turn to the meetings themselves.

#### General Format of Meetings

The social support groups met for two hours once a week for six weeks. They were conducted by at least one health nurse clinician (R.N., M.S.N.) and another member of the staff.\* Each meeting followed the general format and sequence given below:

- blood pressure readings,
- opening exercise,
- factual content,
- break,
- problems of adherence, and
- closing exercise.

We found this format flexible and easily changed as the needs of the group required. Each component of this format is described in detail below; then we will present a meeting-by-meeting description.

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\*E. Robinson, R. Caplan, or another health nurse clinician.

### *Blood Pressure Readings*

Rationale: These readings were intended to provide feedback to the patients on their blood pressure and its relationship to their adherence, to demystify sphygmomanometers, and to demonstrate the variability of blood pressure.

Method: Blood pressures were taken from each patient as the class members arrived. The patients were told their blood pressures and a form was provided for them to keep track of their readings. An explanation of blood pressure readings and the characteristics of blood pressure were given in the factual content section of the classes. The method used for taking blood pressures is described in Chapter 3.

### *Opening Exercise*

Rationale: These opening exercises were designed to establish an atmosphere conducive to positive attitudes toward oneself and toward the group.

Method: We asked the patients to share something positive about themselves or their lives with the group. Sample questions include, "Share something about yourself with the rest of the group," or "What's been new and good in your life in the last week?" Specific questions used at each meeting are given in the description that follows.

The simplest and most straightforward method we found of conducting these openings and closings was to ask each participant\* in sequence, the specific question for that exercise.\*\* Starting with a staff member was a simple way of clarifying for other participants the specific request.

### *Factual Content*

Rationale: We presented factual information on the physiology, pathology, and treatment of high blood pressure to the patients, providing them with a factual basis upon which to plan their adherence behavior.

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\*By participant we refer to patients, guests, and staff. Inclusion of all participants in these group exercises appeared to create a warmer and more open group than would otherwise be the case. In addition, we thought that inclusion of guests would make it more likely that they would be supportive to the patient inside and outside the group situation. Guests (some of them hypertensive) were family members or friends of the patients.

\*\*This was simplest if the group was seated in a circle. Circular seating arrangements seemed to encourage more supportive and open discussions among participants.



Method: Lectures, demonstrations, and lengthy question-and-answer sessions were used predominantly. Other educational methods, such as group discussions, audio-visual materials, situational analysis, and skill performance, were also employed. We preferred to use non-didactic methods over straight lecture presentations whenever possible. The factual information followed this outline:

Week 1: General overview of hypertension, its physiology and treatment, cassette film shown

Week 2: Detailed overview, lengthy question-and-answer session

Week 3: Diuretics, potassium deficiency, low-sodium diets

Week 4: Other anti-hypertensive drugs, cholesterol and triglycerides

Week 5: Over-the-counter drugs, alcohol, tranquilizers, exercise

Week 6: Review session, film shown again

The crucial facts taught about high blood pressure were drawn from the ten items of essential information for patients recommended by the Hypertension Information and Education Advisory Committee, Task Force II (1973).

Dividing factual content from problems of adherence implies a greater division between these two than actually exists. For convenience and organization we made such a division in planning the curriculum; however, we recognized the interrelationship of these two aspects and integrated them throughout the course.

Technical questions raised by the participants to which we did not know the answer prompted a search of the hypertension literature on our part in the intervening week and a subsequent report to the group. This established our good intentions with the patients and provided us with a mechanism for reducing our own areas of ignorance.

### *Break*

Rationale: The break was designed to provide an opportunity for informal socializing among the patients, to introduce foods low in salt, cholesterol, or triglycerides as refreshments, to allow patients on diuretics to go to the rest room, and to provide the staff time to revise, if necessary, plans for the next part of the class.

Method: De-cafeinated coffee and tea were provided at each meeting. Snacks were initially made by members of the staff and later on in the six weeks by participants; sample snacks were low-calorie cookies or fresh vegetables and a synthetic dip. The staff made a point of joining the patients in these activities and encouraging conversations between participants. The breaks

usually occurred halfway through the two-hour sessions and were 10-15 minutes long.

### *Problems of Adherence*

Rationale: This section of the class was intended to provide a supportive forum in which patients could share problems, worries, and concerns about their high blood pressure and their ability to adhere. It also was intended to give patients a chance to try out new ways of coping with these concerns.

Method: Discussions, role-plays, situational analyses, relaxation exercises, and problem-solving techniques were used. The topics included:

How did you find out you had high blood pressure?

What did you think when you found out you had it?

Why do so many people drop out of treatment for their high blood pressure?

The role of stress in hypertension.

Patient-physician relationships.

Are you sick if you have high blood pressure?

These topics are described in detail in the following section. They were integrated with the factual content and were discussed earlier in the sequence if a topic was brought up on the group's initiative.

### *Closing Exercise*

Rationale: The closing exercise was designed to re-emphasize group cohesiveness and support.

Method: We asked each participant to share some thoughts with the group about the meeting, the group, or what each person was looking forward to in the next week.

As the format reflects, considerable time and energy was spent on activities related to personal attitudes and reactions toward high blood pressure and its control. The patients felt that this focus was important in giving them an opportunity to think through the implications for themselves of this disease and their adherence, to articulate their worries and questions, to receive information from a qualified, medically trained person, and to assimilate the behavioral changes required of patients in bringing their high blood pressure under control.

### A Typical Series of Classes

The following description of a "typical" series of classes is a composite of the seven patient groups we conducted. None of the series we ran were exactly like this "typical" one. We continually refined the classes as our experience with methods succeeded or failed, particularly with the first series of classes. All of the activities described here were included in the majority of classes, although the order or precise method of presentation may have been different in each case.

#### *Meeting 1*

Blood pressure readings and distribution of materials. We distributed a folder to everyone so participants could keep handouts together. A listing of meeting topics, dates, and times was in the folders to inform them of the proposed class outline. Additionally, to help participants get to know one another, a roster of the patients in the class was also provided and name tags were distributed. These activities and the blood pressure readings were carried out by staff members as they greeted individual patients arriving at the first meeting.

Introduction. One of the group leaders introduced the staff members present and explained the purpose of the classes (health education and adherence) and the general plan for the six-week session. The patients were told that their attendance was important, but if they missed a meeting, we were prepared to give them a brief verbal summary and handouts from the classes they missed.

Opening exercise. The opening exercise at the first meeting was intended to make patients feel more comfortable in the group by allowing them to share their own and others good qualities. Therefore, in an effort to introduce the patients to each other and share personal (and generally positive) information about each other, we asked the patients to share their name and one other thing about themselves.\* This question allowed considerable choice about what to disclose about oneself. Patient uncertainty about appropriate responses can be resolved by starting with a staff member. Typical responses to this exercise included occupations, marital status, number of children, health status, location of home, hobbies, pets, and other factual personal information.

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\*We avoided qualifying this request by asking for "something interesting about yourself;" some people didn't think there was anything interesting about themselves.

Factual content. To present the patients with a general explanation of hypertension, we presented a comprehensive overview of high blood pressure and its treatment. In this way, we believed the patients were more likely to have a grasp of the relationship of details to the total picture when details were presented later on in the session. We used a 20-minute video cassette film on high blood pressure (Professional Research Incorporated, 1974), which defines blood pressure, explains the deleterious effects of uncontrolled high blood pressure, describes diuretics and other high blood pressure medications, explains the importance of health behaviors in controlling high blood pressure (medications, smoking, caffeine, obesity, and sodium intake), and reminds the patients that their behavior (i.e., their adherence) is the most crucial aspect of their treatment. Patients were told not to worry about remembering everything from the film because we would be going over the same content in detail in the next six weeks.

Question-and-answer period. To allow the patients to ask questions about those issues of concern to them and to give the staff an idea of what those concerns were, we had an open question-and-answer session after the film. Often the patients would ask us to confirm a fact from the film; one question asked in almost every class was, "Is hypertension curable?" Patients found it difficult to accept the idea that they had a disease that could not be cured but could only be controlled. Other questions centered around clinical tests to determine the essential or secondary nature of hypertension. Again, we think that this was a reflection of the patients' desire to have a curable disease--secondary hypertension. Questions were also asked about "old wives' tales" or common myths about hypertension and its treatment. Another issue often raised by the patients was the relationship of stress, "nervousness," and neuroticism to hypertension\*; the patients were threatened by the possibility that their high blood pressure was due to inappropriate coping reactions and behaviors.

Questions which referred to topics to be covered in greater depth at future meetings, were only answered briefly. However, our preferred approach during this part of the meeting was to encourage any and all questions, hopefully establishing an atmosphere in which the patients would feel comfortable asking questions. This implied being flexible about the length of this section of the class; our question and answer sessions have ranged from 10 to 40 minutes,

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\*Because of the professional confusion in the area of stress and hypertension and patient confusion and defensiveness, we used the phrase, "high blood pressure" in the classes rather than the more technical term, "hypertension."

according to the needs of the class and probably to our own attitude of encouragement or discouragement of questions.

Break.

Problems of adherence. A discussion was initiated by asking, "How did you find out you had high blood pressure?" This topic illustrated the lack of symptoms in most cases of high blood pressure as shown by the usually accidental discovery of the disease. A discussion format provided an informal method of making this point and allowed for greater sharing than a more didactic method. We began this discussion by asking each patient to share his or her experience in discovering this condition. We then pointed out the accidental nature of this discovery; often, the patients then carried on the discussion, talking about their own lack of symptoms. The occasional exception was usually the severely hypertensive patient who would thereby point out the limitations to the rule.

Most patients discovered their high blood pressure when visiting a physician for a physical examination or for a health problem or when donating blood. Some patients had known for years that they had high blood pressure, but only recently were being treated. Such changes in treatment approaches were a source of confusion to the patients; the patients needed an explanation of the recency of research on the efficacy of treatment for high blood pressure and that the entire medical community did not completely accept these findings initially. Another illustrative point was made by taking the blood pressure of someone in the class who felt that their blood pressure was "up" or "down" at that moment to prove the point that how one feels is not necessarily indicative of what one's actual blood pressure is.

Patients were then asked, "What were your thoughts when you found out you had high blood pressure?" The purpose of the discussion was to allow patients to talk about fear as a normal reaction to disease. The needs of the individuals in the group for reassurance, more realistic information, and/or grim statistics became clearer as the group considered this question. Attempts were made to meet some of these needs during this discussion and the remaining meetings. Often a chance to "talk out" worries and fears, however irrational they might be, was sufficient for an individual to accept the fact of having high blood pressure and consequently to adhere.

Assignment. At Meeting 2, we intended to check the patients' understanding of their prescribed regimens; for that purpose, we asked them to describe their regimens on a "regimen sheet" and to bring all their medications to the next meeting. We explained that each one of the patients would meet the nurse

individually, which pleased them. This is the only "assignment" we gave the patients because assignments added to demands on patients and were unlikely to increase the probability of adherence.

Closing exercise. The function of this closing exercise was to reinforce positive feelings about the class and the group, reminding the patients of the valuable aspects of the class for themselves. We asked each participant in turn to share with the group what was liked about the class. Typically they mentioned an activity, some new information learned, the chance to meet and talk with other patients, or the opportunity to ask questions.

## *Meeting 2*

### Blood pressure readings.

Opening exercise. This opening was designed to increase the patients' feelings of self-worth by asking them to see the world and themselves in a positive manner. We asked all participants to tell the group, "What's been new and good in your life in the last week?" Again, a staff member answered first so participants would understand the request more clearly. Typical answers were phone calls, letters, or visits from friends or relatives, improvements in the weather, accomplishing some task, following their regimen closely (especially dietary requirements, smoking, and other difficult adherence behaviors), or handling a difficult situation well. Some participants found it difficult to think of a "new-and-good"; with encouragement and time to think most people could think of something "new-and-good." A "new-and-good" did not have to be of earth-shattering proportions to make a person feel better. Cheerfulness, flexibility, patience, and the certainty that everyone had some "new-and-goods" to share were helpful staff characteristics in this exercise. If someone insisted on "passing," the group leader accepted the request and suggested that the participant think some more and make another attempt when everyone else had shared their "new-and-goods."

Factual content. To build on the overview from Meeting 1, the factual content at this meeting was again basic information, repeated in greater detail. The health nurse clinician gave a general lecture briefly explaining in simple lay terms the following topics: the complexity of blood pressure regulation in the body, the measurement of blood pressure, factors associated with high blood pressure, complications of high blood pressure, and the necessity of ongoing

personal health care to keep one's blood pressure under control.\* This lecture was open to questions as it was given. Often digressions from the assigned topics were initiated by patient questions. We found it worth the time and effort to listen to such digressions and answer them because they were of concern to the patients. Questions which might have seemed inappropriate or absurd to us were often a manifestation of the genuine fears and worries of the patient and the answers served the important function of reassuring the patient. We found that the health professional in this situation needs to be unhurried and thoughtful of the needs of the patients.

In an effort to give the patients as many resource materials as they were interested in pursuing, we compiled an annotated bibliography of reasonably accurate books, articles, and pamphlets on high blood pressure written for the lay person. This was handed out to the patients after the question-and-answer session.

#### Break.

Problems of adherence. To optimize time constraints, we conducted two activities simultaneously during this time period\*\*—individual regimen conferences and a group discussion on the difficulties of adherence. The purpose of the conference, conducted by the health nurse clinician, was to check for any inconsistencies between the patient's report of the regimen as listed on the "regimen sheet" and the physician's record of that regimen as written in the medical record. An "open-classroom" technique was used to handle both activities in the time given. The nurse met with individual patients for about five minutes as they came and went from the discussion circle in another part of the room. The conference resolved about 2-3 regimen misunderstandings per class; most of these were concerned with appropriate medication dose or schedule or dietary requirements. Besides correcting these inconsistencies, the conferences provided the patients with the opportunity for private discussions with the nurse, an important consideration for those on medications with side effects that might alter sexual functioning.

The discussion, conducted simultaneously with the regimen conferences, was designed to elicit from the patients a listing of those pressures which make

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\*We made the point that patients with high blood pressure need not restrict their sexual activities except in rare circumstances specifically recommended by a physician. Even if this question is not raised, and often it is not because of patients' modesty, it seems important to alleviate fears in this area. Patients appreciated this reassurance.

\*\*A case where two group leaders were clearly needed.

adherence difficult and subsequently to raise their awareness of and resistance to such pressures.

The second staff member started the discussion by presenting some data on the proportion of hypertensives who drop out of treatment (Caldwell, et al., 1970; WHO, 1974). We then expressed our concern about the high dropout rate and asked the group, "Why do you think so many people drop out?"\*

The answers our patients gave us are presented in Table C-1. They fall into roughly five categories:

1. Lack of information,
2. Personal attitudes of the patient,
3. Patient-physician relationship,
4. Lack of support from family and friends, and
5. Other reasons.

In an effort to encourage patients to resist these pressures toward non-adherence, we asked the patients, after compiling this list, to tell us what a patient could do to keep these factors from interfering with control of their high blood pressure. In brief, the answers to this question included education, changing one's personal attitudes about one's self and one's health, trying to improve relationships with one's physician so necessary information and support is obtained, and educating the general public on the nature of high blood pressure so normotensives would be more understanding. To counter cost as a reason for dropping out, our groups said they needed to view the cost as an investment in their future. Patience with different medication trials, necessary to minimize side effects and maximize control of blood pressure, was also counseled. This aspect of the exercise, although quite short, was effective in initiating patient discussion of ways to resist pressure to dropout of treatment.

The discussion of this topic was relatively structured. The group leader wrote down on a blackboard or on newsprint reasons for dropping out as the members of the class mentioned them. The blackboard or newsprint was then used for the second part of the discussion to generate counter-arguments to these pressures. The leader's role was to keep the discussion moving by continuing to rephrase and repeat the original question until the group did not think of any further reasons and by encouraging and approving of participation from all group members. Digressions, when they occurred, were dealt with as mentioned previously.

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\*By introducing the question in this way, we avoided suggesting that these patients might dropout and also elicited their help in solving this health problem.



Table C-1

PATIENT-GENERATED REASONS FOR HIGH TREATMENT DROPOUT RATES\*  
(based on discussion in five out of seven groups)

| Reason                                                                                                                                                                                                                           | Number of patient<br>groups mentioning<br>this reason |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| <u>1. Lack of information</u>                                                                                                                                                                                                    |                                                       |
| a) Asymptomatic character of disease: no feedback, symptoms, or pain; patient feels well, doesn't know that only sure sign that blood pressure is up is to have a reading taken with a sphygmomanometer . . . . .                | 5                                                     |
| b) Chronic character of hypertension and need for long-term medication not realized by patient: people think they're cured after the first round of medications, don't realize importance of repeated physician visits . . . . . | 5                                                     |
| c) General ignorance about what high blood pressure is, what the complications are, or the causes are: e.g., patients think they're tense if they have high blood pressure . . . . .                                             | 4                                                     |
| d) Mythical cures for hypertension and claim of habit-forming medication . . . . .                                                                                                                                               | 3                                                     |
| <u>2. Personal attitudes of the patient</u>                                                                                                                                                                                      |                                                       |
| a) Discouraged by prospect of long-term control: don't think it's doing any good, loss of hope . . . . .                                                                                                                         | 5                                                     |
| b) General lack of interest or motivation: don't think it's important, don't know and don't care, not willing to seek information, too casual, not scared enough . . . . .                                                       | 5                                                     |
| c) Low self-esteem or drive to live: don't care about their health or themselves, "nothing to live for" . . . . .                                                                                                                | 3                                                     |
| d) Aversion to sick role: don't want to be sick, makes one feel old to take medication, don't like taking drugs in general, don't want to admit that one is sick . . . . .                                                       | 3                                                     |
| e) Not accepting that you have high blood pressure: e.g., "It's a disease of old people. I'm not that old." . . . . .                                                                                                            | 3                                                     |
| f) Not having faith in physicians or medicine, belief in non-medical cures . . . . .                                                                                                                                             | 3                                                     |
| g) Not making medications a habit, not willing to make dietary changes . . . . .                                                                                                                                                 | 3                                                     |
| h) Anxiety too high: too scared or worried, "fear of hospitalization" . . . . .                                                                                                                                                  | 2                                                     |

Table C-1 (continued)

| Reason                                                                                                                                                                                                                            | Number of patient<br>groups mentioning<br>this reason |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------|
| 3. <u>Patient-physician relationship</u>                                                                                                                                                                                          |                                                       |
| a) Lack of communication: physician doesn't explain, is too casual, doesn't stress it enough . . . . .                                                                                                                            | 4                                                     |
| b) Patient confusion arising from lack of clear medical knowledge: physicians disagree about what's high blood pressure and how to treat it; they don't know the cause; how can they treat if they don't know the cause . . . . . | 3                                                     |
| c) Physician doesn't follow up . . . . .                                                                                                                                                                                          | 2                                                     |
| d) Patients don't know how to be good health consumers, how to participate actively and assertively with their physician in their health care . . . . .                                                                           | 2                                                     |
| e) Excessive physician commitments: lengthy office wait for physician, physician is always in a hurry . . . . .                                                                                                                   | 2                                                     |
| f) Physician sets restriction on patient that patient is unwilling to fulfill . . . . .                                                                                                                                           | 1                                                     |
| 4. <u>Lack of support</u>                                                                                                                                                                                                         |                                                       |
| a) Other people think you're tense, nervous, or neurotic if you have high blood pressure . . . . .                                                                                                                                | 2                                                     |
| b) Other comments (about being sick and taking medications) discourage you: "My wife thinks I'm a hypochondriac," "My friends make fun of me and don't really think I'm sick." . . . . .                                          | 2                                                     |
| 5. <u>Other reasons</u>                                                                                                                                                                                                           |                                                       |
| a) Cost of physician visits and medications . . . . .                                                                                                                                                                             | 3                                                     |
| b) Treatment: physician often has to try different drugs, patient doesn't expect that, gets confused and discouraged . . . . .                                                                                                    | 3                                                     |
| c) Side-effects . . . . .                                                                                                                                                                                                         | 2                                                     |
| d) Inconvenience . . . . .                                                                                                                                                                                                        | 1                                                     |

\*This list and tabulation should be interpreted with caution. One must not assume that these reasons are why these patients might be nonadherent. We did not ask "Why are you nonadherent?" The fact that some reasons were mentioned more often than others may simply suggest that these reasons were most obvious to patients. Other reasons, less frequently mentioned, may be equally important; perhaps repressed and unmentioned reasons are even more important because one cannot rationally deal with them.

Closing exercise. To again reinforce positive feelings toward oneself and the group, we asked the patients to share what they were looking forward to in the next week. Typical responses to this question included: planting a garden, going to a concert, improvements in the weather, visiting friends or relatives, losing weight, and stopping (or cutting down) on smoking. The latter two responses are examples of an added "bonus" to this question; patients would often set an adherence goal for themselves on their own initiative. We followed up on these goals, formally or informally, at the next class meeting by asking the patients how well they had done in the past week.

### *Meeting 3*

#### Blood pressure readings.

Opening exercise. "Have you shared anything about this class with someone outside of it?" Many of the patients had previously mentioned feeling alone with their medical problem. To reduce such feelings, we encouraged the patients to share information from the classes with other people and this opening provided an opportunity to share the results of such conversations.

Factual content. Because diuretics are the most common hypertensive medication, we began our detailed lectures on medications with this topic. The lecture built on points made at the previous meeting in which fluid volume was mentioned as one factor affecting blood pressure. The action of diuretics on the kidney was explained, the names of many different common diuretics listed, and possible side effects discussed. A clinical pharmacist was able to come to some meetings and provided valuable advice on the most appropriate timing of diuretics for comfort and effectiveness.

The problem of potassium deficiency was discussed; symptoms were listed and a list of food high in potassium was handed out. Potassium supplements, particularly appropriate scheduling to avoid irritation to the gastro-intestinal tract, were discussed. We tried to make the point in our explanation of side effects that not all medications produce these side effects, not everyone is sensitive to a drug, and of those who are, not all will share the same symptoms. Again, we took this opportunity to underline the complexity of blood pressure control and the consequent differences among the patients' regimens.

At this initial lecture on medications, we handed out and explained some general information for patients on antihypertensive drug therapy from the Journal of the American Pharmacists Association (1974). This handout reiterates some of the information we had given the patients about the chronic nature of this disease and its complications. Additionally, it advises the patients

to know their medication and dosage, to never increase or decrease the dosage, to inform any physician they ever see of their hypertension, and so forth. We felt that this was a sufficiently important collection of information that the patients should have a copy to refer to after the classes were over.

To help the patients reduce the amount of salt in their diets, the effect of excess salt on blood pressure was described. Lists of foods high and low in salt, of disguised salts, and of substitute seasonings were given to the patients. We encouraged all patients to reduce salt intake to some extent as this can reinforce diuretics. Those patients who had been prescribed specific salt restricted diets shared their experiences with the rest of the class. Many of these patients said they had lost their taste for salt and prefer unsalted foods. This was encouraging to those who had not tried this yet. Salt substitutes were briefly described. Their limitations in cooking and their concentrated nature seemed to be important points to mention. The hospital dietician attended some classes and was available to answer questions.

Break. So the patients could try out salt substitutes, several commercial salt substitutes were provided along with popcorn. The patients expressed appreciation at this opportunity to sample the substitutes as they are expensive. It also seemed important to the patients with food restrictions to share with others who had to restrict their diet and who did not disparage their efforts.

Problems of adherence. The relationship between stress and hypertension was considered during the second half of this meeting. We decided that this was an important topic to discuss even though it is an area still in need of definitive research. The following points are those we tried to make in this regard: stress is an unavoidable component of daily life; one of the body's reactions to stress is to raise blood pressure; we don't know why this occurs at some stressful times and not at others; and there is no consistent evidence that hypertensives, as a group, are more or less irritable, tense, or neurotic than normotensives. This information was presented by one of the leaders during the discussion.

Given the controversy and partisanship in the area of self-help techniques for coping with stress, we did not suggest that the patients use any specific body of such techniques, such as transactional analysis, behavior modification, peer counseling, or spiritual comforts, such as meditation and religion. We mentioned that these activities may be beneficial for some persons in dealing with stress, and suggested that patients pursue one of these techniques in other groups if they were interested. We also encouraged the patients to start

thinking about stress, to notice when they felt stressed, and to use whatever constructive and positive means the individual could to minimize the effect of life stresses on them. We do not expect that such advice substantially altered patients' coping styles.

The specific discussion on this topic was structured differently with almost every patient group. We explored a variety of ways of sharing information with the patients and eliciting their own thoughts and ideas about stress. We used role plays and small group discussions of coping in specific stressful situations; we paired the patients with each other and asked them to listen to each other for five minutes each, while they talked about recent personally stressful events; we described some of the research on suppressed hostility and resentment in hypertensives and some of the Type-A research (Rosenman, Brand, Jenkins, Friedman, Straus, & Wurm, 1975). Extrapolating from research by Harburg et al. (1973), we discussed expressing anger and frustration and not feeling guilty about it. We were not completely satisfied with any of these techniques. The format needed here is one which allows the patients to consider these issues, to come up on their own with suggestions for coping, and then to build these ideas into new attitudes and behaviors.

Closing exercise. A closing exercise promoting group cohesiveness seemed important after discussing such a personal topic as stress and coping behaviors. We asked each participant to share what they liked or found valuable in this particular meeting. Participants mentioned such things as taking time to think about stress, the information, sharing thoughts about stress, and encouragement to like oneself and take care of one's own needs.

#### *Meeting 4*

##### Blood pressure reading.

Opening exercise. To obtain some information on the adherence behavior of the patients and to promote a norm of adherence, we asked the patients to share their experiences during the last week in caring for their high blood pressure. Typical responses to this opening included reports of avoiding salty foods, taking all medications, losing a pound or two of weight, and cutting down on the number of cigarettes smoked. All patients were able to think of something in response to this question; the most non-adherent patients in our groups had taken some of their prescribed medications. The patients reacted positively to others' adherence by encouraging each other.

Factual content. To complete the presentation of drug therapy, the lecture covered anti-hypertensive drugs and their modes of action. Appropriate

schedules for optimum effectiveness and possible side effects were explained to the patients. We mentioned to them that some of these drugs may cause dizziness or light-headedness when changing positions suddenly and recommended that they move up and down more slowly to compensate for this. Sexual dysfunction was mentioned as a possible side effect. If some patients wished to discuss this further, we did so. We emphasized that any side effect that impairs their functioning should be discussed with their physician so that alternative medications might be considered.

Cholesterol and triglycerides were also discussed at this meeting as other risk factors for heart disease. We described these two lipids, their effect on blood vessels, and the dietary sources of cholesterol and triglycerides. We mentioned that cholesterol and triglycerides have not been implicated in the etiology of hypertension but are critical factors in heart disease to which hypertensives already are at risk.

#### Break.

Problems of adherence. In this session we conducted an exercise on doctor-patient relationships to encourage the patients to take a more active role in their medical care. We realized when we started the pilot groups that the issue of doctor-patient relationships would have to be addressed. Patients were not clear on what was appropriate behavior for them as patients, what were their rights, or what were appropriate expectations of one's physician. Many of them were upset that their physicians had not told them basic facts about hypertension -- its chronicity, lack of symptoms, and complications. Some had an unrealistic, idealistic view of doctors while others had a very disillusioned and cynical view. We felt that it was crucial to improve doctor-patient relationships as a key to adherence. The following exercise was developed toward this end.

First, patients were asked to generate a list of information which should be known by any patient who has just been diagnosed as having high blood pressure. These items were posted just as patients suggested them. Usually a list of 15-20 items were suggested by the patients. These items included information about the costs of health care, the impact of the disease and the treatment on the patient's life style, a phone number for emergencies, the time and date of the next visit and so forth. The patients were commended on the length and completeness of the list.

Next a previously prepared but shorter list, Figure C-1, Patient Preparedness Checklist, was distributed to all the patients. The patients were told that the two group leaders were about to depict a meeting between a patient and a doctor. Patients were asked to watch the person playing the patient and to

Figure C-1

HOW HIGH IS YOUR PATIENT PREPAREDNESS SCORE?

Score one point for each question the doctor answers.

- ... a) What does the illness do to a person?
- ... b) Is it curable?
- ... c) When should I take the medicine?
- ... d) When should I stop taking the medicine?
- ... e) Are there any side effects of the medicine? Should I report anything to you?
- ... f) How does the medicine work?
- ... g) Should I be worried about my health because of this illness?
- ... h) Do I need to come back for more visits?
- ... i) How much is this going to cost me for visits? For the medicine?
- ... j) Do I have to change the way I live in any manner?
- ... k) Who can I get in touch with in the event of an emergency? Is there a phone number?

TOTAL SCORE = \_\_\_\_\_ (count number of boxes checked).

MAXIMUM SCORE = 11

award one point every time the patient succeeded in getting an answer to a question on the list. During the first interaction the leader playing the patient purposely asked few, if any, questions and merely listened to the physician describe the illness. (A fictitious disease "whizitis" was fabricated so that the listening patients would not already have all the answers.) The patients in the group gave the leader playing the patient appropriate points using the check list in Figure C-1. Then the interaction was performed again with the "patient" asking almost all the questions. The quality of the patient-physician interaction was clearly different and apparent to the observing patients. Every patient awarded the "patient" a high score on this second try.

The patients then formed into groups of three, one person acting as physician, another as patient, and another as observer. The observer received a new rating sheet upon which to score the "patient." The "patient" received the sheet presented as Figure C-2 which described his or her role. The "physician" received the sheet presented as Figure C-3. Each had a chance to read the material before beginning the exercise. Referring to this as a role play only generated defensiveness from the patient. Therefore, we told patients that we were practicing skills involved in doctor-patient relationships. This terminology was more acceptable.

Following the trial doctor-patient practice, the total group reconvened. Patients playing the doctors were asked what they thought of having patients ask so many questions. The "doctors" said the questions were good ones and that they did not mind taking the time to answer them because they were important. Patients playing the patients were asked if they felt they had gotten all their questions answered. The reply was an enthusiastic "yes." As the patients had the questions in front of them all the time, they were rated not on question memorizing but on their question-asking behavior. We suggested that the patients take this list to their next visit as a reminder of what they ought to know.

Finally the observers read off the scores they gave to their respective patients. The average score for the total group was quickly calculated; the average generally ranged between 7-9 points. The patients were liberally praised as a group for doing so well (regardless of the score).

For many patients the exercise demonstrated that a patient could be assertive yet not alienate the physician. We distributed the Patient's Bill of Rights (American Hospital Association, 1972) which demonstrated further to the patients that the health professions affirm patients' rights to courtesy and information.



Figure C-2

ROLE INSTRUCTIONS FOR PATIENT

Lately you have been feeling very drowsy and tired. The doctor has taken some tests of your blood. Now you are sitting in the doctor's office and the doctor is about to tell you the results of the test.

Don't forget that you have a responsibility to ask questions if you don't understand something or are unsure of how to take something.

What should a patient know?

- What does the illness do to a person?
- Is it curable?
- When should I take the medicine?
- When should I stop taking the medicine?
- Are there any side effects from the medicine? Should I report any?
- Should I be worried about my health because of this illness?
- How much is this going to cost me? For visits, for medicine?
- Do I need to come back for more visits?
- Who can I get in touch with in an emergency?
- Do I have to change my way of life at all?
- How does the medicine work?

Figure C-3

ROLE INSTRUCTIONS FOR DOCTOR

Your patient is sitting before you. You have just had some blood tests done on the patient because the patient complained of being tired.

Tell the patient that the patient has whizitis (no such animal) according to the tests. Hand the patient an imaginary prescription and tell the patient to take the pill three times a day.

Also ask the patient to cut down on eating anything with catsup in it because catsup irritates whizitis. Ask the patient if he or she has any questions.

Do not tell the patient anything about the cause of the disease or how the medicine acts, or about side effects or about follow-up visits. Hold off, so the patient can try asking some questions.

IN CASE THE PATIENT ASKS YOU QUESTIONS ABOUT THE MEDICATION OR ABOUT WHIZITIS, HERE ARE SOME THINGS YOU OUGHT TO KNOW.

1. Whizitis is an illness that makes a person feel sleepy all of the time. It is caused when the body produces too much sleep hormone known as ZZ.
2. The name of the medicine you have prescribed for the patient is Awake-a-ril. It works by cutting down on the amount of sleep hormone produced by the body. People should take it after each meal, but not after seven in the evening or they won't be able to fall asleep at night.
3. The medicine causes side effects in very few people. One of these side effects is muscle soreness. The other is a slight headache. Both of these go away in about one week.
4. Patients have to take this medicine for the rest of their lives. There is no other way of controlling whizitis. If people don't take the medicine, they may find that someday they'll go to sleep and not wake up again or else go into a coma.
5. It is good to have patients return every six months for a checkup:

A physician was able to visit one of the classes right after this discussion and role play. The role play proved to be an excellent preparation for frank and considerate discussion of patient-physician relationships. Participants' questions to the physician covered a wide range of topics, from physiology to how and when a patient changes physicians when dissatisfied. The physician at this session answered these questions in a thoughtful, straightforward, dispassionate, and nondefensive manner. This was well-received.

Closing exercise. Participants were asked to share, "What are you looking forward to in the next week?" (See Meeting 2, Closing Exercise.)

### *Meeting 5*

#### Blood pressure readings.

Opening exercise. Any of the opening exercises previously described was repeated here, depending on the needs of the group.

Factual content. Any specific content topics remaining were covered at this meeting. Usually, these topics were over-the-counter drugs, alcohol, tranquilizers, and physical activity. The effect of several over-the-counter drugs on high blood pressure and hypertensive medications were described and recommendations for alternative drugs given. A list of medications that do and do not interfere with blood pressure control was handed out to the patients. We recommended reading labels or consulting with a pharmacist if the patient was ever unsure of the effect of an over-the-counter drug on blood pressure or on medication.

Alcohol's depressing effect on blood pressure was explained and its reactions with different blood pressure medications and with tranquilizers was emphasized. We pointed out that tranquilizers controlled emotions but not blood pressure.

Patients often had misconceptions, or at least questions, about whether hypertensives should limit their physical activity. We routinely explained general guidelines and distributed a booklet on appropriate physical activity (Kaunisto, Connellan, & Zweifler, 1974).

These last three topics were often juggled out of sequence because patient interest prompted their scheduling earlier than anticipated.

#### Break.

Problems of adherence. We felt it was important to underline to the patients that high blood pressure is a serious illness requiring continuous self-care and medical treatment, but that one's life style, particularly physical or social activities, need not be altered drastically. Therefore, we

conducted a discussion on the topic, "Are you sick if you have high blood pressure?" The discussion revolved around definitions of "sickness" and redefining the sick role to include active self-care and minimum disruption of normal activities. Sample patient comments on this question were: "Yes, you're sick and you have to take care of it." "But, you don't have to act sick and lie around and not do anything," and "It's being sick in a different way than with the flu or an operation." The group leaders prompted the discussion in some cases with questions such as, "What does it mean to be sick?" or "Are you sick if you wear glasses?"

Closing exercise. Either closing from Meetings 1 or 2 was used here, depending on the needs of the group for cohesiveness or positive affect.

### *Meeting 6*

Blood pressure readings and distribution of evaluation forms. To obtain patient reactions to the techniques and approaches we used, we distributed evaluation forms as we took blood pressures. The patients indicated on these forms that they almost invariably felt more committed to controlling their blood pressure.

Opening exercise. "What's been new and good in your life in the past week?" was repeated once again. Any of the opening exercises previously described could be repeated at this meeting depending on the needs of the group.

Factual content. To reinforce previous learning, this session of the last meeting was a review session. We showed the video cassette from meeting 1 again. Then we asked the group, "What facts about high blood pressure do patients need to know?" and "What does the general public need to know about it?" These questions elicited from the group facts about hypertension, including a definition of blood pressure and of hypertension, and points on the chronicity of this disease, its lack of symptoms, complications, and so forth. We also distributed a copy of ten items of Essential Information from the Hypertension Information and Advisory Committee, Task Force II (1973), for future patient reference.

Break.

Distribution of certificates. To help give the patients a sense of accomplishment in having attended the classes, we designed a "Certificate of Completion" to give every patient who had attended three out of six classes. This certificate was awarded to each patient with much ceremony, applause, and smiles. The patients appreciated this small token of accomplishment from the classes and many felt it was important to them.

Closing exercise. To emphasize and strengthen group cohesiveness, a variation on the closing from Meeting 1 was used, "What was good for you about these classes?" We mentioned that this need not be class content, but could also be the group or individuals in it. Typical responses included: the chance to talk with other patients, the opportunity to ask unlimited questions of a health professional, the information, thought-provoking issues, and the time and attention from staff members.

#### Group Discussion Techniques and Supportive Resources for Leaders

The group leaders found a number of techniques useful in conducting the sessions just described. Some of these will be described briefly here. By necessity, the following description of these techniques oversimplifies procedures and guidelines which require previous training in group discussion techniques and in counseling or therapy. A list of techniques cannot convey a tone of voice, facial expression, and a necessary sense of humor. The presence or lack of such intangible expressions can do much to enhance or hinder the supportiveness of a group. The list can best be interpreted as a description of techniques and guidelines which the group leaders found helpful and is not intended to be a training device for the complete novice to learn a new set of skills. For the person who is interested in learning more about such techniques, books by Maier (1952) and by Truax & Carkhuff (1967) are suggested. A number of organizations provide training in group discussion, counseling, and therapy techniques in many cities and often through colleges and universities.

(1) Probes. Examples are "Can you tell me more about that," "Can you think of an example?" "What else can be added to the list?" "What has been your experience, Mr. \_\_\_\_\_?" and "Mrs. \_\_\_\_\_, have you had a similar experience?" Probes were intended to encourage participants to elaborate and thereby broaden the discussion. Questions which could be answered by a yes-no or true-false response generally were conversation stoppers.

(2) Reinforcing responses. Examples include, "Good," "Thank you," "That's a good point. Does anyone else want to add to that?" and "Uh-huh." Reinforcing responses of this sort seemed to increase the likelihood that the person would continue contributing to the discussion and that others would do so as well. In contrast, non-reinforcing responses ("Yes, but...," "Oh, I don't think so.") had the opposite effect. When participants made points that were wrong or inappropriate, we found that it was better to respond in a neutral

manner. For example, "You have raised an interesting possibility. Has anyone found Mr. Jones' observation to be generally the case?"

(3) Reassuring patients who made negative remarks about themselves. In accepting the person's right to make such remarks and the legitimacy of such feelings, we found it important to not agree with these remarks and feelings. In this way, we contradicted the feelings without rejecting the patients' feelings. For example, one response to self-deprecating remarks could be, "I know it sometimes feels that way, Mrs. Smith; we all get discouraged, but you're really a fine person. Give yourself some credit." We considered this type of reply to be supportive because it accepted negative emotions and also communicated the supporter's confidence, thereby raising the self-esteem of the patient. It also helped to create a positive group atmosphere in which participants attempted to help each other in a similar manner.

(4) Pauses. The leaders found it useful not to avoid occasional silences or pauses in the discussion. A pause of ten seconds may seem like an hour to a group leader; however, such silences seemed to be important in giving the group a chance to consider a question and to assure the patients of the leaders' willingness to wait and give time to the group. The leaders found that such pauses often fostered more spirited group discussions; whereas interrupting the silence after only a few seconds, interrupted participants' thinking and conveyed leader impatience.

(5) Flexible but controlled guidance of the group discussion. Discussions were often interrupted by a participant bringing up some irrelevancy which the entire group would then pursue for a minute or two. The leaders found these pursuits were useful in releasing tension generated by the main topic. Essentially, it was a way for the patients to take a breather. We usually let such side-tracks be pursued for a few minutes by the group and then redirected the discussion back to the original issue by commenting on the last relevant point. For example, "I'd like us to return again to the point Mr. Green was raising about coming to grips with the fact that high blood pressure is a life-long problem. I don't think we quite finished answering his question. Mrs. Phelps, how do you feel about this 'fact of life'?"

(6) Using patient-centered problem solving. Several studies of learning (such as those reviewed by McKeachie, 1969) show that when students actively attempt to answer the questions at hand they learn more than when the teacher attempts to provide them with the answer. Patients tend to want the nurse to answer their questions for them, even nontechnical ones. We think this passivity and dependency is a reflection of the patients' acceptance of the

traditional sick role. This role creates expectations that health professionals want patients to be passive and wait for directions from the professional. Additionally, a "good" traditional patient never assumes to know the answers to questions and looks to the health professional for advice on all matters regardless of technical relevance to medical science. These expectations have to be changed to promote learning, self-directed adherence, giving and receiving support, and open discussions on topics of concern to patients. Because the traditional patient-health professional relationship has typically been authoritarian, the change to a more egalitarian relationship requires active avoidance of authoritarian attitudes and assurances and encouragement to the patient that passivity is not the desired response. For example, the leaders found that if a patient asked a question about changing life style ("How should I go about handling all my house work if I am supposed to get more rest now?"), they could avoid the position of expert by throwing the question back to the patient or the group ("Well, that's a hard question for me to answer because I don't live in your family. What sorts of options do you see available?"--or--"This is a common problem for people who are asked to change their life patterns. Has anyone else had to deal with it? What ways have you found that were helpful for you?").

(7) Setting group norms. The leaders wanted the patients to respect each others strengths, weaknesses, and differences of thought so the meetings would be a cooperative rather than competitive experience for the patients. Norms to this effect were set up in two ways: (1) the leaders set an example by their own behaviors so that the patients could model them (for example, listening, not interrupting someone, protecting anyone who was interrupted or verbally attacked, and so forth). (2) The patients were asked about the types of ground rules they would like to establish for the group. Their suggestions were always in the best interests of fostering rather than stifling group discussion: individual differences in needs and abilities in the group should be respected, people should remember that what works for them might not work for others, and each person should listen to others without interrupting. The patients who made these suggestions were generally average in their education; they were not experts in leading group discussions, yet they knew how they wanted to be treated by others in the group and they articulated these desires very clearly.

#### Organizational Supports for a Patient Education Program

By now many readers may have formed an impression of the qualities of the leaders who conducted the groups. The following characteristics seemed to be

definite assets for the leader of such a supportive health education program: (1) a belief that human beings are important and worth caring about, (2) an understanding that the social and psychological conditions of patients are as important as their physiological conditions, (3) a conviction that human beings have the potential to grow and improve themselves, and (4) an assumption that human beings can profit from social-emotional support. Consistently behaving in a manner commensurate with these attributes is more difficult than subscribing to them. It appeared to us that people need to receive social support themselves in order to give support effectively and awarely. Our leaders felt that organizational mechanisms for providing social support to the leaders of such groups were a helpful and necessary adjunct to the patient groups. In this study, the opportunity for the leaders to meet together and share their experiences satisfied part of this need. Mutual support systems like this allow health professionals to support each other. The health care organization can actively encourage and support the establishment of this kind of support between health professionals. All providers of health care are subject to a great deal of stress and can all benefit from greater mutual support.

The health educator is in a difficult position at this time; some other health professionals do not recognize the legitimacy of health education as an adjunct to health care, yet there is no doubt that the treatment of chronic diseases require educating patients in self-care and disease knowledge, tasks for which most other providers do not have the time or inclination. The organizational supports for health education need to be obvious and sincere; otherwise the health educator's task is seriously hampered and frustrated.

Several studies on strategies for effectively implementing changes in hospital systems have been conducted (for example, studies reviewed by Hage & Aiken, 1970; French & Bell, 1973). These suggest that programs in health care systems, such as health education programs or professional support programs, have the best chance of surviving if change is initiated with commitments from top members of the organization and subsequently from others downward through the organization. The program itself therefore receives widespread organizational support. The organizational application of programs was not considered in this study. Consequently, the reader who is interested in questions of institutionalizing new health care delivery programs is advised to examine references such as the above and to seek advice from reputable consulting services.



## APPENDIX D

### PROCEDURES USED IN LECTURE GROUPS

This appendix will describe the content and techniques used in the lecture groups. Factual information on the physiology, pathology, and treatment of high blood pressure was provided to the patients through lectures, demonstrations, and lengthy question-and-answer sessions.

The lecture group met once a week for four weeks. Each lecture session was one hour long. The general outline of material was as follows:

Week 1: Definition of high blood pressure, effect on body, treatment. Common myths. Role of the patient.

Week 2: Stress and its effects. Film on high blood pressure and its control.

Week 3: Medications used in the treatment of high blood pressure. Side effects to report to M.D. Over the counter medications to avoid. Potassium supplements.

Week 4: Salt restricted diets, and high sodium foods to avoid. Cholesterol and triglycemide restricted diets.

The specific factual material covered was drawn from the ten items of essential information for patients recommended by the National High Blood Pressure Education Program (1973).

#### *Meeting 1*

High blood pressure, its effect on the body, and its treatment were described at this first meeting. To explain these phenomena, brief, succinct definitions, lay terminology, and analogies were used whenever possible. For example, blood pressure was described as being analogous to the pressure on a garden hose when the water was turned on. These explanations of physiology and treatment were followed by a discussion of common myths about high blood pressure. These were described as "things you may have heard about high blood

pressure which aren't necessarily true." Myths that we found important to dispel were the following: you can tell how high your blood pressure is by the way you feel, once you take medicine you'll be cured, garlic water will cure high blood pressure, only nervous people get high blood pressure. After discussing at least these myths, the patients were asked to describe other myths they had heard of to elicit any more misconceptions of this nature.\*

The final point made at this meeting was the essential nature of the patients' role in controlling high blood pressure.

### *Meeting 2*

Stress and its continual presence in daily life was described. Its unclear relationship to blood pressure was explained. The need to cope with stress in a constructive manner was emphasized. The expression of anger and the need to define and resolve issues that disturb one were additional points made.

This was followed by the Professional Research Inc. (1974) film on high blood pressure and its control.

### *Meeting 3*

Medications used to treat high blood pressure were considered at this meeting. A clinical pharmacist lectured on diuretics and antihypertensives, their effect on the body, and their side effects. Appropriate use of potassium supplements was outlined.

The effects of over-the-counter medications on high blood pressure was described and a list of alternative medications was handed out to patients.

### *Meeting 4*

Diets relevant to the hypertensive were discussed by a dietician. She described salt-restricted diets and listed high and low sodium foods. Cholesterol and triglycerides were also defined and described as relevant to those at risk from coronary heart disease.

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\*This discussion and open question-and-answer sessions encouraged interactions between patients and the nurse clinician, thereby making this lecture condition more supportive than we intended.

## APPENDIX E

### ITEM CONTENT OF THE VARIABLES AND INDICES

The indices are organized in this appendix by domains of variables. For example all the measures of strain are in one section and the measures of social support in another.

The estimated reliabilities are given ( $r_{kk}$ ) for all indices composed of multiple items. If no reliability is presented, then no index was formed of the items; each item was used as a single item index. If two reliability coefficients are presented, they represent the pretest and posttest values, respectively.

The item content for the stem of the index is presented first, followed by the response scale and the values of that response scale. Occasionally there will be a notation that response scale values were not included in the questionnaire and that either blanks or boxes were used in their place.

Scoring of multi-item indices was performed by taking the mean of all items in the index for each respondent. In some cases where the items in an index did not share the same unit length of response scales, the items were standardized before the mean was computed.

I. StrainA. Somatic Complaints

$$r_{kk} = .864, .871$$

We are interested in the general health of persons with high blood pressure. How often have you experienced any of the following in the last month? CIRCLE ONE NUMBER FOR EACH ITEM.

1. Shortness of breath when not working or exercising hard.
2. Heart beating hard.
3. Hand sweated so you felt damp and clammy.
4. Spells of dizziness.
5. You had an upset stomach or stomach ache.
6. Heart beating faster than usual.
7. You had ill health which affected your activities and work.
8. You had a loss of appetite.
9. You had trouble sleeping at night.
10. Your muscles felt weak.
11. You had a headache.
12. Chest pain.
13. Nausea.

RESPONSE SCALE:

|                         | <u>Never</u> | <u>1-2 times</u> | <u>3 or more times</u> |
|-------------------------|--------------|------------------|------------------------|
| Heart beating hard..... | 1            | 2                | 3                      |

Here are some ways people may feel from day to day. When you think about yourself and your daily life nowadays, how much of the time do you feel this way? CIRCLE ONE NUMBER PER ITEM. [B-E use the same stem.]

B. Depression $r_{kk} = .866, .914$ 

1. I feel unhappy.
2. I feel blue.
3. I feel depressed.
4. I feel sad.

C. Anxiety $r_{kk} = .840, .775$ 

1. I feel nervous.
2. I feel tense.
3. I feel fidgety.

D. Irritation and Anger $r_{kk} = .834, .815$ 

1. I get aggravated.
2. I get angry.
3. I get irritated, annoyed.

E. Positive Affect $r_{kk} = .658, .461$ 

1. I feel useful and needed.
2. I feel calm.
3. I feel cheerful.

## RESPONSE SCALE:

|                   | <u>Never or<br/>a little<br/>of the time</u> | <u>Some of<br/>the time</u> | <u>A good<br/>part of<br/>the time</u> | <u>Most of<br/>the time</u> |
|-------------------|----------------------------------------------|-----------------------------|----------------------------------------|-----------------------------|
| 1) I feel sad.... | 1                                            | 2                           | 3                                      | 4                           |

B-E use the same response scale.

F. Self-esteem

$$r_{kk} = .709, .672$$

To what extent do the following characteristics describe your picture of yourself? CIRCLE ONE NUMBER PER EACH ITEM.

1. Value myself enough to want to keep in the best health.
2. Successful in efforts.
3. Capable of taking care of my health.
4. Able to help others.
5. Value myself highly.

## RESPONSE SCALE:

|                                                                      | <u>Very</u> | <u>Somewhat</u> | <u>A little</u> | <u>Slightly or<br/>not at all</u> |
|----------------------------------------------------------------------|-------------|-----------------|-----------------|-----------------------------------|
| Value myself enough to want<br>to keep in the best of<br>health..... | 4           | 3               | 2               | 1                                 |

G. Interference with Activities

$$r_{kk} = .900, .851$$

Does your high blood pressure interfere with or prevent you from doing any of the following? CIRCLE ONE NUMBER FOR EACH ITEM

1. Going to the movies
2. Eating out at a restaurant.
3. Getting together with friends.
4. Going somewhere.
5. Work.

## RESPONSE SCALE:

|                          | <u>Not at<br/>all</u> | <u>A<br/>little</u> | <u>Some</u> | <u>A<br/>Great Deal</u> |
|--------------------------|-----------------------|---------------------|-------------|-------------------------|
| Going to the movies..... | 1                     | 2                   | 3           | 4                       |

II. Adherence

A. Consumption of Restricted Foods. Item 1 was used to code adherence for those persons who answered "yes" to item 2 and completed the appropriate category of item 3.

1. About how many servings or helpings of these foods do you usually have in a day on the average? Please answer this even if you are not on a diet. A SERVING (or HELPING) of food is whatever you consider a serving when you eat. Count snacks.

- A) Number of servings of salty foods (such as potato chips, cured ham): \_\_\_\_\_
- B) Number of servings of sweets and foods with sugar (such as cake, candy): \_\_\_\_\_
- C) Number of drinks with alcohol: \_\_\_\_\_
- D) Number of servings of food with saturated, animal fats (butter, fatty meats, and foods with a lot of cholesterol such as eggs): \_\_\_\_\_

2. Has your doctor asked you to follow a diet for your blood pressure or avoid salt?

yes..... ☐                      no ..... ☐

3. If you are on a diet, what types of food are you supposed to avoid? Check as many boxes as describe your diet.

- a) Cut down on salt or salty foods (such as potato chips, cured ham)..... ☐
- b) Cut down on sweets and foods with sugar (such as cake, candy)..... ☐
- c) Cut down on drinks with alcohol..... ☐
- d) Cut down on foods with saturated, animal fats (butter, fatty meats, and foods with a lot of cholesterol such as eggs)..... ☐
- e) Lose weight..... ☐
- f) Other \_\_\_\_\_.. ☐

briefly describe

E. Filling Prescriptions Promptly

How many days were there between the time the doctor gave you the prescription and the time you had it filled by a druggist? CHECK ONE BOX.

[Codes not in questionnaire]

- |                                                  |                            |                                       |                            |
|--------------------------------------------------|----------------------------|---------------------------------------|----------------------------|
| a) Filled the same day I got the prescription... | <input type="checkbox"/> 5 | d) Filled about a week later..        | <input type="checkbox"/> 2 |
| b) Filled the next day....                       | <input type="checkbox"/> 4 | e) Filled more than a week later..... | <input type="checkbox"/> 1 |
| c) Filled 2-3 days later..                       | <input type="checkbox"/> 3 |                                       |                            |

F. Refilling Prescriptions Promptly

Have you had to refill any prescriptions for high blood pressure medicine?

yes.... ☐

no.... ☐

If yes, which of the following statements best describes when you had it refilled? Consider your most recent refill. CHECK ONE BOX.

[Codes not in questionnaire]

- |                                                                                                   |                            |
|---------------------------------------------------------------------------------------------------|----------------------------|
| a) One week or more before I ran out of medicine.....                                             | <input type="checkbox"/> 6 |
| b) 1-6 days before I ran out of medicine.....                                                     | <input type="checkbox"/> 5 |
| c) On the day I ran out of medicine.....                                                          | <input type="checkbox"/> 4 |
| d) 1-6 days after I ran out of medicine.....                                                      | <input type="checkbox"/> 3 |
| e) One week or more after I ran out of medicine.....                                              | <input type="checkbox"/> 2 |
| f) I have not had a chance to refill my medicine. I was supposed to refill it _____ days ago..... | <input type="checkbox"/> 1 |
| fill in                                                                                           |                            |

G. Adherence in Taking Medication

[Codes not in questionnaire]

- |                                                                                                                          |
|--------------------------------------------------------------------------------------------------------------------------|
| <input type="checkbox"/> 2 .... I take my medicines if I feel that I need them. It varies from day to day.               |
| <input type="checkbox"/> 3 .... I sometimes go several days without taking my medicine because I forget or am very busy. |
| <input type="checkbox"/> 4 .... I rarely miss taking my medicines.                                                       |
| <input type="checkbox"/> 5 .... I <u>never</u> forget to take my medicines.                                              |

Note: A code of 1 was given persons who wrote in that they were not taking any of their medicines.




- H. Discrepancy between number of pills taken and prescribed (self-report). Score is discrepancy between answers to 1 and 2.
1. According to the prescriptions, how many pills from all these medicines were you supposed to take during the last three days? \_\_\_\_\_ Pills
  2. How many total pills for high blood pressure did you actually take in the last three days? \_\_\_\_\_ Pills
- I. Discrepancy between number of pills taken and prescribed (medical record). Score is discrepancy between item 2 above and medical record data.

J. Adherent Self-View Vignettes (posttest only)


$$r_{kk} = .808$$

WHO ARE YOU LIKE?

Please read what Bill is like and what Don is like. Then indicate the extent to which you are like either Bill or Don.

Bill


Bill doesn't think much about his health. Although his doctor told him his blood pressure is high, Bill doesn't bother with his medicine because he doesn't think his blood pressure is very important compared to other things in life. "You can't worry about tomorrow all of the time. I live each day to enjoy it."

Don


Don thinks about his health and has regular medical check ups. When Don's doctor told him he had high blood pressure, Don decided to take his medicines religiously. He also started watching what he ate more carefully and thought about whether he was getting into situations with other people that might raise his blood pressure. "My future health is important to me. I think about it a lot."

1. Who are you like? CIRCLE ONE NUMBER

| <u>Exactly or a</u><br><u>lot like Bill</u> | <u>Somewhat</u><br><u>like Bill</u> | <u>Halfway</u><br><u>between</u> | <u>Somewhat</u><br><u>like Don</u> | <u>Exactly or a</u><br><u>lot like Don</u> |
|---------------------------------------------|-------------------------------------|----------------------------------|------------------------------------|--------------------------------------------|
| 1                                           | 2                                   | 3                                | 4                                  | 5                                          |

\*\*\*\*\*

Jim and Pete

Jim and Pete both think it is important to take care of their high blood pressures. But Jim is forgetful, gets too involved in other things, and finds it is very difficult to follow the routine prescribed by his physician. By contrast, Pete is very careful and systematic about taking his medicines or doing whatever else is required. He never forgets.

2. Who are you like?

| <u>Exactly or a</u><br><u>lot like Jim</u> | <u>Somewhat</u><br><u>like Jim</u> | <u>Halfway</u><br><u>between</u> | <u>Somewhat</u><br><u>like Pete</u> | <u>Exactly or a</u><br><u>lot like Pete</u> |
|--------------------------------------------|------------------------------------|----------------------------------|-------------------------------------|---------------------------------------------|
| 1                                          | 2                                  | 3                                | 4                                   | 5                                           |

\*\*\*\*\*

### III. Knowledge of High Blood Pressure and Its Control

#### A. Knowledge of Medical Regimen

 $r_{kk} = .745, .613$ 

Answers to the following questions were compared with patients' medical records and the number scored correct was recorded.

Please write the name of one prescribed medicine you are taking for high blood pressure. Fill in other information. If you don't know some of the information, leave the item blank.

1. Name of medicine: \_\_\_\_\_
2. Color: \_\_\_\_\_
3. How often are you supposed to take this medicine? \_\_\_\_\_  
\_\_\_\_\_
4. How many pills are you supposed to take each time? \_\_\_\_\_
5. How many different medicines are you supposed to take for high blood pressure? \_\_\_\_\_
6. According to the prescriptions, how many pills from all these medicines were you supposed to take during the last three days?  
\_\_\_\_\_

- B. True-False Test of knowledge about high blood pressure (different items were used for the pretest and the posttest). Total correct was converted to standardized scores.

#### Pretest items

HOW MUCH DO YOU ALREADY KNOW ABOUT

HIGH BLOOD PRESSURE

Each statement is either TRUE or FALSE. Check the correct box for each statement. If you are unsure, guess. Work quickly.

- |                                                                                                                                       | <u>TRUE</u>              | <u>FALSE</u>             |
|---------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1. Few people with high blood pressure need to take medication for the rest of their lives.....                                       | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. High blood pressure is another name for hypertension.                                                                              | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. When first starting to take diuretics (water pills), a loss of weight is normal.....                                               | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. People with high blood pressure usually have headaches, nosebleeds, or dizzy spells.....                                           | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Once a person is taking medicines for high blood pressure, continuing, regular appointments with the doctor are not necessary..... | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. High blood pressure can cause or help cause all of the following: stroke, heart disease, kidney disease.....                       | <input type="checkbox"/> | <input type="checkbox"/> |

- |                                                                                     |                          |                          |
|-------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 7. Hypertension means the person feels tense, nervous...                            | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. High blood pressure can be controlled by medicine<br>but it cannot be cured..... | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Feeling well is a sign that your blood pressure<br>is low.....                   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. Sodium, such as from table salt, relaxes the blood<br>vessels.....              | <input type="checkbox"/> | <input type="checkbox"/> |

Posttest items

HOW MUCH DO YOU ALREADY KNOW ABOUT  
YOUR HIGH BLOOD PRESSURE

Each statement is either TRUE or FALSE. Check the correct box for each statement. If you are unsure, guess. Work quickly.

- |                                                                                                 | <u>TRUE</u>              | <u>FALSE</u>             |
|-------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| 1. Normal blood pressure is anything below 160/100...                                           | <input type="checkbox"/> | <input type="checkbox"/> |
| 2. High blood pressure cannot exist in calm, thin<br>people.....                                | <input type="checkbox"/> | <input type="checkbox"/> |
| 3. Uncontrolled high blood pressure can lead to<br>kidney failure.....                          | <input type="checkbox"/> | <input type="checkbox"/> |
| 4. Most people can tell when their blood pressure<br>is high or low by the way they feel.....   | <input type="checkbox"/> | <input type="checkbox"/> |
| 5. Most diuretics get rid of potassium, water, and<br>sodium.....                               | <input type="checkbox"/> | <input type="checkbox"/> |
| 6. If your blood pressure returns to normal, you<br>can usually stop taking your medicines..... | <input type="checkbox"/> | <input type="checkbox"/> |
| 7. It is not normal for people's blood pressure to<br>rise and fall throughout the day.....     | <input type="checkbox"/> | <input type="checkbox"/> |
| 8. Some over-the-counter cold-remedies and medicines<br>may raise your blood pressure.....      | <input type="checkbox"/> | <input type="checkbox"/> |
| 9. Most people with high blood pressure have<br>headaches, nose bleeds, and dizzy spells.....   | <input type="checkbox"/> | <input type="checkbox"/> |
| 10. People need blood pressure to keep their blood<br>circulating.....                          | <input type="checkbox"/> | <input type="checkbox"/> |

C & D. Knowledge of systolic and diastolic blood pressure

Score is discrepancy between patient's answer to the following question and the nurse's measurement.

1. Do you happen to remember what your blood pressure reading was when it was last taken? If you weren't told or don't know, leave the space blank.<sup>1</sup>

BLOOD PRESSURE READING: \_\_\_\_\_

IV. Stresses Caused by Demands of the Medical RegimenA. Demands of the Regimen

Note: Items 1-5 were presented in section II-3 of this appendix. Items for this index were standardized before being combined.

If you are on a diet, what types of food are you supposed to avoid?

1. Cut down on salt or salty foods (such as potato chips, cured ham).
2. Cut down on sweets and foods with sugar (such as cake, candy).
3. Cut down on drinks with alcohol.
4. Cut down on foods with saturated, animal fats (butter, fatty meats, and foods with a lot of cholesterol such as eggs).
5. Lose weight.
6. How many different medicines are you supposed to take for high blood pressure? \_\_\_\_\_ Medicines
7. According to the prescriptions, how many pills from all these medicines were you supposed to take during the last three days? \_\_\_\_\_ Pills
8. How difficult is it to do all that your doctor has asked?  
CIRCLE ONE NUMBER.

|           |           |          |      |
|-----------|-----------|----------|------|
| 1         | 2         | 3        | 4    |
| Very      | Slightly  | Slightly | Very |
| difficult | difficult | easy     | easy |

---

<sup>1</sup>Asking for guesses would be preferable because we never found any satisfactory way of scoring nonresponses.

B. Changes in Eating and Living Habits $r_{kk} = .706, 403$ 

1. How much of a change in your eating habits or diet has your doctor asked you to make?
2. How much of a change in your pattern of living (avoiding stress or irritating and annoying events) has your doctor asked you to make?

## RESPONSE SCALE:

| 1                                 | 2                                 | 3                            | 4                                  | 5    |
|-----------------------------------|-----------------------------------|------------------------------|------------------------------------|------|
| Much more<br>than I want<br>to do | A little<br>more than<br>I can do | About<br>the right<br>amount | Less than I<br>would want<br>to do | None |

Note: Persons circling "5" were omitted from the analysis. Then the index was reverse scored. Curvilinear relationships are possible if either too little or too much change is stressful compared to "About the right amount." We suggest that "None" not be used in the response scale.

V. Utility of Source Specific Determinants of AbilityA. Competing Motives (posttest only) $r_{kk} = .770$ 

Whether or not people strictly do all they are asked to do for their high blood pressure depends on a variety of considerations. How have the following affected your ability to strictly follow you doctor's advice? CIRCLE ONE NUMBER PER ITEM.

1. Liking to eat certain foods.
2. Having to spend money on other things instead of on doctor visits and medicine.
3. Having to spend time on other things instead of on doctor visits, pharmacy visits, or on time taking medicine.
4. Having to think about other things instead of my high blood pressure.

## RESPONSE SCALE:

| Has Had<br>No Effect | Has <u>Slightly</u><br><u>Reduced</u> My<br>Ability | Has <u>Somewhat</u><br><u>Reduced</u> My<br>Ability | Has <u>Greatly</u><br><u>Reduced</u> My<br>Ability |
|----------------------|-----------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|
|----------------------|-----------------------------------------------------|-----------------------------------------------------|----------------------------------------------------|

- a) Liking to eat certain foods.... 1                      2                      3                      4

B. Help in Adhering of Others' Concern (posttest only)  $r_{kk} = .870$

Has the degree of interest and concern shown by your doctor in your health had any effect on your ability to follow the doctor's advice?

| Greatly<br>reduced<br>my ability | Somewhat<br>reduced<br>my ability | Slightly<br>reduced<br>my ability | Has had<br>no effect | Slightly<br>increased<br>my ability | Somewhat<br>increased<br>my ability | Greatly<br>increased<br>my ability |
|----------------------------------|-----------------------------------|-----------------------------------|----------------------|-------------------------------------|-------------------------------------|------------------------------------|
| 1                                | 2                                 | 3                                 | 4                    | 5                                   | 6                                   | 7                                  |

The degree of interest and concern shown by your spouse (if no spouse, by a close relative or close friend)?

| Greatly<br>reduced<br>my ability | Somewhat<br>reduced<br>my ability | Slightly<br>reduced<br>my ability | Has had<br>no effect | Slightly<br>increased<br>my ability | Somewhat<br>increased<br>my ability | Greatly<br>increased<br>my ability |
|----------------------------------|-----------------------------------|-----------------------------------|----------------------|-------------------------------------|-------------------------------------|------------------------------------|
| 1                                | 2                                 | 3                                 | 4                    | 5                                   | 6                                   | 7                                  |

C. Tangible Support of Health Care System (posttest only)  $r_{kk} = .870$

In helping you to control your high blood pressure, how adequate or inadequate has each of the following been for you? CIRCLE ONE NUMBER PER ITEM.

1. The information your doctor has given you about your high blood pressure?
2. The information you have received from other sources about your high blood pressure?
3. The overall service provided by your clinic or hospital?
4. Your medicines for high blood pressure?
5. What medical science knows about high blood pressure?
6. Your doctor's knowledge about the treatment of high blood pressure?

RESPONSE SCALE:

|                                                                               | Very<br><u>Inadequate</u> | Somewhat<br><u>Inadequate</u> | Somewhat<br><u>Adequate</u> | Very<br><u>Adequate</u> |
|-------------------------------------------------------------------------------|---------------------------|-------------------------------|-----------------------------|-------------------------|
| The information your doctor has given you about your high blood pressure..... | 1                         | 2                             | 3                           | 4                       |

D. Consequences of Nonadherence

If you don't follow your physician's recommendations strictly, how serious do you think that will be? CIRCLE ONE NUMBER.

|                                 |                                             |                                             |                                         |                                  |
|---------------------------------|---------------------------------------------|---------------------------------------------|-----------------------------------------|----------------------------------|
| It won't<br>affect my<br>health | It will be<br>slightly bad<br>for my health | It will be<br>somewhat bad<br>for my health | It will be<br>very bad<br>for my health | It will<br>eventually<br>kill me |
| 1                               | 2                                           | 3                                           | 4                                       | 5                                |

VI. Motivation for Adherence

(Same question stem for all; posttest only).  $r_{kk}$  overall = .863

Have any of the following affected your ability to strictly follow your doctor's advice?

A. Other-Mediated (Extrinsic) Motivation for Adherence.  $r_{kk} = .872$

1. Gaining your doctor's approval.
2. Gaining your spouse's approval (if no spouse, a close relative or friend).

B. Self-Mediated (Intrinsic) Motivation for Adherence.  $r_{kk} = .887$

1. The possibility of avoiding a heart attack or stroke.
2. The possibility of lengthening your life.

RESPONSE SCALE FOR A AND B:

|                                                         |                                                          |                                                          |                                    |
|---------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|------------------------------------|
| <u>Greatly</u><br><u>Increased</u><br><u>My Ability</u> | <u>Somewhat</u><br><u>Increased</u><br><u>My Ability</u> | <u>Slightly</u><br><u>Increased</u><br><u>My Ability</u> | <u>Has Had</u><br><u>No Effect</u> |
|---------------------------------------------------------|----------------------------------------------------------|----------------------------------------------------------|------------------------------------|

The possibility of  
avoiding a heart attack  
or stroke.....

4

3

2

1



VII. Social SupportA. Number of Friends and Social Visits

$$r_{kk} = .606, .493$$

1. How many people have you talked with about or told about your high blood pressure aside from your doctor? \_\_\_\_\_ PEOPLE.
2. How many close friends do you have who live within 45 minutes travel? \_\_\_\_\_ FRIENDS.
3. How many time have you visited with any of these close friends in the last four weeks? \_\_\_\_\_ TIMES

B-E. (same question stems for all at pretest only).

Please read what Mike and Jim are like. Then indicate the extent to which the following people are like Mike and Jim.

Mike

Mike is a warm friendly person. When something concerns a person, Mike listens sympathetically and attentively. Mike gives people encouragement and praises people's efforts no matter how small those efforts may be. Most of all, Mike is very understanding and accepting of others' feelings.

Jim

Jim is a cold, business-like person. People rarely talk to Jim about their concerns, and when they do, he appears unsympathetic and inattentive. Jim shows his disappointment in people and their concerns. He rarely praises others' efforts. People often feel that Jim is not very understanding or accepting of their feelings.

How much does each of the following persons resemble Mike or Jim?  
CIRCLE ONE NUMBER FOR EACH ITEM.

B. Social Support of Boss.

1. Your immediate supervisor at work? If you have no boss or don't work check here ☐.

C. Social Support of Spouse.

1. Your spouse (if you are not married, rate your closest relative).

D. Social Support of Best Friend

1. Your best friend or acquaintance within 45 minutes of where you live.

E. Social Support of Physician

1. Your doctor who treats your high blood pressure.

RESPONSE SCALE FOR B-E (reverse scored):

Your immediate supervisor at work? If you have no boss or don't work check here ☐.

Exactly or a

|                         |                              |                           |                             |                                     |
|-------------------------|------------------------------|---------------------------|-----------------------------|-------------------------------------|
| lot like<br><u>Mike</u> | Somewhat<br><u>like Mike</u> | Halfway<br><u>between</u> | Somewhat<br><u>like Jim</u> | Exactly or<br><u>a lot like Jim</u> |
|-------------------------|------------------------------|---------------------------|-----------------------------|-------------------------------------|

1

2

3

4

5

F. Supportive Behaviors (posttest only)

$$r_{kk} = .874$$

How often did someone do each of the following for you during the past six weeks? CIRCLE ONE NUMBER FOR EACH ITEM.

1. Showed warmth or friendliness toward you when you were troubled about something
2. Listened attentively to you when you needed to talk about something.
3. Encouraged you or showed approval for something you did.
4. Showed understanding when you felt upset or irritable.

RESPONSE SCALE:

|                                                                                           |                       |             |              |                        |                               |
|-------------------------------------------------------------------------------------------|-----------------------|-------------|--------------|------------------------|-------------------------------|
|                                                                                           | <u>Not at<br/>all</u> | <u>Once</u> | <u>Twice</u> | <u>Three<br/>Times</u> | <u>Four or<br/>more times</u> |
| Shown warmth or friendli-<br>ness toward you when you<br>were troubled about something..0 |                       | 1           | 2            | 3                      | 4                             |

G. Concern of Others (posttest only).

$$r_{kk} = .670$$

How much real concern about you and your health has been shown by each of the following people? CIRCLE ONE NUMBER PER ITEM.

1. A nurse at your clinic or hospital?
2. Your physician?
3. Your spouse (if no spouse, a close relative or friend)?
4. Other people with high blood pressure who do know?

## RESPONSE SCALE:

|                                          | <u>Almost<br/>none</u> | <u>A little</u> | <u>Some</u> | <u>A lot</u> |
|------------------------------------------|------------------------|-----------------|-------------|--------------|
| A nurse at your clinic or hospital?..... | 1                      | 2               | 3           | 4            |

H. Ability to Give Social Support

$$r_{kk} = .911, .891$$

How often did you do each of these activities during the last three months? ("six weeks" in posttest version). CIRCLE ONE NUMBER PER ITEM.

1. Showed warmth or friendliness toward someone when they were troubled by something.
2. Listened attentively to someone who needed to talk about something that was bothering them.
3. Encouraged or showed approval to someone who needed encouragement.
4. Showed understanding with someone who felt upset or irritable.

## RESPONSE SCALE:

|                                                                                        | <u>Not at<br/>All</u> | <u>Once</u> | <u>Twice</u> | <u>Three<br/>Times</u> | <u>Four or<br/>more times</u> |
|----------------------------------------------------------------------------------------|-----------------------|-------------|--------------|------------------------|-------------------------------|
| Showed warmth or friendliness toward someone when they were troubled by something..... | 0                     | 1           | 2            | 3                      | 4                             |

I. Ability to Accept Social Support (pretest only)  $r_{kk} = .894$ 

How comfortable do you usually feel about friends doing each of the following for you? CIRCLE ONE NUMBER PER ITEM.

1. Showing warmth or friendliness toward you when you are troubled about something.
2. Listening attentively to you when you need to talk about something.
3. Encouraging you or showing approval for something you do.
4. Showing understanding when you feel upset or irritable.

## RESPONSE SCALE:

|                    |                    |                      |                      |
|--------------------|--------------------|----------------------|----------------------|
| VERY               | SOMEWHAT           | SOMEWHAT             | VERY                 |
| <u>COMFORTABLE</u> | <u>COMFORTABLE</u> | <u>UNCOMFORTABLE</u> | <u>UNCOMFORTABLE</u> |

|                                                                                                  |   |   |   |   |
|--------------------------------------------------------------------------------------------------|---|---|---|---|
| Showing warmth or<br>friendliness toward<br>you when you are<br>troubled about<br>something..... | 1 | 2 | 3 | 4 |
|--------------------------------------------------------------------------------------------------|---|---|---|---|

J. Trust in Others (pretest only)  $r_{kk} = .735$ 

Generally speaking, would you say that

☐ most people can be trusted.

OR

☐ you can't be too careful in dealing with people.

Would you say that most of the time

☐ people try to be helpful.

OR

☐ they are mostly just looking out for themselves.

Do you think that most people

☐ would try to take advantage of you if they got the chance.

OR

☐ would try to be fair.

# APPENDIX F

## REPEAT RELIABILITIES OF THE MEASURES

| Variable Name                                    | Repeat<br>reliability | N  | p    |
|--------------------------------------------------|-----------------------|----|------|
| <u>Blood Pressure Measures:</u>                  |                       |    |      |
| Systolic blood pressure                          | .57                   | 62 | .000 |
| Diastolic blood pressure                         | .53                   | 62 | .000 |
| <u>Indicators of Adherence:</u>                  |                       |    |      |
| Filling Prescription                             | .25                   | 89 | .016 |
| Refilling Prescription                           | .30                   | 67 | .014 |
| Take Medicines                                   | .41                   | 88 | .000 |
| Reported # pills taken vs.<br>subj. # prescribed | .10                   | 80 | .375 |
| Reported # pills taken vs.<br>obj. # prescribed  | .37                   | 63 | .003 |
| Adherence to diet                                | .15                   | 45 | .312 |
| Adherence to sodium<br>restrictions              | .42                   | 51 | .002 |
| <u>Strains</u>                                   |                       |    |      |
| Somatic Complaints                               | .79                   | 75 | .000 |
| Depression                                       | .58                   | 80 | .000 |

| Variable Name                | Repeat<br>reliability | N  | p    |
|------------------------------|-----------------------|----|------|
| Anxiety                      | .59                   | 82 | .000 |
| Irritation                   | .59                   | 82 | .000 |
| Positive Affect              | .30                   | 78 | .008 |
| Interference w Activities    | .49                   | 76 | .000 |
| <u>Demands of Regimen:</u>   |                       |    |      |
| Change in Eating and Living  |                       |    |      |
| Habits                       | .32                   | 24 | .123 |
| Reported # pills             | .77                   | 81 | .000 |
| Objective # pills            | .87                   | 72 | .000 |
| Demands of Regimen           | .56                   | 93 | .000 |
| <u>Knowledge of Disease:</u> |                       |    |      |
| True-False Test              | .62                   | 92 | .000 |
| Knowledge of Regimen         | .43                   | 79 | .000 |
| <u>Social Support:</u>       |                       |    |      |
| Friends                      | .71                   | 88 | .000 |
| <u>Personality:</u>          |                       |    |      |
| Gives Support                | .51                   | 89 | .000 |
| <u>Perceived Competence:</u> |                       |    |      |
| Self-esteem                  | .44                   | 86 | .000 |
| Take care of own health      | .29                   | 87 | .007 |
| Help others                  | .46                   | 89 | .000 |

## APPENDIX G

### JOINT EFFECTS OF SOCIAL SUPPORT AND ABILITY TO ACCEPT SUPPORT ON OTHER VARIABLES: A COMPARISON OF FIVE MODELS

The buffering hypothesis of social support states that the effects of stress (such as demands of the regimen or life stresses) on strain and on adherence behaviors will be buffered by social support. Persons with high social support should show minimal effects of such stress whereas persons with low levels of social support should show strong, positive relationships between stress and strain or stress and inability to adhere. French (1975) further suggests that the extent to which social support will have such effects will be further determined by the person's ability to accept social support. This is a plausible hypothesis. If a person rejects support or finds it threatening to a need for independence, for example, then support should not have the hypothesized beneficial effects.

In order to explore the value of the triple interaction effect of ability to receive social support, social support, and a stress indicator, such as Demands of the Regimen, on strain or adherence, a set of exploratory analyses were performed. Five different models of the joint effects of social support and ability to accept social support were considered. In order to construct these models, measures of Social Support and of Ability to Accept Social Support were trichotomized, and a 3 x 3 matrix of the two types of measures were formed. The five models are described below and depicted in Figure G-1.

#### a. Multiplicative Model

The amount of benefit the person derives is a straight multiplicative function of social support and the ability to accept social support. Benefit is defined in terms of several dependent or predicted variables: low strain, low perceived stress (Demands of the Regimen), and high Knowledge of Regimen and of disease (the benefit of education or information), although any variable hypothesized to be dependent on social support would be applicable. The model

| Social Support | Ability |     |      |
|----------------|---------|-----|------|
|                | Low     | Med | High |
| Low            | 1       | 2   | 3    |
| Med            | 2       | 4   | 6    |
| High           | 3       | 6   | 9    |

a. Multiplicative model

| Social Support | Ability |     |      |
|----------------|---------|-----|------|
|                | Low     | Med | High |
| Low            | 1       | 1   | 1    |
| Med            | 1       | 2   | 2    |
| High           | 1       | 2   | 3    |

b. Ceiling model

| Social Support | Ability |     |      |
|----------------|---------|-----|------|
|                | Low     | Med | High |
| Low            | 1       | 1   | 1    |
| Med            | -1      | 2   | 2    |
| High           | -2      | -1  | 3    |

c. Overnurturance model

| Social Support | Ability |     |      |
|----------------|---------|-----|------|
|                | Low     | Med | High |
| Low            | 1       | -1  | -2   |
| Med            | -1      | 1   | -1   |
| High           | -2      | -1  | 1    |

d. Under/over-nurturance model

| Social Support | Ability |     |      |
|----------------|---------|-----|------|
|                | Low     | Med | High |
| Low            | 1       | -1  | -2   |
| Med            | 1       | 2   | -1   |
| High           | 1       | 2   | 3    |

e. Undernurturance model

Figure G-1. Five models of the hypothesized joint effects of Ability to Accept Social Support and Social Support on level of benefit derived by the patient. (Benefit was defined as level of stress, strain, and health care knowledge.)



argues that the effects of social support are enhanced by the degree to which ability to accept the support is present. This model and its predictor weights are depicted in Figure G-1a.

#### b. Ceiling Model

Ability to accept social support (capacity for social support) sets a ceiling on how much benefit one can derive (Figure G-1b). Social support provided up to this capacity will have beneficial effects which are governed strictly by the amount of social support that is provided (that is, the ability to accept support is added as a variable with a weight of zero). Support provided in excess of this capacity will have no additional effects.

#### c. Overnurturance Model

Benefits will increase with social support directly up to the value set by the person's maximum capacity (Figure G-1c). Social support provided in excess of this capacity, however, will have a negative effect on the benefits the person derives. The negative effects of too much support may occur because excesses of support threaten the person's needs for autonomy or independence. Each unit of excess adds a weight of -1 to the model.

#### d. Under/Overnurturance Model

This model specifies that both too little as well as too much support have negative benefit. The model (Figure G-1d), in terms of its weights, is practically identical to the preceding model in terms of the ordering of the weights. The major difference is that where ability is two and the amount of social support is one (deficit), the weight is negative and equal to the case where ability is two and amount of social support is three (excess). The signs of the weights for models c and d, however are quite different. For such a model, the measure of capacity must be reconceptualized as a measure of need for social support so that deficit amounts of social support produce tension due to unmet needs.

#### e. Undernurturance Model

For this model (Figure G-1e) too little support produces negative benefits but all other amounts yield benefits equal to the amount of social support provided and not higher than the capacity of the person to accept such social support. The ceiling model, described earlier, is different because amounts

of support which are less than the ability to receive support do not produce deficits in proportion to the person's capacity to accept social support.

Finally, for comparison, the following model was contrasted against the preceding models.

#### f. Straight Social Support Model

This is essentially the "control" in that social support is not weighted by any measures of ability to accept social support.

There are many more weighting systems that could be devised. For purposes of exploratory analyses it was felt that the above set represented several of the major types of weighting systems.

Any weighting system of the type already described should meet the assumption that the scale units of the measures of social support and the ability to accept social support have some logical, theoretically meaningful relationship to one another. Trichotomizing the two types of measures along their distributions is a very rough way of attempting to equate the two scales in each of the matrices in Figure G-1. Consequently, the tests of which systems of weighting works best must be viewed with some caution.

In order to test the predictive strength of these models, interaction terms were formed using each of the measures of social support in the study and each of the measures of ability to accept social support (including the measure of Trust in Others). The weighting schemes from Figure G-1 were used to create the values for these measures. Then the measures were correlated with measures of strain, stress, and knowledge to determine the relative predictiveness of the different weighting schemes.

In all, there were 33 correlations that were performed for each measure of social support by each measure of ability to accept social support by each of five models using ability to accept social support. Similarly there were 33 correlations that were performed for each measure of social support alone. The mean number of significant correlations out of the 33 possible correlations for each of the six models was as follows: (a) multiplicative, 4.4 (S.D. = 1.9); (b) ceiling, 5.1 (1.9); (c) overnurturance, 4.5 (3.1); (d) under/over-nurturance, 2.2 (2.9); (e) undernurturance, 1.4 (1.6); and (f) social support only, 5.2 (1.2). These findings show that the unweighted measure of social support did nonsignificantly better than the best of the weighted models (ceiling).

A Scheffé post-hoc test of differences among the weighted models indicated that the undernurturance model correlated with significantly fewer variables

( $p < .05$ ) than the best weighted model, the ceiling model. The over/under-nurturance model also did rather poorly although the difference between it and the other weighted models was not significant. This pattern of findings suggests that the measures of ability to accept social support probably tap capacity to accept support, rather than need for social support, because the models which assume that the measures tap needs rather than capacities (models d and e) are the poorest predictors.

These analyses suggest that there would probably be no added value in using the measures of social support weighted by capacity to accept social support as a conditioner of the relationships depicted in Figure 4-1. This does not mean that capacity to accept social support does not play a role in the effect of support on the person. It is likely that the measures of social support in the study already tap the effects of such weighting processes. The fact that the ceiling model did as well as the nonweighted measures of social support suggests that this is the most likely model by which responses to the measures of social support in this study were obtained. The extent to which all responses to social support are governed by this model, however, cannot be judged from these data. It may be that the ceiling model was the most appropriate because the item content of the social support measures did not extend far enough along the dimension of social support to include highly over- and undernurturant behaviors. For these extreme behaviors the other models might be more appropriate descriptions of the weighting process by which persons determine whether social support is a boon or a hindrance.

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