

LOCUS OF CONTROL AND COMPLIANCE  
IN CARDIAC PATIENTS

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We hereby recommend that the thesis prepared under  
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to

Jim, David, Anthony,

Mother,

and

to

Jim and Mary Emma

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## CHAPTER 1

### INTRODUCTION

The extended life span has brought about many changes in the health needs of our society. The increased incidence of chronic disease and associated problems of self-care have produced treatment regimens for which health care recipients have little understanding. Compliance to the prescribed treatment regimen necessitates changes in what was once a stable pattern of self-care. If he is to remain free from complications, the person with a chronic disease must manage a therapeutic regimen on a daily basis.

However, the need to control his body is basic to a person's existence. One must learn to deal with his body and the influences affecting it in order to maintain equilibrium within himself and the outer environment (Frieland, 1976). When a person develops a cardiac disease such as angina, myocardial infarction, or congestive heart failure, he may feel that he no longer has control over his body. Frequently he is discharged from the hospital on a complicated medication and exercise regimen about which he is unsure. A hurried explanation

when the medications were handed to him to the day of discharge may have been the only information the patient received.

If compliance is to be met, teaching must be an integral part of nursing intervention throughout the patient's hospitalization. Teaching on the day of discharge from the hospital may not be sufficient to insure that the patient understands how he is to comply with the prescribed treatment. Teaching must be an ongoing, constant process with emphasis on helping the patient understand the nature of his illness and prescribed treatment regimen. The patient must receive instruction concerning his physician's orders. When the responsibility for medication shifts from the physician and the nurse in the health care setting to the patient, the patient may find he has difficulty remembering instructions that seemed quite clear before discharge.

When instructions for groups of patients provide for comparable understanding of the treatment regimen, the degree of compliance may be different. The patient who complies with the recommended treatment is viewed by the health care team as highly motivated and the one who does not comply is thought to lack motivation. The apparent lack of effort for following the course of

treatment seems to come from a perception within the patient that the progress of the disease cannot be controlled by his actions but by outside influences.

The ability to control one's life and maximize the healthy functioning of one's personality is known as locus of control, a variable on a continuum ranging from the externally controlled person to the internally controlled person. The internally controlled person perceives that an event is contingent upon his behavior; the externally controlled person does not perceive the contingencies between his behavior and outcomes.

Compliance to a medication and exercise regimen following instruction by the nurse should, therefore, be proportional to the learner's locus of control. If nurses can identify through locus of control awareness those patient behaviors which lead to compliance in a treatment regimen, the patients who do not display these behaviors may be directed toward a higher level of compliance. This study was undertaken to determine the relationship of locus of control and compliance to a medication and exercise regimen of the cardiac patient.

### Problem of Study

The problem of this study was to determine if cardiac patients with an internal locus of control are more compliant to a medication and exercise regimen than are cardiac patients with an external locus of control.

### Justification of Problem

Several areas of research relating to the study were reviewed for substantiation of the problem selected. The literature emphasizing the validating related research was divided into four broad topics germane to the study: locus of control, locus of control and compliance to a treatment regimen, compliance to a medication regimen, and post-discharge follow-up.

A. MacDonald (1970) discussed social disadvantage-ment, physical disability, and emotional disorders as three major categories suggesting definite probability that the person's values were influenced by control expectancy. Persons with strong internal orientation are likely to emphasize emotional disorders over physical disabilities.

Seeman and Evans (1962) studied tubercular patients in a hospital setting. Internal patients were found to

know more about their illness than external patients. Internal patients seemed to be more active in their seeking and using of information about thier illness than were external patients.

Two studies were found which correlated locus of control and adherence to a treatment regimen. Snyder (1977) studied persons on home hemodialysis and found that internals had a higher level of adherence to medical recommendations than did externals. The internals also perceived a greater level of social support than the externals who felt less social support and more stress from treatment.

Lowery and DuCette (1976) studied the relationship between locus of control and patients' response to diabetes. Internal diabetics were found to have more diabetic information; however, this difference diminished as the length of the disease increased. External diabetics did not actively seek information about their condition, but as the disease continued, they gained a considerable body of facts. The knowledge gained was by passive compliance with authority figures and not by active participation in the teaching-learning process by the external. These findings were interpreted by the researchers as presenting a limiting case to the

usual thinking about the superiority of an internal's response to problem situations.

Lack of compliance to a medication regimen poses many problems to the patient and to the health team. Many studies have been conducted to determine incidence and cause of noncompliance. In a study of patients on antituberculosis drugs, McInnis (1970) found that 55% of the patients on Para-aminosalicylic Acid (PAS) and 59% of the patients on Isoniazid (INH) were in compliance as verified by urine samples. The study revealed no significant differences in compliance in relation to length of disease or if the patients were taking the medication for prevention or for treatment. An attempt was made to assess patients' knowledge of why the drugs were prescribed and to plan teaching according to need.

Allendorf and Keegan (1975) worked with a group of 20 persons with angina pectoris who were being treated with nitroglycerin. Only four persons knew the physiological mechanism causing the physiological response. "Thin blood," "a cold in the chest," and "collapsed veins" were some of the responses given for why the drug was prescribed. The study concluded that the nurse's teaching role is a significant factor in increasing patient compliance with the prescribed therapy.

The nurse-patient interview was the method used by Schwartz (1975) to elicit assessment data for determining the level of compliance to the medication regimen. A 24-hour medication history was recorded and included medication history, what medications and strengths were taken, the frequency of dosage, and the patient's perception of why the medication was taken. The most frequent errors found by this study and listed in decreasing order of frequency were: omission, inappropriate self-medication, incorrect dosage, improper timing, and inaccurate knowledge of purpose.

Deberry, Jefferies, and Light (1975) studied cardiac patients who were discharged on antiarrhythmic drugs, anticoagulants, digitalis, or diuretics. The instruction was given individually and was done in conjunction with a pretest, posttest, and second posttest administered when the patient returned to the doctor. The study found that the greatest difficulty the patient experienced was with the name of the drug and its action. Compliance increased when the medication was labeled with the name of the drug and the action in bold faced type, as "DIGOXIN-HEART PILL."

Peoples-Viega (1976) found when working with hypertensive patients that the most common form of

noncompliance was that of missing a medication or taking the wrong one. Many patients were found in this study to pool all medications in one vial, then take the medication by color. This becomes dangerous when the patient has poor vision or the pharmacist with the physician's consent, substitutes a different color of medication.

Discharge teaching alone may not be sufficient to assure that the patient continues the prescribed regimen when he returns to his home environment. Many studies focused on the post-discharge phase of patient teaching. A variety of methods for conducting the post-discharge follow-up were presented in the literature.

Laird (1975) participated in pre-operative and post-operative teaching and continued the teaching through the post-discharge phase of care. She encouraged the patient to call if problems were encountered after discharge. Patients were routinely called at home within a week after discharge and assessment of their physical and emotional coping patterns and compliance with the discharge teaching was made. In addition she met with them at their return visits to the outpatient clinic for the first 6 months following surgery. Laird (1975) found that the patients became quite resourceful when following medical advice because of this comprehensive teaching approach.



Hushover, Gamberg, and Smith (1978) saw discharge planning as the right of every patient admitted to the hospital. Patient education must be started as soon as the patient is ready. The information should be directed to him and his family and should begin with helping him and his family understand his illness and related care.

In conclusion, because man is capable of self-movement from a state of disequilibrium to a state of equilibrium, a person who understands his medication and exercise regimen will more likely comply to his prescribed treatment regimen than a person who does not receive this instruction. The degree of compliance should be greater in the person who perceives that the force for controlling his life comes from within himself.

### Theoretical Framework

The presentation of the construct of locus of control as a personality variable began in 1954 with Rotter's book, Social Learning and Clinical Psychology. Rotter's social learning theory describes locus of control as a variable on a continuum from external to internal. Internal-external locus of control refers to the extent to which persons perceive that contingencies control their actions and the outcomes. Rotter identified the

externally controlled person as one who sees payoffs as outside of his control. The internally controlled person is further identified as one whose behavior demonstrates that he believes he can control payoffs in his life.

Validity of Rotter's construct has been verified by much concept-related research. Reviews by Joe (1971), Lefcourt (1966), and Rotter (1966) showed that locus of control is a concept that is applicable to a wide variety of people and situations. Roueche and Mink (1976) stated that internality is a more positive personality trait than is externality.

Rotter (1966) further stated that a person's locus of control orientation depends upon his reinforcement history. The person begins to perceive that there are and are not relationships between events and begins to connect his actions with both positive and negative reinforcements that he receives. Throughout life the person develops expectations about behaviors and outcomes. These relationships and expectations become generalized to similar situations and become firmly established in the person's mind.

Roueche and Mink (1976) indicated that the person who believes in and takes control of his life maximizes the healthy functioning of his personality. They further

described the person with an internal personality as one who has a higher self-concept, is generally better adjusted, more independent, more achieving, more realistic in his aspirations, more open to new learning, more creative, more flexible, more self-reliant, shows more initiative and effort in controlling the environment, is less anxious, has better grades, and shows more interest in intellectual matters. The external personality is on the less positive side of these variables.

When the external person does not perceive relationships between his actions and outcomes, he retains inefficient behaviors which significantly lower the amount of new learning which can take place. The internal person perceives a relationship between his behaviors and his environment. He is open to new learning and new patterns of behavior.

Theoretically stated, locus of control proposes that: the person who believes that control of life events comes from within himself will accept new learning and attempt to control his environment. The person who believes that control of life events comes from outside sources will not accept new learning nor will he attempt to any great degree control of his environment.

### Assumptions

The following assumptions were the basis of this study:

1. A person who guides and directs his actions is in control of himself and his environment
2. The internally controlled person has a higher level of self-concept, shows more initiative in controlling the environment, and is more open to learning
3. The externally controlled person has a lower level of self-concept, shows less initiative in controlling his environment, and is less open to new learning
4. Locus of control is applicable to a wide variety of people and situations
5. Locus of control is related to effective, goal-striving behavior, and is predictive of apathetic, withdrawal behavior.

### Hypotheses

The hypotheses tested were:

1. Cardiac patients with an internal locus of control are more compliant to a medication regimen than are cardiac patients with an external locus of control

2. Cardiac patients with an internal locus of control are more compliant to an exercise regimen than are cardiac patients with an external locus of control.

#### Definition of Terms

The following operational definitions of terms were developed:

Locus of Control--the belief that a person has regarding the extent of his control over his life and is expressed as a personality variable on a continuum from the externally controlled personality to the internally controlled personality (Rotter, 1966). In this study locus of control is measured by the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974).

External Locus of Control--the individual views himself as having no control over payoffs or over life. Inability to perceive contingencies between his behavior and outcomes characterizes external behavior (Rotter, 1966). A score of 24 to 15 from a possible range of 40 to 0 on the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974) delineates the range of scores for the external person in this study.

Internal Locus of Control--this individual views control over life and over payoffs as within his capacity to direct. He perceives contingencies between behavior and outcomes (Rotter, 1966). A score of 14 to 7 from a possible range of 40 to 0 on the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974) delineates the range of scores for the internal person in this study.

Compliance--the subject takes the medication and performs the exercise as ordered by the physician and as explained in the teaching plan by the nurse.

Compliance to Medication Regimen--the subject takes the medication prescribed by the physician according to frequency, dosage, route of administration, manner, and with knowledge of purpose, action, side effects, and toxicity as explained in the planned health teaching.

Compliance to Exercise Regimen--the subject performs the exercise ordered by the physician according to type, amount, and frequency as explained in the planned health teaching.

Medication Regimen--the medication order as prescribed by the physician and explained in the planned health teaching program by the nurse (Appendix A).

Exercise Regimen--the exercise order as prescribed by the physician and explained in the planned health teaching program by the nurse (Appendix B).

Cardiac Patient--a patient whose diagnosis is angina pectoris, myocardial infarction, or congestive heart failure who is alert and has been discharged. Upon discharge this person will have a prescription for one or more of the following medications: vascdilators, anti-arrhythmics, anticoagulants, digitalis preparations, or diuretics; and will also have prescribed an exercise regimen.

Planned Health Teaching--one planned period of instruction between researcher and subject which may include significant others who are part of the subject's support system.

Instructions relating to the medication order will include frequency, dosage, route of administration, and when appropriate a brief explanation of purpose, action, side effects, toxicity, and any special instructions (Appendix C).

Instructions relating to the exercise regimen will include when appropriate type, amount, frequency, and any special instructions (Appendix D).

### Limitations

The following variables may have influenced the conclusions of this study:

1. The sample size which was small was taken from an in-patient population in a general hospital and results from this study cannot be generalized to other patient populations.

2. Absence or presence of reinforcement by the health care team to the researcher's teaching may have affected some degree of variance in the knowledge base of participants in the study.

3. Subjects entered the study with varied backgrounds of knowledge about their treatment regimens.

### Summary

Increasing compliance to a treatment regimen is a challenging aspect of health care with strong implications for nursing intervention. When behaviors which lead to increased compliance in the cardiac patient are identified, nursing care which maximizes these behaviors can be designed and implemented throughout the acute care setting. If locus of control is found to be a significant factor in compliance, the results of this study can be used to give direction to more effective health care.



## CHAPTER 2

### REVIEW OF LITERATURE

The development of highly effective oral drug therapies for acute and chronic illnesses has shifted the responsibility of the treatment regimen from the health professional in the acute care setting to the patient who manages his care at home. The extent to which the patient takes his medicine and follows other medical recommendations has received considerable attention in the literature. Numerous studies have affirmed that patients of all ages and with most disease states and socioeconomic backgrounds do not comply with their medical regimens.

The problem of noncompliance has been investigated by educators, sociologists, psychologists, physicians, pharmacists, physical therapists, and nurses. Although most of the compliance studies focused on drug therapy, the implications for compliance with other forms of medical advice were usually given or implied. This review of literature will focus on compliance to medication and exercise, the role of the nurse in assisting the patient to understand the treatment regimen, locus of

control, and the relationship of locus of control to health behaviors.

### Compliance

Published reports of compliance vary considerably in the degree to which the patient adheres to the therapeutic regimen. Rates of compliance from 8% to 90% were reported by Sackett (1976) in a review of 40 studies measuring the phenomenon of compliant behavior. When observing compliance with doctor's orders, Davis (1968) stated that at least a third of the patients fail to comply with the prescribed regimen. In addition, Davis asserted that one-third of the studies reviewed by him reported a noncompliance rate of 50% or more. A study by Davis (1968) which assessed physiologic, psychological, and demographic factors of compliance further showed that 40% of the medical outpatients openly admitted that they had never intended to comply with the physician's recommendations.

Gilium and Barsky (1974) suggested that compliance from the patient's viewpoint is in reality a series of trade-offs, and the patient chooses to give up or take on new behaviors in return for expected benefits. Davis and Eichhorn (1963) suggested that no person is willing to

make all the changes in his life necessary for 100% compliance.

Marston (1970) summarized that noncompliance with medical regimens is a substantial problem which concerns nursing. She also indicated that most of the research has been conducted by physicians or behavioral scientists.

#### Compliance to Medication

Most of the compliance studies in the literature were in reference to medications. Many of the studies focused on identifying relationships between patients, drugs, diseases or situational factors, and compliance behavior. Differences in measuring drug noncompliance posed difficulties in generalizing findings across studies. Generally, the researchers expressed frustration in attempting to identify noncompliance and in attempting to improve compliance.

According to M. A. Rosenberg (1973) the term non-compliance has somewhat of an authoritarian ring to it and should be replaced with the term nonadherence. He placed responsibility for improvement of compliance on all members of the health team. The three-failure concept of modern medicine is a term coined by M. A. Rosenberg to explain difficulties encountered by the patient

when following medical treatment. M. A. Rosenberg's (1973) three-failure concept included his description of the medical failure, the clinical failure, and the educational failure. He described the medical failure as the patient for whom there is no cure, and the clinical failure as the exacerbation of illness by an unavoidable accident or agent. M. A. Rosenberg (1973) placed responsibility for these two failures beyond the control of the health team. The educational failure was described as failure by the health professional to provide the opportunity for formal and informal exchange of information about the treatment regimen. M. A. Rosenberg reported results of two studies conducted by him in which patients were questioned concerning their medications. Of the 10 patients who participated in the first study which was conducted in an out-patient clinic in a New England hospital, none knew they were on anticoagulants. Only 4 of the 50 subjects from the second study conducted at St. Peter's Hospital in Brunswick, New Jersey, knew they were on a digitalis preparation.

A classic study on compliance is the study by Charney, Bynum, Eldredge, Frank, MacWhinney, McNabb, Sheiner, Sumpter, and Iker (1967). Three private pediatric groups studied how well children took oral penicillin prescribed

for streptococcal pharyngitis or otitis media. Compliance was measured by the presence of penicillin in the urine. A total of 459 patients were studied. Failing to receive the full course of penicillin therapy were 44% of the patients and 19% were estimated to receive less than half of the 10-day course. The results of this study have been the impetus of subsequent compliance studies conducted in a number of situations and settings.

A paper presented at the Massachusetts College of Pharmacy by Weintraub (1975) placed responsibility for patient compliance on the physician, pharmacist, pharmacologist, nurse, pharmaceutical industry, and the government. Patients frequently do not comply, according to Weintraub (1975), because of similarity in color, size, and shape of the medication. He further stated that the physician adds to the problem of noncompliance when prescribing complicated regimens with little or not explanation. The pharmacist's role in improvement of compliance was described as that of teacher and overseer of the medication regimen. The role of nurses in improving compliance is education, reinforcement, and a liaison between physician and patient. Again, Weintraub (1975) pointed out the need for early nurse-patient interaction in patient education.

Blackwell (1976) looked at the literature which has been published in relation to medication compliance. He saw adherence to medication regimens as a particular problem in diseases of hypertension, hyperlipidemia, and recurrent mania because the short-term side effects or sacrifices of treatment appear to exceed the consequences of the disease. According to Blackwell the monitoring of compliance is a social as well as scientific problem and should be approached with a high level of skill. He further stated that psychological strategies as self-control and social reward systems, though usually expected to improve self-esteem, may precipitate dependency or inadequate coping devices in others. He pointed out that patients who are totally dependent in the hospital setting may experience difficulty when moving to the responsibility of self-care outside the acute care setting. Possible remedies for these problems offered by Blackwell (1976) were: allowing patients to assume control over their medications before discharge, educating and encouraging them to seek advice when necessary, and involving family members in the plan of care.

Closson and Kikugawa (1975) investigated the presence or absence of inherent error potential within discrete therapeutic drug classes. They hypothesized that undefined

characteristics of certain drug classes relate them to greater than average patient error potential. Over a period of 5 weeks, patients were interviewed on random availability in the general surgery or comprehensive medical clinics of a Veterans Administration Hospital in San Francisco. The interviewer recorded the patient's explanation of the drug's intended use. Noncompliance was defined as any regimen other than that originally prescribed. Noncompliance rates ranged from 11.1% to 83.3%. The highest percentage of compliance was reported with cardiac drugs. Compliance with absorbents and antacids was reported least. The researchers believed that the low noncompliance rate among users of cardiac drugs was due to the intensive initial indoctrination and closer follow-up supervision of cardiac patients. Although cardiac patients reported the highest degree of compliance, 10% of patients in this group were found by the study to be noncompliant.

Various methods of documenting adherence to treatment routines have been used. Three commonly used methods reported by Rickels and Briscoe (1970) were urine tests, pill counting procedures, and verbal reports of medication taken. Although urine analysis is usually an objective indicator, its validity is not always guaranteed if

the detecting agent used has entered the patient's system from another source. They further stated that pill counts are a simpler technique for measuring dosage deviation. This method may prove inadequate if, after an initial period of adherence to dosage, the patient discontinues treatment entirely. Hypothesizing that the verbal report is less accurate than the pill count for measuring compliance, Rickels and Briscoe's (1970) study included the possibility that the verbal report may be suitable under a number of specific conditions. The study design included two phases. Phase 1 included 176 patients and tested for sample differences in the discrepancy between verbal reports and pill counts. Phase 2 used 248 clinic patients and tested for return of unused medication and differences between pill count and for verbal report. In all, 675 pill counts and verbal reports were compared for neurotic outpatients. The results of the study did not demonstrate significant population differences despite the researchers' expectation of greater verbal report accuracy in the better-educated middle social class private practice patients than in the less-educated lower social class clinic patients. Overall, verbal reports generally indicated less deviation from prescribed dosage than did pill counts.



Discrepancies between the verbal reports and pill counts were relatively infrequent when deviation was large.

A comparison of three methods for measuring compliance in a clinical setting was described by Fletcher, Pappius, and Harper (1979). A random sampling procedure elicited 173 study subjects from a group of cardiac patients discharged from the hospital on a regimen of digoxin. The researchers interviewed the patients upon return to the clinic and asked their compliance to each individual drug. The patients were asked to choose a percentage which described their compliance level the previous week. In addition, a pill count and serum digoxin concentration were conducted with these persons.

The study supported the superiority of the interview as a measure of compliance over the pill count and serum digoxin level. Timing of the interview for digoxin revealed a mean time of 37 seconds with the advantage of immediate response. The interview had the added advantage of allowing the patient to state why the medication was not taken as ordered. Pill counts were shown by the study to be unreliable in the clinic setting because the patient frequently forgot to bring his bottle. Added disadvantages were the pooling of several prescriptions into one bottle, and difficulty in correlating the pill count with the

interview and serum levels. Although the researchers found some advantage in the use of the serum digoxin concentration in clinical research, they stated this laboratory test was not feasible, time efficient or effective for use in usual clinical practice (Fletcher et al., 1979).

Roth, Caron, and Hsi (1971) tested the validity of the two common objective criteria utilized by the health care team in estimating compliance: patients' regularity in keeping appointments and the amount of medicine for which the patient requests prescriptions. Data for the study were obtained from 160 patients who were followed for 2 years after an acute attack of peptic ulcer. Antacid and atropine consumptions were measured by pill and/or bottle count, tracer for the antacid, and urine analysis for the atropine.

Among those who completed the study there was no direct correlation between regularity of attendance at the clinic and the amount of antacid taken. Less antacid was consumed by the 17 who never missed an appointment than those who missed one appointment. Only 20% requested prescriptions for the full amount of atropine. Results of the study indicated that only 36% of the persons obtaining atropine at the pharmacy had positive urine tests.

The researchers suggested that subjective data are ineffective in estimating the level of compliance. Attendance at clinics, number of tablets requested, pill counts, and estimates from the health care team were pointed out to be unreliable. Implications from the studies were that accurate measurements are available only by direct and objective methods such as blood or urine levels (Roth et al., 1971).

Rosenstock (1975) saw compliance as consistent with Becker's Health Belief Model (1974). Rosenstock stated that the patient would follow medical advice if he had the characteristics of health motivation, perceived susceptibility to a particular illness, perceived severity, and perceived benefits of professional intervention. He reported a study in which a Jewish population in the Baltimore-Washington area participated in mass screening for the Tay-Sachs Disease (TSD) trait. Multiple educational approaches were used to give accurate and clear information about the disease. The entire target group, couples of childbearing age, were exposed to at least some of the education activities. Results of the study indicated that a couple was more likely to participate in the screening if either person believed he could carry the TSD gene, had a low level of

perceived severity, and really wanted to know his carrier status. Those couples with a high level of perceived severity were less likely to participate in the screening. Rosenstock (1975) concluded that this study helped to explain compliance and noncompliance in preventive health programs and medical care programs.

The effect of an attempt to investigate anti-medical attitudes or social and demographic determinants on compliance was reported by Collette and Ludwig (1969). The study population was drawn from 486 social security disability applicants in central Ohio. Certain kinds of advice elicited varying rates of compliance. When told to see a specialist, get or replace eyeglasses, change their diets, get or replace prostheses, or to quit work, 89% of the subjects followed such advice. The researchers chose the behaviors or: advice to get new eyeglasses, change in diet, and advice to have surgery as variables to compare with statements reflecting anti-medical attitudes. Little difference in compliance was found between those with favorable and unfavorable attitudes toward the medical profession.

Demographic characteristics were studied with significant findings in income level and compliance. Money was found to stand as an important variable associated

with compliance, especially in areas of advice where finances were a major factor as glasses and surgery. Although education and increased income levels are usually found in the same persons, education was not considered as strong an influence on compliance as money (Collette & Ludwig, 1969).

Dickey, Matter, and Chudzik (1975) described a two-part compliance study which evaluated compliance to the treatment regimen of children between 1 and 12 years of age with acute otitis media. Acute otitis media was chosen for the study because of its occurrence in all ethnic groups, uniform treatment, and follow-up care. The two phases of the study included parental interviews conducted in the clinic at the end of the 10-day treatment period, measurement of remaining medication, and determination of accuracy of the measuring device used to administer the medication. Phase 2 of the study differed in that the pharmacist followed a dispensing routine that included detailed verbal and written instructions, an accurate administration device, and an illustrated calendar to assist the parents in remembering the dosage schedule. Of the 34 patients in the study group whose parents received counseling by the pharmacist at the time the drugs were dispensed, complete compliance

was achieved by 17 (50%) of the subjects. The control group who did not receive the counseling had a complete compliance rate of 8.5%.

The effect of counseling on medication errors was assessed by E. T. MacDonald, MacDonald, and Phoenix (1977) in 165 elderly patients after leaving the hospital. The study group was divided into three subgroups. Group 1 received no counseling; Group 2 was counseled by the pharmacist prior to discharge, and Group 3 was counseled by the pharmacist and then given one of three types of memory aids: a pill wheel designed to separate daily medications, an individually designed tear-off calendar, or a tablet identification card with a sample of the medication and the daily schedule.

Patients returned to the out-patient clinic on the seventh day after discharge where they were asked to detail dose schedules. Compliance was assessed and a new supply of medication was dispensed along with a new memory aid. Assessments were made twice weekly at the out-patient clinic or by random spot checks in the home. Reassessments were made at 6 and 12 weeks after discharge.

At the end of 12 weeks, half of the uncounseled patients were taking less than half their tablets and

25% were overdosing themselves. Less than 25% of the subjects were taking their medication properly. The 15 minute instruction session before discharge proved highly effective in reducing medication errors and counseled patients were making one-third less errors at the end of the 12 week study (E. T. MacDonald et al., 1977).

The three memory aids were assessed with interesting findings. The pill wheel was the least effective as the patients found it hard to get tablets out of the compartments. The card describing the regimen proved unsatisfactory. Although the individually prepared tear-off calendar slightly improved compliance, the researchers felt it was not feasible because of the time involved for preparation. The main recommendation from the study was that a member of the staff talk to the patient for about 15 minutes before discharge. This method was shown to be effective even in the very confused person (E. T. MacDonald et al., 1977).

Another study of the incidence and frequency of omission and extra dose medication errors of persons returned to home following hospitalization was conducted by Clinite and Kabat (1969) in a group of 30 men ranging in age from 21 to 90 years. At the time of dispensing,

pill counts were made and directions for use were reviewed with each patient by a pharmacist. Patient home interviews were made between 6 and 28 days following discharge from the hospital. Only four patients received their medications as prescribed and patients over 70 were found to have the lowest error rate. The researchers felt that persons in this older age group probably had fewer distractions in their lives, permitting greater attention to their therapy requirements. An error rate of 25.1% for omissions and extra dose errors was confirmed by the study. More than half of the 61 prescription orders in the study had an error ratio over 10% and 12 prescription orders had an error rate above 50%.

The pharmacist was challenged to concern himself with the medication following dispensing. Suggestions were made for a family or patient record system and specific instructions to the patient for intended use and effect of the drug. Pointed out also was the need for patient instructions which are clear and concise and given in a quiet area away from a noisy, distracting environment (Clinite & Kabat, 1969).

Another study, conducted by an occupational therapist looked at compliance in the medication regimen of elderly patients following discharge from the acute care



setting. Atkinson, Gibson, and Andrews (1978) investigated 50 elderly patients who participated in self-administration of drugs prior to discharge. When the patients were within 1 week of discharge, a questionnaire was administered which elicited information concerning memory, previous drug-taking habits, reading, handling the containers, and access to the physician and pharmacist. The patients were supervised when participating in self-administration and special emphasis was given to the subjects' ability to open child-proof containers. Following discharge the researchers assessed the patient's compliance upon return to the post-discharge out-patient clinic at 3 weeks.

Results of the study indicated that improvement in compliance can be achieved by following the elderly patient to participate in a program of self-administration while in the acute care setting. The researchers pointed out also that the medical profession is unrealistic in taking the view that the patient is complying to the medication regimen unless measures described in the study are taken to assess, plan, and evaluate compliance.

Significant was the recommendation that the occupational therapist is a member of the health team who should

include the drug-taking regimen in the activities of daily living program prescribed for the patient upon discharge. The researchers felt this recommendation to be justified because of the therapist's training in both the physical and psychiatric fields (Atkinson et al., 1978).

Morris and Halperin (1979) reviewed the effect of written drug information on patient knowledge and the effect of written drug information on patient knowledge and compliance and indicated that written drug information alone does little to improve compliance to the drugs used on a long-term basis. When written information was combined with social support and verbal advice from the health professional, the writers described increased compliance. Most of the studies reported by Morris and Halperin (1979) showed the nurse or pharmacist as the health professional most likely to dispense the written information.

The claim that compliance can be promoted by offering the patient fewer tablets per day or less frequent dosage was disputed by Haynes, Sackett, Taylor, Roberts, and Johnson (1977). Benefits provided by long-acting parenteral medications were believed to be substantial. In hypertensive patients a small but positive correlation between the number of drugs and pills prescribed

existed at 6 and 12 months after the initiation of treatment. Consideration for prescribing long-acting parenteral drugs was encouraged by Haynes et al. (1977). Advantages to the patient of long-acting drugs were seen as less frequent dosages, supervision of dosages by the health professionals, and a systemic approach to evaluation of the treatment regimen. Especially indicated for treatment with long-acting parenteral drugs were chronic conditions as hypertension, congestive heart failure, and diabetes mellitus.

The relationship between knowledge of illness and attendance was looked into by Tagliacozzo and Ima (1970). Their study focused on conditions which involved the patients' modes of perceiving illness and on conditions involving the social facilitation of medical care. A knowledge test which focused on diabetes, hypertension, arthritis, and cancer was administered to 159 clinic patients who had one or more of the diagnoses tested. Significant was the finding that 22% denied that they had one of the diagnoses. The hypothesis that knowledge of illness would relate positively to attendance was supported by the results of the study. Knowledge of illness and attendance were found to be markedly pronounced for patients with hypertension.

A research project to determine strategies for improving patient adherence to medication regimens was designed and conducted by O'Connell and Marvin (1979). The study was conducted with 166 patients in clinic and private practice settings and compared patient response to 18 hypothetical treatment situations and actual compliance to their own regimens. For the first component of the study patients were asked how likely they would be to comply with a standard medication regimen along three dimensions: severity of the condition, discomfort of the condition, and whether the regimen made him feel better, worse, or no different. In the second component patients were interviewed about actual compliance with their regimens. Noncompliance rates of up to 75% of the patients were reported over a 1-month period of time. Suggestions for improving compliance were in the areas of patient motivation, simplification of the regimen, training of the patient to carry out the regimen, and follow-up.

Haynes (1976) looked at determinants of compliance reported in the literature. He found strong evidence that regimens regarding extensive behavioral changes, complex regimens, and long-term therapy were the major causes of noncompliance. In addition, the patients'

stated level of satisfaction with the therapist and degree of supervision while taking the medication strongly influenced the level of compliance. Patients who positively related to their therapist were reported to be more compliant than those who did not. Supervision which increased compliance was not limited to the health professional but included family members and significant others.

An examination and analysis of variations in the behaviors of conforming and nonconforming medically diagnosed persons with reference to the sick role construct of Parson (1951) was the focus of an exploratory study by Vincent (1971). Data were obtained from interview of glaucoma patients for whom eye medications were prescribed. Significant findings implied a direct relationship between the sick role and normal social role obligations of the individuals involved. Nursing interventions to increase the likelihood of compliance suggested by the researcher included contribution to the patient's definition of the situation so that the resolution of conflict is in the direction of compliance. Rather than sharing new information with the patient the suggestion was for evaluation of what kinds of information would be more helpful, more meaningful, and less ambiguous

for the patient. Recommendations for future research were toward evaluation of noncompliant behavior in individuals who have had medication prescribed for them on an outpatient basis.

The medical model of compliance which views compliance in terms of characteristics of the patient regimen and illness was described as deficient by Becker (1974). He proposed that the variables of the Health Belief Model: perception of susceptibility, severity, benefits, and costs are more likely to predict compliant behavior. A sociobehavioral model for predicting and explaining compliant behavior which listed variables influencing readiness to undertake recommended compliance behavior and modifying and enabling factors was submitted in defense of his views.

According to Gordis (1976), Hippocrates observed that physicians should remember that patients often lie when they state that they have taken certain medicines. In reviewing the literature, Gordis indicated that there was little or no evidence to suggest that complying patients represent themselves as noncompliers nor is there evidence that the persons who represent themselves as noncompliers are lying. Again, persons representing

themselves as compliant were found by urine tests or pill counts to be in error.

Another of the early studies on compliance (Gordis, Markowitz, & Lilienfeld, 1969) looked into the compliant behavior of children on long-term prophylaxis for rheumatic fever. The study which observed 136 pediatric clinic patients of three large teaching hospitals focused on the effect of sociomedical factors in long-term management of a chronic cardiac problem. Several attitudinal factors consistent with locus of control were tested in the study. Mothers were asked to agree or disagree with the statement, "If a person is going to get rheumatic fever, he'll get it no matter what he does." Almost twice as many of the noncompliers agreed with the statement as did the compliers. Although the researchers anticipated a strong relationship between perceived alienation from society and compliance, no significant relationship was found. Compliance was determined to be more frequent in children who had been hospitalized for their previous attacks implying that patients in home treatment were not cognitive of the seriousness of their disease process. In addition, the degree to which the child's normal function was interrupted was found

to more likely determine compliance than the diagnosis alone.

Hershey and Kunreuther (1978) saw a lack in the number of research studies which looked at compliance as a dynamic process in which change may occur as a result of new knowledge and experience. They felt that most research on compliance had been based on the assumption that behaviors affecting compliance were constant and had neglected to look into the effect of life experiences which occurred during the course of therapy. Many additional hypotheses were suggested by the writers including generalizations about how those with early knowledge of the overall disease and treatment process differed from those whose knowledge is gained later. A strong relationship between compliance and the health belief model was seen by Hershey and Kunreuther (1978) who also challenged future researchers to develop new research models which add to the existing body of knowledge regarding compliance behavior.

Medication compliance in the long-term hypertensive patient was observed by many researchers. Davidoff (1976) described the evaluation of hypertensive therapy as a chain which begins with the invention of the sphygmomanometer and ends with compliance, the last link. He



estimated compliance to a hypertensive regimen to range from 97% to 25% with 50% the average degree of compliance. Suggestions for improving compliance included monitoring of serum and urine drug concentrations, keeping of drug profiles on the patient's record, simplifying drug regimens, and visiting with the patient in the home. Significant was Davidoff's (1976) suggestion that the nurse could adequately manage these methods of increasing drug compliance with the added advantage of acting as a liaison in the patients' care.

Why large number of patients choose to discontinue therapy or remain under poor control of hypertension was the focus of an exploratory study by Podell, Kent, and Keller (1976). A group of 53 hypertensive patients between the ages of 40 and 60 was selected from the private practice files of a family physician who used the Problem-Oriented Medical Record. The patients were classified according to severity of hypertension and degree of control. Included in the rating of the subjects was a compliance index, a numerical score derived from dividing the number of pills dispensed from the pharmacy by the number of pills calculated to be taken. All participants were given a test of knowledge about hypertension and an opportunity to make open-ended comments about their

attitudes toward the hypertension and the therapy. A major contributor to blood pressure control was proposed to be a patient factor called the Disease Denial Rationalization Syndrome (DDR), a factor noted when the patient seemed to deny the fact of his hypertension or the necessity of treatment despite knowledge of medical information to the contrary. Approximately half of the physician factors contributing to poor control seemed related to antecedent patient factors with the DDR as a major contributor. Psychological defenses were found by the study to limit the effectiveness of programs aimed solely at education of the physician or patient. Future research was suggested in the area of psychological factors affecting compliance in the hypertensive patient.

Sackett, Gibson, Taylor, Haynes, Hackett, Roberts, and Johnson (1975) studied the effect of convenience of follow-up care on compliance in hypertensive patients. For the study 230 Canadian steelworkers with hypertension were selected and randomly assigned to receive their anti-hypertensive care in one of two ways. One group followed the usual practice in their community and saw their family physicians in their offices outside working hours. The other group was afforded an augmented degree of convenience for hypertensive care and saw one of the

industrial physicians at the foundry during working hours and while on full pay.

These same patients were randomly assigned to receive an educational program which consisted of facts about hypertension, effects upon organs, health, life expectancy, benefits of antihypertensive therapy, the need for compliance with medications, and simple reminders for pill taking.

Six months after the initiation of antihypertensive therapy the men were reassessed and blood pressure and compliance were determined. Compliance was calculated by pill count and urine analysis. Compliance was not improved by attempts to make care and follow-up more convenient; 54% of the augmented convenience group were compliant at 6 months compared to 51% of the normal convenience group who were compliant in the same period. Mastery learning was highly effective in teaching the men about hypertension and its management. Although 85% of the men in the educational program had learned the health information and only 18% in the control group had mastered the same information, compliance and blood pressure control were not found to be significantly different in the two groups (Sackett et al., 1975).

That mastery of knowledge about a disease and its treatment failed to improve compliance did not signify to the researchers that health education is worthless nor was it thought that these results implied release from responsibility of the health care team to provide information to the patient. The study confirmed that acquisition of knowledge and convenience alone are not sufficient to alter behavior (Sackett et al., 1975).

Following the study of the 230 steelworkers at Dominion Steel Foundries and Steel Limited, Sackett, Haynes, Gibson, Taylor, Roberts, and Johnson (1977) conducted a second clinical trial to determine whether a more behaviorally-oriented set of strategies could improve the compliance rate of the men who remained uncontrolled and noncompliant at the end of the first trial. The study included 38 men who were assigned either to a control group or to an experimental group and who were taught to measure their own blood pressure, keep their own records of blood pressure and medication, and how to individualize the medication administration to their own daily living patterns. In addition, they were seen each 2 weeks by a high school graduate with no formal health professional training and who rewarded them for improvements in compliance and blood pressure

control. At 6 months average compliance was 21.3% in the experimental group compared with 1.5% in the control group. Achievement in goal blood pressure was present in 30% of the subjects.

Implications from the results of the study could mean that laypersons can plan and maintain effective compliance-improving strategies without demanding more time from the clinician or more reorganization from the present health service. A word of caution was given by the researchers in reference to placing laypersons in charge of blood pressure monitoring. Which of the components of the strategy elicited the improved compliance rate was not determined by the study and suggestions for further trials in this area were made by the groups of researchers (Sackett et al., 1977).

Medication compliance in cardiac patients was the focus of several studies. Researchers looked at compliance from the time the patient entered the acute care setting to several months after the return to the home environment. Cardiac patients displayed varying levels of compliance and rationale for noncompliance.

Davis (1967) investigated whether or not a patient would choose to comply with the medical regimen established by his physician. Utilizing a group of 369 farmers

with cardiac diseases, Davis (1967) looked at compliance in three areas: work, diet, and changes in personal habits as smoking, drinking, and rest. As expected, the greatest number of cardiacs complied with one or two of the regimens prescribed for them by their physician. In addition, cardiac patients were found to comply with the regimens where noncompliance would create the greatest amount of difficulty. Those who complied with one regimen chose work most often, and those who complied with two regimens chose work and diet most of the time. When the regimen called for changes in personal habits, the patients were less compliant. Compliance was described by Davis (1967) as practices assumed by the patient which necessitate giving up behaviors which a patient may not wish to relinquish. Identification of the patient's social, psychological, and cultural behaviors when designing the regimen were activities which were expected to increase compliant behavior.

A basic premise for the study of Gray, Reinhardt, and Ward (1969) was that the process of rehabilitation of patients is both physical and psychosocial and that cardiovascular patients comply to rehabilitation less frequently because they are less realistic about their

impairment. In addition, Gray et al. (1969) looked at the assumption that once cardiovascular patients can be helped to accept their impairment and participate in a rehabilitation program that they comply to rehabilitation as successfully as toher disabled patients. Using two groups of subjects, a national sample of 4,463 severely disabled persons and a community sample of 109 severely disabled persons, the researchers found support for their assumptions. Cardiac patients did tend to deny their illness more frequently than persons with other disabling disease conditions according to the study results. Compliance to rehabilitation programs was concluded to be less in subjects impaired by cardiovascular diseases than persons with other disabilities.

Emotional problems during convalescence from a myocardial infarction were found by Wishnie, Hackett, and Cassem (1971) to hamper compliance to a rehabilitation program and the subsequent return to work. All of the 24 patients studied had initially been seen in the Coronary Care Unit by the investigators and were followed after discharge to determine sources of emotional distress in the convalescent period. Four subjects admitted to engaging in mild physical exercise (walking) which was not planned by their physician. An exaggerated compliance to

the physician's instructions was observed 8 of the subjects. Two patients consistently disregarded the physician's orders while the 14 remaining tended to comply with instructions with minor indiscretions. Suggestions were offered by the researchers to lessen the emotional hazards of convalescence, thereby improving compliance to the rehabilitation phase of the illness.

An evaluation of personality factors affecting patients with ischemic heart disease and myocardial infarction was made in a study by Cay, Vetter, Philip, and Dugard (1972). Psychological factors seen in the patient's reaction to this illness and to his rehabilitation were assessed. The study group consisted of 203 male patients with ischemic heart disease. Those with ischemia differed from those with myocardial infarction in their poor prior work records and their likelihood for social withdrawal. These psychosocial factors were thought by the researchers to decrease the degree of rehabilitation upon discharge from the hospital. Implications from the study results were for early psychosocial intervention for appropriate patients in order to improve post-discharge rehabilitation.

G. D. Johnston, Kelly, and McDevitt (1978) looked at the plasma digoxin level of a group of 60 emergency room



patients who were on maintenance digoxin dosages. They then compared the results with the digoxin level obtained after 1 week of hospitalization in which the patients received the same dosage as was prescribed before hospitalization. Of these patients 50% were found to be taking their digoxin improperly. Out-patient follow-up revealed that 27% were noncompliant at 1 month and 30% were noncompliant at 3 months. If the results of this study were in any way representative of drug compliance and patient understanding about therapy in general, the researchers warned about the effects of medication regimens in which only half of the patients complied.

A group of seven patients who had recently experienced a myocardial infarction and who were judged to be noncompliant with their treatment regimen were observed by Baile and Engel (1978). The study focused on several behaviors which were potentially destructive: denial of diagnosis, poor history of noncompliance, unrealistic postinfarction work abilities, and excessive delay in seeking medical treatment following onset of symptomatology. Treatment strategy included self-planning of a rehabilitation program, self-monitoring of bio-behavioral data, and weekly visits by the researchers

to review data and decide on new activities. Cardiac Care Unit nurses were included in the treatment strategy and were utilized to teach patients to monitor their pulse rate. Study results showed improved compliance in all subjects. Questions suggested by Baile and Engel for future research should be aimed at determining what features of the program affect compliance, applying the rehabilitation strategy to other patient groups, and to using nurses or social workers to implement the program.

Weintraub, Au, and Lasagna (1973) investigated compliance with a digoxin regimen in a group of 101 cardiac outpatients. Compliance was measured by questionnaire, interview, and by serum digoxin concentration. Patients determined to be compliant by questionnaire and interview were found to have higher serum digoxin concentration levels than persons determined to be noncompliant, giving credence to the verbal and written statement of the patient. The most important conclusion drawn by the researchers was that formulas for determining optimum digitalization levels based on age, renal function, and other factors simply do not hold true for the person who does not take his medicine.

Perhaps one of the best areas for studies of compliance is with hemodialysis patients. The strict

treatment regimen and the potential for objective laboratory measurement of compliance at frequent and intensive intervals are ideal for evaluating compliant behavior.

Borkman (1976) studied 661 hemodialysis patients from 93 centers in the United States to identify how useful were staff estimates of the patients' intelligence level or level of understanding of a restriction in relation to assessment of patients' compliance with three dietary restrictions and shunt care. She hypothesized that dialysis staff beliefs about patient's intelligence could operate as a self-fulfilling prophecy. Patient selection criteria from 82% of the centers included an intelligence level sufficient to understanding the regimen and 59 centers excluded "mentally deficient" patients.

Staff members were asked to estimate the patients' knowledge level and to assess the understanding of the restrictions and compliance with the restriction. Physicians and social workers tended to estimate the intelligence level of the patients lower than nurses' estimates.

Support was found for the belief that staff assessments of patients' understanding of restrictions is more useful in predicting compliance than patients' estimated intelligence level by the staff. Staff members' beliefs

about patient characteristics associated with successful compliance was seen by Borkman (1976) as operating as a self-fulfilling prophecy by affecting the manner in which the staff instructed and managed the patients (Borkman, 1976).

Effects of personality factors on noncompliance with a medical regimen (diet) was studied by DeNour and Czaczkes (1972). Again, hemodialysis patients were used for the study because of the advantages in observing compliant behavior patterns in these individuals whose disease process is chronic and the treatment pattern is intense.

Forty-three patients on chronic hemodialysis were observed in six different dialysis units in the country. The most frequent personality factors causing noncompliant behavior were low frustration tolerance and primary and secondary gains from the sick role. "Acting out," although frequent in both groups, was significantly higher in the noncomplier. Denial of sick role and suicidal behavior were also found, although more rarely. The researchers suggested that these personality factors can be identified in other patients and other medical setups (DeNour & Czaczkes, 1972).

In conclusion, from the literature on compliance no consistent description of the noncompliant patient emerges. The problem of noncompliance encompasses attitudes, socioeconomic factors, treatment settings, and interactions with professional caretakers. The problem of noncompliance is an extensive one with strong implications for all health professionals. Interventions to increase compliance must become a necessary part of patient care so that the treatment recommendation will be continued when the patient leaves the health care setting and assumes responsibility for his care.

#### Compliance to Exercise

Exercise compliance was reported less in the literature than compliance to drug therapy. Studies which focused on physical rehabilitation revealed wide variations in compliance as with drug compliance. In general, patients were less compliant to the physical aspect of their rehabilitation following a major illness than with other therapeutic modalities.

Compliance literature was reviewed by Mayo (1978) in an effort to describe implications for physical therapists. Mayo pointed out that studies which focused on compliance to an exercise regimen were considerably less

numerous than those stemming from drug compliance. An obstacle to monitoring compliance to an exercise program was seen to exist because there are no completely objective measurements available as pill counting or laboratory examinations. In addition, compliance to an exercise program was pointed out to be a major problem because the exercise prescription demands that the patient change established habits of life style. Monitoring compliance by journal recording or personal observation was suggested to improve compliance in circumstances where the patient wished to please the therapist. Personal interview with the patient or his family was indicated to be a fairly reliable method of monitoring compliance if the interview was structured in such a way that guilt was not implied.

Compliance to an exercise regimen following a myocardial infarction was seen by Hackett and Cassem (1973) as one of the most important aspects of convalescence because of its ability to control depression. In a study of 100 myocardial infarction patients, the researcher found that 75% of the subjects were depressed while in the Coronary Care Unit and recommended that all post-myocardial infarction patients be treated for depression. A program of physical conditioning appropriate to the patient's physical status and beginning on the third CCU

day was recommended as the treatment of choice for alleviating depression. Physical conditioning was determined to be valuable in controlling depression by raising self-esteem and the sense of independence. Having a nurse telephone the patient and his family in the first 2 months after discharge to determine if advice is needed was pointed out to be useful in conditioning programs where activity is stressed. Exercise was viewed by the researchers as the most potent antidote and prophylaxis against depression known.

Friedman and Hellerstein (1973) looked at the relationship between the socioeconomic status of 173 middle-aged men and coronary risk factors of blood pressure and body weight, psychosocial factors (Behavior Pattern A, a measure of self-esteem and the Hollingshead [cited in Friedman & Hellerstein, 1973] Two-Factor Index of Social Position), adherence to a prescribed physical fitness regimen, and modification of blood pressure and body weight at the 6 month follow-up examination. The subjects were grouped according to socioeconomic status and annual income into three groups. Group 1 had the highest socioeconomic status and income and Group 3 had the lowest socioeconomic status and income. At the 6 month evaluation, Group 3 subjects who entered the study with the

greatest risk factors were found to have the greatest adherence to the training program, greatest improvement in physical fitness, weight loss, and reduction of systolic blood pressure. Group 1 which was hypothesized to be at the lowest coronary risk on entry into the study compared closely with Group 2 which was found to enter the study with the highest risk. Study results did not support the hypothesis that Group 1 subjects would be at a greater coronary risk and would demonstrate greater adherence to a physical fitness program. Explanations offered for rejection of the hypothesis were that Group 1 was at greater physiological risk because of poor lifetime health habits, the enhancement of the physiological function by physical activity had a satisfying and beneficial effect in ways not tested by this study.

New, Ruscio, Priest, Petritsi, and George (1968) looked at the effect of significant others in the rehabilitation of heart and stroke patients. They observed that whether or not a person with coronary heart disease adhered to a physical rehabilitation program was influenced strongly by the patient's spouse and degree of family support. The patient's view of his own functional capacity in terms of daily activities was suggested by the researchers to determine his adherence more than any



objective criteria presented by the rehabilitative staff. Implications were for planning rehabilitation programs based on the attitude and degree of support from the patient's family and employer as well as the patient's perception of his ability to participate.

The effects of a team approach in cardiac rehabilitation were investigated in 89 post-myocardial infarction patients by B. L. Johnston, Cantwell, and Fletcher (1976). The researchers looked at rehabilitation activities of both complicated and uncomplicated patients during convalescence from an acute myocardial infarction. Team members consisted of a physician, nurse, physical therapist, dietitian, recreational therapist, pharmacist, chaplain, and educational coordinator. When necessary, personnel from community health agencies assisted in post-discharge rehabilitation. An eight-step protocol beginning on the day of admission was followed by team members in caring for the patient during the hospitalization phase. At a mean time of 13.5 months after discharge, risk factor modification data which included work, exercise and diet habits, body weight, high blood pressure, and cigarette smoking were collected. Results showed that 56% of the survival group were actively working, 66% were adhering to a fat-controlled diet, 77%

continued on an exercise regimen, 70% lost excess body weight, 91% had their blood pressure controlled, and 60% had stopped smoking cigarettes. The researchers concluded that the team approach to rehabilitation of myocardial infarction patients while in the hospital and continued when necessary after discharge by personnel from community health care agencies was beneficial in long term risk factor modification.

A group of 163 men who had experienced a myocardial infarction were enrolled in a 4 year rehabilitation program of physical activity by Oldridge, Wicks, Hanley, Sutton, and Jones (1978). The men were assigned at random to groups of either high intensity exercise or to low intensity exercise. Subjects who did not comply with the protocol for more than 8 weeks for reasons excluding myocardial infarction or death were considered noncompliers. Early noncompliance was defined as that occurring before the end of 1 month and late noncompliance was defined as that occurring after 1 month but before 12 months. Of the 163 men enrolled in the exercise program, 153 remained who could have participated for at least 12 months. In the 153 men who could have participated with the protocol, 57% complied. The early and late noncompliance rates for the high and low intensity exercise

groups were similar: 42% and 58% for the high intensity group and 50% each for the low intensity group. Lack of motivation or interest was the most common cause for leaving the program. The men in both groups who left the program early were the ones with the greatest risk for a further myocardial infarction. Implications from the study were for designing exercise programs which encourage long-term compliance and constant reinforcement. Educational strategies as pamphlets, films, game-type activities, or group symbols were suggested by the researchers to benefit the early noncomplier who seemed to be at a higher risk than the complier for another myocardial infarction.

In summary, most of the literature on compliance supports the belief that noncompliance is greatest with regimens requiring that the patient perform multiple and complex procedures which differ from routine activities of daily living. In addition, when the regimen has little immediate visible effect on the symptoms, compliance decreases. Because the exercise regimen demands life style changes with few short term rewards, the patient whose treatment includes an exercise prescription is at great risk for treatment failure.

Role of the Nurse in  
Compliance

Several studies on patient compliance were written by nurses or utilized nurses in the study. Most of the researchers in these studies placed the nurse in the role of provider of knowledge concerning the treatment regimen. Others suggested that the nurse is the appropriate person to provide information to the patient before and after discharge.

S. G. Rosenberg (1971) designed an educational program for a group of 50 patients with congestive heart failure. He then compared their readmissions with previous admissions and with a control group. He found patient readmissions as well as total admissions for the study significantly reduced following the education program. Also, knowledge related to disease, diet, and medications was increased in those subjects participating in the educational program. Based on the theory that patients who know about their care would more likely participate with a prescribed regimen than a patient who does not, S. G. Rosenberg (1971) designed an educational program utilizing five components: group instruction, family participation, information-giving throughout hospitalization, meal planning and ordering assistance,

and audiovisual aids. Increased adherence to the treatment regimen was demonstrated as well as a statistically significant decrease in hospital readmissions in the study group. Any system of medication distribution should be accomplished by an educational process provided by the nurse, pharmacist, and physician, according to S. G. Rosenberg (1971), a public health education specialist.

Wilber and Barrow (1972) studied hypertensive patients agreeing to accept home visits from a nurse who encouraged them to seek and maintain care, taught them about hypertension and its management, and assessed their progress. The group who accepted home visits from the nurse were more compliant than those who refused home visits.

A study of contingency contracting to increase adherence to a hypertensive treatment program was designed by Steckel and Swain (1977). The clinic nurse and the patient wrote, dated, and signed a simplified one statement contract which described the behavior to which the patient agreed to conform. Chosen behaviors included such goals as weight loss, keeping of clinic appointments, and taking prescribed medications. The patients were given tangible rewards in return for contract fulfillment. The most frequently chosen rewards were lottery tickets,

money, books, magazines, and increased time with the health provider. The study group consisted of 115 hypertensive outpatients divided into three groups. One group received routine clinic care; the second group received routine clinic care and education with counseling; and the third group participated in contingency contracting in addition to education, counseling, and routine clinic care. Those signing contracts demonstrated increased compliance by reduction in weight, blood pressures, and increased knowledge of the disease.

Determination of the degree to which a clinical nurse using practical intervention strategies could improve the level of medication compliance was the purpose of a study by Spector, McGarth, Uretsky, Newman, and Cohen (1978). Patients taking two or more drugs, one of which was digoxin or methyldopa, were randomly selected from a group of medical clinic patients. After being randomized into a control and experimental group, the experimental group was seen by a specially trained nurse interventionist who attempted to improve compliance by reviewing factors that have been identified as impediments to medication compliance. Next the nurse emphasized improvement by various strategies. Compliance was measured by serum analysis. Although medication

compliance was shown by the study to be greater in the intervention group than in the general clinic population, no significant difference was found between the intervention and control groups. Possible causes for the unexpected results of the study were those concerned with nonparticipation. The consent form was a hinderance to patient cooperation in that some refused to sign it. Because those who did sign the consent form had some knowledge of the purpose of the study, the researchers felt that data elicited was not as valid as if the patients had no prior knowledge of the study. Further studies which would establish the apparent value of the nurse interventionist were suggested.

An educational program which covered anatomy and physiology, dietary management, appropriate activity programs, the adjustment process, risk factors, and signs and symptoms of complications of therapy was provided for patients in an intermediate cardiac care unit by Owens, McCann, and Huteimyer (1978). The information was provided in a series of five 45-minute discussion sessions which began 6 to 10 days after surgery or myocardial infarction. The pharmacological management was not included in the group setting, since not all patients required the same drug therapy, but was taught by

staff nurses on an individual basis. Written information relating to medication included the name of the drug, dosage, purpose, and side effects was given to the patients. The 36 subjects were followed at 6 weeks and 3 months after discharge. Results of the study demonstrated that patients were capable of learning in a group setting during the early stages of recovery and continued to gain knowledge after discharge. Measurement of knowledge was by pretest and posttest used before the discussions, after the discussions, and at the 6 weeks and 3 months post-discharge interview.

Inadequate programs to teach patients before discharge were thought by Romankiewicz, Gotz, Capelli, and Carlin (1978) to be a major cause of patient noncompliance with prescribed drug regimens, dietary restrictions, limitations on physical activity, and other discharge instructions. A teaching program was developed by the medical care committee composed of representatives from medicine, nursing, pharmacy, social services, and administration. Wallet size patient instruction cards to be given to the patient upon discharge were developed by the hospital's pharmacy drug information service. The information was written in lay terms and included: why the drug was prescribed, precautions to be observed,



adverse effects, and additional individualized information necessary to increase compliance. Each patient area had a loose-leaf book with inserts containing the wallet-sized cards. Nurses and pharmacists working in that area spent time with the patients and used the drug information from the notebook to explain the medication regimen and evaluate patient understanding. At the time of discharge, patients received their prescriptions and the wallet-sized cards with instructions to refer to them as needed. When an evaluation period demonstrated that the cards were useful for improving patient knowledge, their use was extended to the 23 out-patient clinics. This system of patient instruction which was developed as a team approach by physicians, nurses, and pharmacists was presented by the researchers in the hope that other institutions would be stimulated to develop similar systems.

The effect of planned, individual instruction by nurses on the number of medication errors committed at home in out-patient adults receiving tuberculosis chemotherapy was tested by Hecht (1974). Forty-seven adult tuberculosis patients attending a chest clinic in a large county hospital participated in the study. After the patient had seen the physician, a nurse discussed the medication regimen with the subject, reinforcing what he

already knew, answering his questions, and correcting any misinformation. An important aspect of the information regimen was the absence of a structured format for instruction. Instead, the teaching was individually planned for each subject based on his personal background of information, and using vocabulary appropriate for his level of understanding. After the clinic visit, each patient was seen twice at home by a nurse with a baccalaureate degree. Four study groups were the basis of the study: a control group who received no teaching, a group who received a clinic teaching only, a group who received clinic and home teaching, and a group who received teaching prior to discharge in the clinic and at home. Compliance was measured by patient report, urine tests, and by pill counts. Results of the study suggested that increased amounts of teaching improved compliance. Based on the pill count, serious error was reduced from 53% in the control group to 17% of the patients in the group receiving the most intensive teaching. Patient report of medication taken was found to be the least reliable of the three measures for compliance used in the study.

The effect of a comprehensive teaching program on patient knowledge and compliance was studied by Linde and Janz (1979). Three purposes were stated for the study:

effectiveness of hospital-based patient education, demonstration of the role of nurses in providing patient education, and comparison of the teaching effectiveness of Master's prepared versus non-Master's prepared nurses.

The researchers designed and implemented a comprehensive post-operative patient education program for patients following cardiac surgery. Content of the program included information on the disease process and surgical intervention, exercise, medication, and dietary regimens. Included also were warning signs of complications (Linde & Janz, 1979).

Persons having valve replacement or coronary bypass surgery were selected for the sample of 55. The knowledge test was given as a pretest and as a posttest at discharge, 1 month following discharge, and 3 to 4 months later. Compliance was measured in four ways: patient reports on reduction of risk factors, laboratory follow-up, diet adherence, and attendance at clinical appointments (Linde & Janz, 1979).

Results of the study were in response to five hypotheses. Significant findings were that patients participating in the study increased their knowledge following the postoperative teaching program; patients who received the postoperative teaching program had higher

compliance rates than cardiac patients who had not received the teaching; and discharge test scores for patients participating in the study were higher in those who had been taught by the Master's prepared nurse (Linde & Janz, 1979).

Finnerty (1978) surveyed a group of patients who had dropped out of city hypertension clinics and determined that the reasons for which patients discontinued clinic visits were not poverty, disregard for health, or lack of education. Patients were shown by the study to wait an average of 2.5 hours before seeing the physician, 1.8 hours before getting the prescription for that visit filled, and saw a different physician for each visit for an average of 7.5 minutes. To improve compliance, Finnerty (1978) placed a specially trained registered nurse in charge of the clinic under supervision of the physician. Two paramedic assistants were assigned to the registered nurse and the team of three assumed responsibility for both the workup and long-term care of each newly discovered hypertensive patient. Within 3 years the dropout rate decreased from 42% to 8%.

Two pilot studies were in progress for the purpose of testing the method in a private setting: one in the office of a suburban family practitioner and the other in

an internist's group practice. In each was placed a nurse, specially trained in hypertension monitoring. Finnerty (1978) felt that the data analysis at the end of the study would show an increased incidence of hypertensive patients, an increased number of hypertensive patients in treatment, better control of arterial pressure, and a decreased incidence in the number of dropouts. Again, he presented the nurse's role as a significant one in the management of hypertension (Finnerty, 1978).

Determination of the ability of persons aged 60 and over, living at home, and under private medical care was the focus of a replication study by Neely and Patrick (1968). The study used a random selection of 59 persons from a population of 236 clinic patients in an urban-rural area of a large west coast city. Patients were interviewed at home by phone by a who asked both open and closed questions. Both the nurse and the physician hematologist reviewed each interview schedule to see if errors had been made. In addition, errors were judged as to the kind of error and whether or not it was potentially serious. No errors were reported by 41% of the respondents. In the group reporting errors, 68% of the errors were not considered to be potentially serious. The study results suggested that older persons who make

medication errors cannot be identified by the usual variables. Implications for nursing were: teaching older patients prior to discharge, allowing self-medication during hospitalization, encouraging the practice of labeling of prescriptions with drug name, and encouraging public health nurses in their visits with patients in the home to routinely review medications with the patient.

A study by Tagliacozzo, Luskin, Lashof, and Kenji (1974) examined the effect of nurse intervention on patient compliance. The longitudinal study was conducted in an outpatient department of a large metropolitan hospital and involved 192 patients with either essential hypertension, diabetes mellitus, cardiovascular disease, or gastrointestinal illness. After randomly assigning the subjects to an experimental and control group, the study began as soon as the diagnosis was entered into the chart.

Both experimental and control patients first contacted the nurse at about the fourth visit to the clinic. At this time the nurse administered two types of knowledge tests. The first focused on four common chronic diseases and the second one focused on the illness of the current primary diagnosis. The tests formed the basis of subsequent teaching.

Experimental patients were told that in subsequent visits the nurse would continue to see them, discuss their problems, and instruct them about their treatment. Patients in the control group were followed on return appointments but had very limited contact with the nurse.

The impact of the nurse on improving patients' knowledge and compliance was assessed. Experimental patients improved knowledge and regularity of clinic visits only slightly above those in the control group. However, this pattern was not evident in compliance behaviors as medication taking, weight loss, attendance at other clinics, or compliance with laboratory requirements. The conclusion drawn by the researchers for these observations was that behaviors fundamentally rooted in specific illness experiences, personality traits, or social conditions was less readily influenced by nurse intervention while nurse intervention was very effective in traits which were a function of prolonged problems in illness management and need for information and reassurance (Tagliacozzo et al., 1974).

In conclusion, nurses have a strong impact in health behaviors affecting compliance. Because the nurse spends more time with the patient than any other health professional, the nurse is the logical person to assess

behaviors which increase or decrease compliance. As the role of the nurse in the health care system changes, more opportunities will come about in which the nurse can independently plan and manage compliant behavior.

### Locus of Control

The locus of control construct is derived from Rotter's social learning theory (1954). Behavioral scientists have published large volumes of work in which internality or externality is the primary focus. All of the research points to the same conclusion: people are handicapped by external locus of control orientations. Most authors believe it is desirable to change people in the direction of internality. Presented are some of the research studies with findings that can be applied to the health care setting.

Lefcourt (1966) summarized an extensive group of the early studies concerning the construct, internal vs. external control of reinforcement. According to Lefcourt, most of the investigations had either utilized situational manipulation of locus of control or had involved differential predictions to given situations based on measures of internal-external control. He indicated that in both types of investigations, locus of control was



found predictive to different social behaviors, learning performance, and to achievement activities. Implications for future research were seen by Lefcourt to be in the areas of antecedents of internal and external-control orientation and factors leading to the generalization of these orientations. Lefcourt (1966) saw a strong relationship between government programs which seek to eliminate problems of poverty and social barriers and the lack of goal-striving behavior found in the externally oriented person.

Another extensive group of early studies of the internal-external control of reinforcement was reviewed by Joe (1971). He grouped the studies into 12 areas: the Internal-External (I-E) Locus of Control Scale, personality, attempts to control the environment, achievement, reactions to threat, ethnic group and social class differences, parent-child relationships, risk-taking, reactions to social stimuli, and the relation to the internal-external control measure to anxiety, adjustments, and learning. The review was limited to those studies which investigated locus of control as a personality characteristic. Although Joe (1971) found the studies' results not consistent, generally data tended to support Rotter's (1954) contention that the internal-external

concept is a generalized expectancy operating across many situations. Contrary to Rotter's (1966) claim that sex differences on the Internal-External Scale among college students seemed to be minimal, Joe (1971) declared that sex difference did influence an individual's belief regarding locus of control. Many of the studies showed females significantly more external than males, according to Joe (1971). In addition, Joe (1971) pointed out that such differences could have been related to the cultural roles assigned to each sex, to social class, and to regional affects. Suggestions for further studies were listed as determining relationships between parental antecedents, race, social class, and the degree to which an internalized cultural orientation may influence a person's preference in locus of control.

Rotter (1975) discussed the concept of internal versus external control of reinforcement and attempted to clarify some of the problems and misconceptions that have evolved in recent years. He estimated the number of published studies dealing with some aspect of internal versus external control of reinforcement, also known as locus of control, to be well over 600. According to Rotter (1975) much of the research has produced important and well-replicated findings. However, he felt that many

of the studies reflected basic misunderstanding of the nature of the variables and the measuring devices. Although the concept of internal versus external control of reinforcement developed out of Rotter's (1954) social learning theory, he warned that many investigators have erroneously referred to locus of control as the major or central concept of the theory.

Social learning theory was described as a theory of personality that attempts to integrate stimulus-response theories and cognitive theories. Rotter (1975) explained that social learning theory is based on the premise that when an organism perceived two situations as similar, then his expectancies for a kind or class of reinforcements will generalize from one situation to another. With this view in mind, he stated that the most frequent conceptual problem with investigators of internality and externality was the failure to treat reinforcement as a separate variable. Rotter questioned those studies which did not control or measure reinforcement value or systematically take it into account. He gave as an example of the value of reinforcement in locus of control the internal who may not join a protest group simply because he did not believe in the cause and the external who did

not join a protest group not because he believed in the cause, but because he liked the people in the group.

Rotter (1975) cautioned about the misuse of the internal-external concept in two other areas. First, he pointed out that people concerned with predicting achievement behavior or performance in achievement areas may fail to see that the more structured, the more familiar, or the more unambiguous a situation is the less likely generalized expectancy can be predicted. He used the example that most persons in college have had enough experiences in the educational system to know the relationship between studying and grades and that the reasons for a person not studying to get good grades lie instead in the reinforcements gained from that behavior.

The third problem in conceptualization described by Rotter was the intrusion of the "good guy--bad guy" dichotomy. Many psychologists have ignored Rotter's warning to the contrary and quickly assume that it is good to be internal and bad to be external. Again, if one systematically considers the role of reinforcement in internal or external behavior then the "good guy--bad guy" bias would be eliminated.

Rotter concluded his discussion by offering hope that future studies involving the construct of internal

versus external control of reinforcement will be carried out, taking into account the underlying theory and recognizing the limitations of this construct and its measurements.

A. P. MacDonald (1973) reviewed the locus of control construct and pointed out the large volume of related literature published each year. He attributed the popularity of the construct to its wide-range of generalizability and its social relevance. He saw the trend of future research falling into two areas: antecedents and the multidimensional nature of the construct. Antecedents were described as episodic (those events of relatively great import and occurring at a restricted point in time as the death of a loved one or a mining accident) or accumulative (those continuous exposures that can affect the development of internal and external control orientations as social discrimination prolonged incapacitating disability, or parental child-rearing practices). He described the multidimensional nature of the construct beginning with the Rotter Internal-External (I-E) Locus of Control Scale (1966) and continuing through development of other scales. A. P. MacDonald (1973) concluded his review with a description and example of seven tests in current use which measure locus of control.

Seeman and Evans (1962) conducted a study which linked locus of control (alienation) and cognitive activity. Testing the hypothesis that differences in alienation are associated with differential learning of behavior-relevant information, the researchers used a 12-item measure of powerlessness to measure the degree of alienation. In addition, the hospital staff was asked to estimate the patient's knowledge about his condition and the patients were asked to respond to several statements which reflected their satisfaction with the information process in the hospital ward. Both staff and patients' self-rating placed internals as having more knowledge about tuberculosis. The study was conducted using 86 cases, consisting of 43 pairs of hospitalized tuberculosis patients who were matched for socioeconomic background and for health and hospital histories but differed in degree of alienation. Results of the study supported the prediction that high alienation and poor learning were associated. The more alienated patients were found to have significantly lower scores on the test of objective knowledge than their matched subject with low alienation.

Three hypotheses derived from Rotter's (1966) construct of Internality-Externality were tested by Phares,

Ritchie, and Davis (1968). First, when confronted by threatening material which presented a challenge to one's views of himself, an external was hypothesized to react with less anxiety than an internal. Secondly, the investigators proposed that when both adverse and positive-material was presented, the external would forget less of the adverse material than would the internal, while there would be no differences between the two groups in regard to the retention of the positive material. The third hypothesis was that when presented an opportunity to take overt remedial action in regard to personal shortcomings, internals would show a greater tendency to do so than would externals. The third hypothesis was that when presented an opportunity to take overt remedial action as regarded personal shortcomings, internals would show a greater tendency to do so than would externals.

From a group of 225 college students who were administered the Internal-External (I-E) Locus of Control Scale (Rotter, 1966), 43 subjects were drawn from the upper 27% and lower 26% of the population based on test results. The subjects were then administered a series of personality tests. Test results were by means of brief 2 and 3 line statements both positive and threatening.

Unknown to the subjects, all were given identical interpretations of the results. When given the results of the tests the subjects were asked to indicate which of the test results made them feel comfortable or uncomfortable and offered choices for participating in activities to alter personality traits disclosed by the tests. Contrary to prediction, there were no differences in anxiety between internals and externals following reading of threatening material. Externals recalled significantly more of the threatening material than did the internals. They were also superior in recall of total material. Internals were significantly more willing to engage in remedial behaviors to confront their problems. Suggestions for future study were to match for anxiety and test for action and for more intense study of the internality-externality construct.

An examination of the relationship in women between the motive to avoid success and feelings of being controlled externally was the focus of a study by Midgley and Abrams (1974). The investigators hypothesized that scores of the Horner's (1969) incomplete story lead and Rotter's (1966) Internal-External (I-E) Locus of Control Scale would indicate a strong belief in external control of reinforcement contingencies in those female subjects



who evidenced a high degree of fear of success imagery. The study group was composed of 108 female university undergraduates. Results of the study supported Rotter's statement (1966) that high achievement motivation was generally associated with a high degree of internal control. Data from the study also suggested that achievement motivation was blocked or lowered by feelings of external control in the situation of arousal of achievement in young women. The major implication from the results of the study was that anxiety about the prospect of successful achievement of a goal was highest when it was associated with a fatalistic outlook about locus of control.

The degree to which internals, in situations where information can be obtained that will lead to problem solution, demonstrate a greater ability to extract information from their environment and then use this information to solve a problem than do externals was the hypothesis tested by DuCette and Wolk (1973). Using 138 high school subjects enrolled in an advanced placement course of psychology at Cornell University, the researchers had the subjects to perform three tasks. The first task required the students to estimate the grade obtained on a midterm or final test as he turned the paper in to

his instructor. The second and third tasks required the subjects to guess which of two letters in the alphabet was on a card the examiner held. In the second task the examiner offered feedback after each guess and at the end the subject was asked to recall how many times he had correctly guessed the letter on the card. The third task was like the second except the subject was told the examiner would offer cues to assist him in guessing the correct letter. The cues were in the form of the number of fingers the examiner held up while displaying the card. Again feedback was offered each time the subject guessed the letter on the card. At the conclusion of the task the subject was asked to estimate the number of correct guesses.

Results of the study supported the hypothesis that internal subjects are more sensitive to environmental stimuli. They demonstrated the ability to use experience with a task to improve their perception of performance; they were more accurate in remembering successes when feedback was provided; and they more quickly devised an invariant rule from an ambiguous situation and used this rule to solve a problem (DuCette & Wolk, 1973).

The thesis of the study as seen by the researchers was that the mediating power of locus of control resides

in both cognitive and motivational qualities. The decision to engage in a task was formulated to be a function of the ability to do the task. If a person perceived that he could perform a task, he would more likely attempt that task.

Literature which examined the relationship between locus of control and the attitude toward and reaction to social disadvantage, physical disability, and emotional disorders was observed by A. MacDonald (1971). He questioned if external control orientation restricted activities of an otherwise normal individual, how much more debilitating might it be should that person become disabled. According to A. MacDonald (1971), research literature led to the conclusion that: externally controlled persons are more threatened by physical disabilities, and internals, in relation to externals, view emotional disorders as more debilitating than physical disabilities. In addition, he saw social disadvantages and minority group membership more conducive to the development of external orientation. A. MacDonald (1971) cautioned against creating the impression that the locus of control construct applied only to social disadvantage, physical disability, and emotional disorders. Because the studies reviewed by A. MacDonald (1971) were conducted

using nondisabled persons who projected how they would react to disability, A. McDonald (1971) cautioned the reader about generalizing the results to a disabled population. Implications from the study were for designing studies which focus on attempts to raise expectancy levels of persons.

An examination of the relationship between depression, locus of control, and the perceived causes of depression in a nonpsychiatric population was the purpose of a study by Calhoun, Cheney, and Dawes (1974). The subjects were 81 undergraduate students enrolled in an introductory psychology class who volunteered to participate in the study. The subjects were administered the Internal-External (I-E) Locus of Control Scale (Rotter, 1966) and a series of tests which rated the subjects' depression tendencies and the degree to which the subject thought the causes of depression were outside his personal control. The study results indicated sex differences in the relationship of mood and locus of control and mood and perceived causes of depression. Externality was related to the presence of relatively enduring symptoms of clinical depression for both male and female subjects as well as to simple depressed mood for males. Female subjects showed an unreliable relation between

externality and simple depressed mood and a positive relation between the degree of depressed mood and the tendency to hold oneself responsible for it. The findings were considered by the investigators to suggest that females hold themselves more responsible than males for unsatisfactory personal situations as well as for unhappy mood.

The hypotheses that physically disabled subjects have a significantly higher threshold for threatening stimuli (threat slides) than nondisabled subjects and that physically disabled subjects who are externally controlled have a higher threshold for threat stimuli than disabled subjects who are internally controlled were tested in a study by Lipp, Kolstoe, and James (1968). The subjects were disabled and nondisabled persons who were placed in three groups according to locus of control: a strongly internal group, a strongly external group, and a group with mean scores. Pictures of 15 disabled persons (threat slides) and 15 nondisabled persons (nonthreat slides) were presented to the subjects tachistoscopically. The slides were presented at a time exposure of 1/100 second. If the subjects were unable to correctly describe the slide, it was shown again at increasingly longer times

until the subject was able to correctly describe the slide.

The disabled group took 710 more trials to recognize threat slides than nonthreat slides, compared to 161 for the nondisabled group. Middle-ranged disabled on the locus of control scale were significantly more denying than either the extreme internals or externals. Also, the high externals were significantly less denying than either the high internals or the middle range internal-externals. The researchers considered the most significant finding was that physically disabled subjects demonstrated extreme difficulties in perceiving slides of disabled people as opposed to those of normal people. This finding adds support to the contention that disability is unacceptable to the disabled who defend against this threat by denial (Lipp et al., 1968).

Externally controlled persons were less denying of their disability than internal persons. Perhaps physical disability was perceived more threatening to one who customarily sees himself in control of his life. Implications from the study were for further research on internals placed in external situations and for predicting rehabilitation success based on the internal-external construct.

Pierce, Schauble, and Farkas (1970) questioned: if internalizing behavior is related to successful progress in therapy, and if successful or effective therapy results in increased internalization for the client, could internalizing behavior be systematically taught to clients in the early stages of therapy, thereby causing client progress. In response to this question, Pierce et al. (1970) designed a study to evaluate whether or not the client's behavior in approaching his problems could be changed using a direct, straightforward learning technique. In addition, the group assessed various ways of predicting internalizing behavior. The subjects were 15 undergraduate college students who sought help at the university's counseling center, and after meeting once with their therapist, agreed to participate in the research.

During the therapy session the subject was allowed to talk about his problem in any way he saw it for the first 20 minutes. The role of the therapist was a traditional one where the therapist engaged in interchangeable reflections. During the second 20 minutes, the therapist stopped the client, explained very straightforwardly what locus of control was about, and that it was thought to be a helpful way of looking at problems.

In this 20 minutes the therapist directly made the client aware of internalizing or externalizing and verbally reinforced the client. The last 20 minutes of the session was again spent in the traditional manner with the therapist engaging in interchangeable reflection, and the client allowed to explore his problem as he wished.

Results of the study indicated that client behavior can be changed with brief, straightforward intervention. Clients who were more external benefited most from this approach but still fell short of clients initially demonstrating a higher level of internality. The results also indicated that therapists familiar with the locus of control concept could judge the degree to which their clients internalize. Next the therapist could decide when a direct approach was indicated and teach more appropriate behavior. If the externally oriented person having difficulty coping with his environment can be taught the more productive behavior of internalization, the researchers stated he could then use this new behavior to positively interact with his environment (Pierce et al., 1970).

In conclusion, internal-external locus of control refers to the extent to which persons perceive contingency



relationships between their actions and their outcomes. Internally oriented persons believe some control lies within themselves. Externally oriented persons believe their outcomes are determined by agents or factors extrinsic to themselves. Most of the locus of control research supports the belief that internals engage in emotional non-goal directed activities. The implications from these studies for the health care setting are many.

#### Locus of Control and Health Behavior

Many researchers have looked at the relationship between locus of control and health behavior. The extent to which a person followed medical advice and assumed responsibility for his health care was seen by the researchers to correlate closely with the locus of control construct. Presented here are selected studies which look at locus of control and health behavior.

The relationship between locus of control and compliance to medication and dietary restrictions was observed by Wenerowicz, Riskind, and Jenkins (1978). Using a group of 19 chronic hemodialysis patients the researchers hypothesized that subjects rated as internals on the Rotter Internal-External (I-E) Locus of Control Scale (Rotter, 1966) would show a significantly higher

rate of compliance to medical and dietary prescriptions than those subjects rated as externals. Compliance was assessed by measuring serum potassium, serum phosphorous, blood urea nitrogen, and average weight gain between dialysis treatments. The results of the study supported the expectation of a relationship between the locus of control score and behavioral compliance to the medical and dietary regimen. Internal subjects complied an average of 2.9 of the 4 measures compared to 1.2 of the 4 measures in external subjects. The results of the study were highly significant at the .001 level. Implications from the study were for development of interventions to modify locus of control, thereby improving compliance to the treatment regimen.

A program to increase patients' post-discharge compliance to the prescribed treatment regimen through drug self-administration while in the hospital setting was designed and implemented by D'Altroy, Blissenbach, and Lutz (1978). Based on the premise that people become responsible when they accept responsibility, the researchers developed a three-phase program in which patients learned about their medications and gradually accepted responsibility for self-administration and for adhering to their regimens. In Level 1 the nurse and pharmacist

taught the patient basic information about the medication such as side effects, correct dosages, and purpose. When the patient understood the information presented in Level 1, he moved to Level 2 in which he assumed responsibility for requesting each dose of medicine from the nurse. In Level 3, a 24-hour supply of appropriate drugs excluding narcotics and injectables was kept in fully labeled bottles at the patient's bedside in order to simulate home conditions as closely as possible. The nurse checked the drugs daily to determine degree of compliance.

A study was conducted 1 month after discharge to evaluate the program's effects on patients' knowledge about their drug regimen and also on patient's compliance. The follow-up was by means of home visits with pill counts to measure compliance. Two groups of subjects participated in the study: 34 were patients who had participated in the program and 30 were patients from the control group. Patients in the medication-self-administration program had a significantly higher rate of compliance than did the control group who had traditional care and instruction about medications (D'Altroy et al., 1978).

During the 1 month follow-up interview a locus of control test was administered to determine whether the person were internally or externally oriented. The test

showed that the internal patients benefited more from the self-administration program but that the externally oriented patients in the control group were more compliant. The researchers believed that these findings could be used to design self-administration programs using a different educational strategy for the internally oriented patient than for the externally oriented patient.

Abram, Moore, and Westervelt (1971) looked at 201 hemodialysis centers in the United States and discovered a suicide rate of more than 400 times that of the normal population. In their sample of 3,478 hemodialysis patients approximately 5% ended their lives by suicide. In addition, 192 exhibited suicidal behavior, 117 of which died as a result of not complying with the prescribed treatment regimen.

A study which considered the rejection of his role in the hemodialysis program by the chronically ill patient not as suicidal but as an attempt to adjust to the psychological stress of his illness was designed by Goldstein and Reznikoff (1971) in response to the study by Abram et al. (1971). The researchers hypothesized that hemodialysis patients adopt an external locus of control as a means of coping with the rigid treatment regimen thereby avoiding responsibility. In addition, the hypothesis

was proposed that an inverse relationship existed between external control and socioeconomic status: patients from the lower socioeconomic level would demonstrate a greater degree of externality.

A battery of psychological tests, including Rotter's Internal-External (I-E) Locus of Control Scale (Rotter, 1966) and the Two Factor Index of Social Position (Myers, & Bean, 1968), were administered to the two study groups, 22 male hemodialysis patients and a control group of 24 male patients in the convalescent stage of a minor medical condition as hernia, pneumonia, or appendicitis. Results of the study supported the first hypothesis that patients on chronic hemodialysis evidence a significantly greater degree of external locus of control than patients with minor medical problems. The second hypothesis was supported only in the control group, suggesting that as the ego is threatened, external locus of control transcends socioeconomic considerations. The researchers felt that the overall results of the study indicated that chronically ill patients become more external as the course of the disease progresses and fail to adhere to the treatment regimen because they perceive no relationship between their behavior and illness condition. Operant conditioning was proposed as one intervention to

assist the externally oriented person to become more internal thereby increasing compliance to the treatment regimen.

The assumption that a health related locus of control scale would provide more sensitive predictions of the relationships between internality and health behaviors was the basis of two studies by B. S. Wallston, Wallston, Kaplan, and Maides (1976). After development and validation of the 11 item Health Locus of Control Scale, B. S. Wallston, Wallston, Kaplan, and Maides (1976) looked at two groups of subjects for further validation of the scale. Group 1 consisted of 88 college students for the purpose of determining if internals who valued health highly sought more information than other subjects. Group 2 was made up of 34 overweight women who were placed in one of two weight reduction treatments according to their locus of control. Internally oriented subjects were placed in a self-directed program and externally oriented persons were placed in a group program. Results of the two studies supported using an area-related measure of locus of control over Rotter's I-E Scale. Implications for future study were stated by the authors to be for development of locus of control scales for other health behaviors or conditions as diabetes, hypertension,

obesity information seeking, medicine taking, and appointment keeping.

A test of the construct validity of the Health Locus of Control Scale developed by B. S. Wallston, Wallston, Kaplan, and Maides (1976) was presented by Lewis, Morisky, and Flynn (1978). Using a group of 285 ambulatory hypertensive patients in a large inner-city university hospital, the investigation was conducted to determine the effect of perceived assistance from a significant other in the home environment and the reinforcement value of health on the internal person's compliance behavior. Because the study by B. S. Wallston, Wallston, Kaplan, and Maides (1976) had not taken into account the effects of a supportive environment on health-related behavior, the researchers proposed that the more support the subject received from someone in the home environment and the more highly the subject values his or her health the more powerfully internality predicts compliance behavior. The 11 item Health Locus of Control Scale was administered as part of person-to-person home interviews or home interviews to the subjects. In addition, the subjects' medication compliance was measured by self-reported compliance scale during the same interview.

The highest levels of compliance behavior were reported by internally oriented subjects with high levels of perceived home assistance. This result was thought to be consistent with theoretical expectation. Lowest compliance was reported in externally oriented subjects with high perceived levels of home assistance. This result was also considered to be theoretically expected as subjects lacking a sense of personal control over outcomes of behavior would not report themselves to be in compliance even with environmental support. The researchers suggested that although the Health Locus of Control Scale held promise for future use based on its application in the health care setting, severe restrictions should be placed on its unconditional acceptance because of a low internal consistency in this study population.

Two studies were reported by K. A. Wallston, Maides, and Wallston (1976) which investigated the hypothesis that health-related information seeking is a joint function of the person's locus of control beliefs and the value that person places on health. Study 1 consisted of 88 college students who participated to fulfill an introductory psychology course requirement. After administration of a health-related locus of control



scale (B. S. Wallston, Wallston, Kaplan, & Maides, 1976), and a measurement of the values of health modeled after Rokeach's 1973 Value Survey, the subjects were exposed to a mildly threatening written message about the danger of hypertension. An opportunity was then given for the subjects to seek further information about this topic by choosing from among a list of pamphlets prepared by various health care professionals. Support was obtained for the hypothesis that health related information-seeking is a joint function of an internal health related locus of control belief and holding health in relatively high value.

Study 2 was a replication of Study 1 and was conducted in response to an unexpected finding that subjects seemed to choose pamphlets according to sex and role of author. Subjects for Study 2 were 97 volunteers who were either enrolled in a psychology class or who were contacted by telephone. Results from Study 2 gave greater confidence to the assertion that information-seeking about a little known health-related condition is a joint function of locus of control and value for health. No significant statistical correlation between sex and role of pamphlet author and choice of pamphlet by subject was demonstrated by the study. Implications for future

research were for additional locus of control studies in health areas for the purpose of prediction of health behavior (K. A. Wallston, Maides, & Wallston, 1976).

These studies have supported the belief that health behavior is largely affected by the patient's locus of control orientation. The degree to which individuals perceive a relationship between their actions and consequences affects health behavior and the extent to which the patient conforms to his therapeutic regimen. Health care professionals can gain much insight from consideration of these variables.

### Summary

In conclusion, a vast amount of research exists in which the variables of this study, locus of control and compliance to a medication or exercise regimen, are examined. Compliance has been studied from behavioral, sociological, physiological, and educational viewpoints with inconsistent results. Most research supports the view that medication compliance is more frequent than exercise compliance. The role of the nurse as a facilitator of increased compliance was directly or indirectly implied in many studies. Although most locus of control studies were conducted outside the health care setting,

the theoretical framework in each was compatible with health behavior compliance.

## CHAPTER 3

### PROCEDURE FOR COLLECTION AND TREATMENT OF DATA

The independent variable, locus of control, and the dependent variable, compliance, were investigated by means of a descriptive correlational study design (Polit & Hungler, 1978). This design is recommended by Polit and Hungler (1978) for studies which describe relationships between variables rather than infer cause-and-effect relationships. In the descriptive correlational study randomization is not necessary because the investigator does not manipulate or control the independent variable. Results obtained by descriptive correlational studies are often the impetus for further, more rigorous research.

#### Setting

The study was conducted in Wadley Hospital which is classified a general teaching hospital and located in Texarkana, Texas, an urban community with a population of approximately 50,000. Most patients come from a 50 mile radius in a four-state area. An associate degree nursing program and two vocational nursing programs use

Wadley Hospital for clinical learning experience. In addition, a small number of medical students study with preceptors at Wadley Hospital each year. Medical, administrative, and nursing staff encourage nursing research.

Wadley Hospital, with a 385-bed capacity, houses a medical floor with a 60-bed capacity and a 20-bed step-down cardiac unit. Approximately 30 staff physicians specialize in internal medicine and admit cardiac patients to those sections. In addition, patients may be transferred to this section from the 14-bed cardiac intensive care unit. An 85% occupancy rate and admission of approximately 2,340 cardiac patients annually suggested adequate availability of participants for the study.

#### Population and Sample

The population of this study included cardiac inpatients at Wadley Hospital. The subjects for the study were selected by convenience sampling from those cardiac patients at Wadley Hospital listed on the hospital census with a diagnosis of angina pectoris, myocardial infarction, or congestive heart failure and who were discharged on a treatment regimen of one or more of the following medications: vasodilators, antiarrhythmics, anticoagulants, digitalis, or diuretics. To be included in the

study, the patient also had to have an order for some form of post-discharge exercise. No effort was made to randomize the subjects once they met this criteria.

To minimize the effect of extraneous variables, selected subjects were included in the study. Subjects who were over 18 years of age and spoke English were selected for the study. Only those cardiac patients who were alert and whose disease process allowed the researcher to interview, administer the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974), and teach without undue physical stress were included in the study. Subjects were selected from those patients whose hospital stay was between 3 and 30 days. Only those subjects who would be responsible for their own medication and exercise program upon discharge were included in the study.

#### Protection of Human Subjects

When permission was received from the Human Research Review Committee (Appendix E), the Dean of the Graduate School of Texas Woman's University (Appendix E), Wadley Hospital (Appendix F), and oral permission from the physician to include the subject in the study, the selection of the sample began. After the subjects were

selected, the researcher explained to the subjects the procedure to be followed, associated discomforts or risks, benefits to be expected, alternative procedures which might be advantageous, and that their name would not be identified (Appendix G). Any inquiries concerning the procedures to be used were answered this time and a consent form was then signed (Appendix H). Before the research was begun, the subject understood that at any time he wished to withdraw from the study he could do so without consequence. Each subject understood that his care would not change whether or not he chose to participate in the study.

### Instruments

The independent variable, locus of control, was measured by means of the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). The scale was designed for self-administration by the subject. The subject indicated "yes" or "no" according to his belief about each statement. The test, consisting of 40 items, is written at a fifth grade reading level and can be answered in approximately 15 minutes (Appendix I). The score equals the number of external items endorsed and

can range from 40 (extremely external) to 0 (extremely internal).

The scale is group-referenced; the purpose of this scoring is for discovering trends within a particular group. There are no set group of scores indicating definite internality or definite externality. For assessment purposes, the scores are grouped from high to low. The median (or middle-most score) is suggested by Roueche and Mink (1976) for use with the Adult Nowicki-Strickland Internal-External (ANS-IE) Scale (Nowicki & Duke, 1974) to define the hypothetical cut-off between internals and externals. The higher the score, the more external the person (Roueche & Mink, 1976).

In this study use of the median split separated the subjects into two groups. Group 1 (the external group) consisted of those 15 persons whose scores ranged from 24 to 15 on the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). Group 2 (the internal group) consisted of those 15 persons whose scores ranged from 14 to 7 on the Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974).



### Validity

Extensive validation of the ANS-IE was done by Nowicki and Duke (1974). In one college sample ( $n = 48$ ), the ANS-IE and Scholastic Aptitude Test (SAT) score were not significantly correlated ( $r = .11$ ). The ANS-IE and Rotter I-E Scale (Rotter, 1966) were then administered to two college samples and to one community of adults. Congruent validity was established at satisfactory levels,  $r = .68$ ,  $df = 47$ ,  $p = .01$ ;  $r = .48$ ,  $df = 37$ ,  $p = .01$  (Roueche & Mink, 1976).

### Reliability

Three groups of college students ( $n = 156$ ) and a group of adults ( $n = 33$ ) from the general community (a suburb of a large metropolitan area in the Southeastern part of the United States) were examined in the gathering of psychometric data. The college students participated for credit in their introductory psychology course. They were predominantly members of the middle and upper-middle classes. The community adults were voluntary participants in the study of locus of control in children. They ranged from 26 to 30 years of age and were predominantly members of the upper-lower and lower-middle classes. All subjects were Caucasian. In addition to these subjects,

577 other subjects were administered the ANS-IE. These subjects included mental patients and Blacks.

The percentages of subjects in the test group answering in the external direction indicate the ANS-IE is moderately homogeneous. Split-half reliabilities ranged from .74 to .86, indicating satisfactory internal consistency, especially since the items are not arranged according to difficulty. Thus, the split-half reliabilities are an under-estimate of the true internal consistency reliability. For one group of college subjects ( $n = 48$ ), test-retest reliability for a 6-week period was  $r = .83$ , indicating good stability (Roueché & Mink, 1976).

The dependent variable, compliance, was measured by personal telephone interview at intervals of 1, 2, and 4 weeks following discharge from the hospital. The researcher asked each subject the number of times in the past week (7 days) he had taken his medication and performed his exercise according to his physician's orders. This information was then transferred into a medication and exercise form designed by the researcher (Appendix J).

## Data Collection

Using a median split the subjects were divided into two groups of 15 each by means of the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). The external group (Group 1) consisted of those persons whose scores ranged from 24 to 15. The internal group (Group 2) consisted of those persons whose scores ranged from 14 to 7.

Both groups then received similar instructions concerning the medication and exercise regimen. Because the purpose for the teaching of the prescribed medication and exercise regimen was to establish a comparable baseline of information for all participants in the study, no attempt was made to provide an in-depth teaching program. The information consisted of the physician's order for the drug in relation to frequency, dosage, route of administration, and a simplified explanation of the drug's purpose, action, side effects, and toxic symptoms. The explanation of the exercise regimen consisted of type, amount, and frequency.

Instruction sheets with the simplified instructions were given to the patient at the time of the discharge teaching (Appendix C and Appendix D). The subject was asked to repeat the information to verify the level of

understanding. The researcher explained the plan for post-discharge follow-up for the purpose of determining compliance and verified how the subject would be contacted at each of the time intervals.

The post-discharge follow-up was by means of telephone interviews at 1 week, 2 weeks, and 4 weeks following discharge (Appendix J). At this time the researcher questioned the subject concerning the variables discussed during the in-patient instruction phase of the study. To decrease bias, the researcher derived the information by means of a general, non-threatening conversation. Specific information relating to compliance was elicited by beginning the conversation with the following statement:

In talking to patients who have been discharged from the hospital, many have found that they are unable to take their medicine and perform their exercise as prescribed. I wonder what have been your experiences this past week?

The information was placed onto the medication and exercise compliance sheets designed for this purpose (Appendix J).

#### Treatment of Data

At intervals of 1, 2, and 4 weeks following discharge, the subjects were contacted by telephone and

asked the number of days in the past week they had followed their medication and exercise regimen as their physician had prescribed. A percentage of compliance for each subject per week was calculated by dividing the number of days the subject stated he was in compliance by the number of days in a week (7). This calculation was determined for each subject in Group 1 and Group 2 at each of the three time intervals. The mean percentage was then determined. Using a 2 x 3 factorial design a separate calculation was figured for medication compliance and for exercise compliance. This method of calculation allowed for comparison of each subject's compliance across time, each group's compliance across time, comparison of compliance between groups at each interval, or total compliance between the two groups of medication and for exercise. Support of rejection of the hypotheses was determined by comparing the mean percentage of the total measurements of the two groups. Throughout the study the significance level was .05.

## CHAPTER 4

### ANALYSIS OF DATA

This study was conducted to determine if a relationship existed between locus of control and compliance to the prescribed medication and exercise regimen in a group of cardiac patients. Hypothesizing that cardiac patients with an internal locus of control would be more compliant to a medication and exercise regimen than cardiac patients with an external locus of control, the subjects were assigned to an internal or external group based on scores obtained from the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). To assure that all subjects entered the study with a similar baseline of knowledge, the medication and exercise regimens were explained to each subject before discharge from the hospital. At intervals of 1 week, 2 weeks, and 4 weeks following discharge, a telephone interview was conducted with each subject to determine the degree of compliance to the medication and exercise regimen. Support or rejection of the hypotheses was by comparison of the reported compliance with the locus of control scores.

Description of Sample

On the sample of 30 subjects, 4 (13%) were listed on the hospital census with a diagnosis of congestive heart failure. A diagnosis of angina pectoris accounted for the highest frequency of subjects, 17 (57%). Myocardial infarction was the diagnosis of the remaining 9 (30%) of the subjects.

Twice as many males (20 subjects or 66.7%) as females (10 subjects or 33.3%) participated in the study. Caucasian males comprised the largest single group in the study, 40% (12 subjects). Black males accounted for 23.3% of the sample (7 subjects), and 1 Acadian French male (3.3%) represented the remainder of the male subjects. Of the female subjects, 20% (6 subjects) were Caucasian and the remainder, 13.3% (4 subjects), were Black.

Of the sample, 13.3% (4 subjects), were from 31-40 years of age and 10% (3 subjects) were from 51-60 years of age. Ages 61-70 and 71-80 comprised the largest group of participants with 30% (9 subjects) in each group. Of the remaining subjects, 1 subject who represented 3.3% of the group was 82 years of age.

Individual differences in locus of control were measured using the Adult Nowicki-Strickland Internal-External (ANS-IE) (Nowicki & Duke, 1974). The range of

scores was from 24 to 7; the higher the scores, the greater external control. Appendix I presents the distribution of the participants by locus of control.

### Findings

The first hypothesis of the study was that cardiac patients with an internal locus of control are more compliant to a medication regimen than are cardiac patients with an external locus of control. Using a two-way factorial analysis of variance design with two levels of locus of control and three repeated measures of medication compliance, the results were  $F = 2.96 (1,28), p > .05$ . The results of this hypothesis were not statistically supported, indicating that locus of control does not appear to be a useful predictor of compliance with the medication regimen in the cardiac patient. The data for this hypothesis are presented in Table 1.

Although the first hypothesis was not statistically supported, the internal group was more compliant to the medication regimen than the external group in total weeks and at weeks 1, 2, and 4. At week 1 the internal group was compliant with the medication regimen an average of 6.6 days (94%) compared to 5.3 days or 76% of the time in the external group. At week 2 the internal group again



Table 1  
Analysis of Variance for Medication Compliance  
and Locus of Control

Source of Variance	Sum of Squares	Degrees of Freedom	Variance Estimate	<u>F</u>
Between Subjects	185.95	29		
Rows	17.7	1	17.7	2.96
S/R	168.17	28	6.01	
Within Subjects	21.3	60	.74	2.24
Columns	1.48	2	.81	2.45
R x C	1.62	2	.33	
SC/R	<u>18.2</u>	<u>56</u>		
Total	207.28	89		

S/R: Subjects-within-groups sum of squares.

R x C: Row by column.

SC/R: Column-by-subject interaction.

reported compliance to the medication regimen 6.6 days or 94% compared to 5.9 days (85%) in the external group. The internal group reported an average compliance of 6.4 days (91%) at the end of week 4 compared to 5.7 days (81%) in the external group. The mean for all weeks in the internal group was 6.5 days (93%), or more than a day above the mean for the externals which was 5.6 days (81%). The internal group exceeded the external group in compliance by 1.3 days (19%) at week 1, 0.7 day (10%) at week 2, 0.7 day (10%) at week 4, and an average of 0.9 day (13%) in total weeks. These data are summarized in Table 2.

The findings showed that all subjects failed to comply about 1 day a week. At week 1 the average days of compliance for all subjects was 6 days (85%). Week 2 showed the highest average days in compliance for all subjects, 6.3 days (90%). At week 4 the subjects reported compliance an average of 6.0 days (86%). Throughout the study all subjects reported an average of 6.1 days (87%) of medication compliance. These results are also shown in Table 2.

The second hypothesis of the study was that cardiac patients with an internal locus of control are more compliant to an exercise regimen than are cardiac patients

Table 2

Medication Compliance between  
Weeks by Groups

Week	Group 1 Externals	Group 2 Internals	Difference between Groups	Total Group Mean
<u>Week 1</u>				
Mean Days	5.3	6.6	1.3	6.0
Percentage	76%	94%	19%	85%
<u>Week 2</u>				
Mean Days	5.9	6.6	0.7	6.3
Percentage	85%	94%	10%	90%
<u>Week 4</u>				
Mean Days	5.7	6.4	0.7	6.0
Percentage	81%	91%	10%	86%
<u>Mean Compliance</u>				
Mean Days	5.6	6.5	0.9	6.1
Percentage	81%	93%	13%	87%

with an internal locus of control. Data for this hypothesis were also measured using a two-way factorial analysis of variance design with two levels of locus of control and three repeated measures of exercise compliance. The second hypothesis was not statistically supported,  $F = 2.91, (1,28), p > .05$ , indicating that locus of control does not seem to be a useful indicator of compliance to the exercise regimen in cardiac patients. These results are summarized in Table 3.

Although the second hypothesis was not statistically supported, the internal group was in compliance more days than the external group at weeks 1, 2, and 4 and in total weeks. The internal group reported compliance to the exercise regimen 4.1 days (58%) at week 1 in comparison to the external group which reported compliance 3.1 days (44%). At week 2 both groups reported higher rates of compliance with the internal group reporting 4.5 days (64%) and the external group reporting 3.7 days (52%). Internals continued to be more compliant at week 4 with 5.1 days (73%) and 2.9 days (42%) for the externals. Of the total weeks the internal group averaged 4.6 days (65%) in compliance and the external group averaged 3.2 days (46%) in compliance. The internal group exceeded the external group by 1 day (14%) at week 1, 0.8 day (11%)

Table 3

Analysis of Variance for Exercise Compliance  
and Locus of Control

Source of Variance	Sum of Squares	Degrees of Freedom	Variance Estimate	<u>F</u>
Between Subjects	424.8	29		
Rows	40	1	40	2.91
S/R	384.8	28	13.75	
Within Subjects	136.00	60		
Columns	4.68	2	2.34	1.07
R x C	8.6	2	4.3	1.96
SC/R	<u>122.71</u>	<u>56</u>	2.19	
Total	560.8	89		

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S/R: Subjects-within-groups sum of squares.

R x C: Row by column.

SC/R: Column-by-subject interaction.

at week 2, and 2.2 days (31%) at week 4 with an average for all weeks of 1.4 days (20%). These results are summarized in Table 4.

The findings showed that all groups failed to comply about 3 days a week at each of the time intervals. All subjects averaged 3.6 days of compliance (51%) at week 1. The highest average exercise compliance in both groups was reported at week 2 with 4.1 days of compliance (58%). The subjects averaged 4 days of compliance (58%) at week 4. The overall average for exercise compliance in all subjects was 3.9 days (55%). Table 4 presents this data.

Additional findings in the study suggested relationships between medication and exercise compliance in internals, externals, and in the total of both groups. The externals averaged compliance to medication 5.6 days (81%) and 3.2 days (46%) to exercise. The internal group reported an average compliance to the medication regimen 6.5 days (93%) and 4.6 days (65%) to the exercise regimen. All subjects averaged 6.1 days (87%) of medication compliance and 3.9 days (55%) of exercise compliance. These findings show externals averaging compliance to medication 2.4 days (34%) a week more than to exercise and internals compliant to medication an average of 1.9

Table 4

Exercise Compliance between  
Weeks by Groups

Week	Group 1 Externals	Group 2 Externals	Difference between Groups	Total Group Mean
<u>Week 1</u>				
Mean Days	3.1	4.1	1.0	3.6
Percentage	44%	58%	14%	51%
<u>Week 2</u>				
Mean Days	3.7	4.5	0.8	4.1
Percentage	52%	64%	11%	58%
<u>Week 4</u>				
Mean Days	2.9	5.1	2.2	4.0
Percentage	42%	73%	31%	58%
<u>Mean Compliance</u>				
Mean Days	3.2	4.6	1.4	3.9
Percentage	46%	65%	20%	55%

days (27%) more than to exercise. All subjects averaged 2.2 days a week (31%) more compliance to medication than to exercise. Table 5 summarizes these findings.

When comparing medication and exercise compliance by weeks, all subjects reported a higher rate of compliance to medication than to exercise at each interval. At week 1 the subjects averaged 6 days (85%) compliance to medication and 3.6 days (51%) to exercise. Both groups reported a higher rate of compliance to both medication and exercise at week 2 with 6.3 days (90%) compliance to medication and 4.1 days (58%) compliance to exercise. At week 4 the compliance rate was 6 days (86%) to medication and 4 days (58%) to exercise. The groups complied a minimum of 2 days a week more to medication than to exercise. At week 1 the difference in medication compliance was 2.4 days (34%). At week 2 the difference in compliance was reported to be 2.2 days (31%). The smallest difference between medication and exercise compliance was 2 days (29%) and was reported at week 4. Table 6 summarizes these findings.

The external group was consistently more compliant to the medication regimen at each of the time intervals by more than 2 days. At week 1 the external group reported a compliance to medication an average of 5.3



Table 5  
Comparison of Medication and Exercise  
Compliance by Groups

Groups	Medication	Exercise	Difference between Medication and Exercise
<u>Group 1--External</u>			
Mean Days	5.6	3.2	2.4
Percentage	81%	46%	34%
<u>Group 2--Internal</u>			
Mean Days	6.5	4.6	1.9
Percentage	93%	65%	27%
<u>Total Group</u>			
Mean Days	6.1	3.9	2.2
Percentage	87%	55%	31%

Table 6  
Comparison of Medication and Exercise Compliance  
of all Subjects by Weeks

Weeks	Medication Compliance	Exercise Compliance	Difference between Medication and Exercise
<u>Week 1</u>			
Mean Days	6.0	3.6	2.4
Percentage	85%	51%	34%
<u>Week 2</u>			
Mean Days	6.3	4.1	2.2
Percentage	90%	58%	31%
<u>Week 4</u>			
Mean Days	6.0	4.0	2.0
Percentage	86%	58%	29%

days (76%) and an average of 3.1 days (44%) to the exercise regimen. Medication compliance was reported to be 5.9 days (85%) at 2 weeks compared to 3.7 days (52%) for exercise compliance. At week 4 the medication compliance was 5.7 days (81%) and the exercise compliance was 2.9 days (42%). The difference between the medication and exercise regimen in the external group for weeks 1 and 2 was 2.2 days (31%). At week 4 the difference between medication and exercise compliance was 2.8 days (40%). The external group seemed to follow no particular pattern with medication compliance across time. The exercise compliance decreased consistently across the three time intervals and a consistent increase between medication and exercise compliance was observed in the external group. These data are presented in Table 7.

Internals consistently reported higher rates of compliance to the medication regimen than to the exercise regimen at each of the time intervals. At week 1 the internals complied to the medication regimen 6.6 days (94%) and to the exercise regimen 4.1 days (50%). At 2 weeks the compliance to the medication regimen, 6.6 days (94%), was the same as week 1; however, the compliance to the exercise regimen had increased to 4.5 days (64%). Compliance to the medication regimen at week 4 was

Table 7

Comparison of Medication and Exercise Compliance  
by Weeks for Group 1, Externals

Weeks	Medication Compliance	Exercise Compliance	Mean Difference between Medication and Exercise
<u>Week 1</u>			
Mean Days	5.3	3.1	2.2
Percentage	76%	44%	31%
<u>Week 2</u>			
Mean Days	5.9	3.7	2.2
Percentage	85%	52%	31%
<u>Week 4</u>			
Mean Days	5.7	2.9	2.8
Percentage	81%	42%	40%

reported as 6.4 days (91%) and with exercise the days of compliance were reported as 5.1 or 73%. The differences in medication and exercise compliance for the internal group was 2.5 days (36%) at week 1, 2.1 days (30%) at week 2, and 1.3 days (19%) at week 4. The internal group was more consistent in medication compliance across time, dropping only 0.2 days (3%) from the beginning of the study to the end of week 4. The days of compliance to the exercise regimen consistently increased throughout the study in the internal group and the differences between medication and exercise compliance consistently decreased in the internal group throughout the time intervals in the study. These data are shown in Table 8.

#### Summary of Findings

The two hypotheses of the study: that cardiac patients with an internal locus of control are more compliant to a medication regimen than external cardiac patients and that cardiac patients with an internal locus of control are more compliant to an exercise regimen than external cardiac patients were not found to be statistically significant at the .05 level. When comparing mean days and mean percentages of compliance, internals were consistently more compliant to both

Table 8

Comparison of Medication and Exercise Compliance  
by Weeks for Group 2, Internals

Weeks	Medication Compliance	Exercise Compliance	Mean Difference between Medication and Exercise
<u>Week 1</u>			
Mean Days	6.6	4.1	2.5
Percentage	94%	50%	36%
<u>Week 2</u>			
Mean Days	6.6	4.5	2.1
Percentage	94%	64%	30%
<u>Week 4</u>			
Mean Days	6.4	5.1	1.3
Percentage	91%	73%	19%

medication and exercise than externals. In addition, both groups were consistently more compliant to medication than to exercise. Although no particular pattern seemed to emerge when comparing compliance between weeks, internals appeared more consistent in their degree of compliance than did externals.

## CHAPTER 5

### SUMMARY OF THE STUDY

Based on the construct internal-external locus of control developed from Rotter's social learning theory (Rotter, 1954, 1966), this study was conducted to determine if cardiac patients with an internal locus of control were more compliant to a medication and exercise regimen than were cardiac patients with an external locus of control. Two hypotheses were tested based on the problem of the study. The first hypothesis was that cardiac patients with an internal locus of control are more compliant to a medication regimen than are cardiac patients with an external locus of control. The second hypothesis was that cardiac patients with an internal locus of control are more compliant to an exercise regimen than are cardiac patients with an external locus of control.

#### Summary

The sample for the study was drawn from in-patients at Wadley Hospital, a 385-bed general teaching hospital in Texarkana, Texas. Thirty subjects were selected by



convenience sampling from those cardiac patients at Wadley Hospital listed on the hospital census with a diagnosis of angina pectoris, myocardial infarction, or congestive heart failure, and who were discharged on a treatment regimen of one or more of the following medications: vasodilators, antiarrhythmics, anticoagulants, digitalis, or diuretics. To be included in the study, the subjects must have had also a physician's order for some form of post-discharge exercise.

The independent variable, locus of control, was measured by means of the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). The subjects were divided into two groups of 15 each based on the results of the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). Using a median split for the data obtained from the subjects, Group 1 (externals) consisted of those persons whose score was 24 through 15. Group 2 (internals) consisted of those persons whose score was 14 through 7. To establish a baseline of information for all subjects in the study, brief oral and written instructions about the medication and exercise regimen were given by the researcher to all subjects before discharge from the hospital.

The dependent variable, compliance, was measured by personal telephone interview at intervals of 1, 2, and 4 weeks following discharge from the hospital. Each subject was asked the number of times in the past week (7 days) he had taken his medication and performed his exercise according to his physician's orders. A mean percentage for compliance in each week was calculated by dividing the number of days the subject stated he was in compliance by the number of days in that week (7). Using a 2 x 3 factorial design a separate calculation was figured for medication compliance and for exercise compliance.

The first hypothesis of the study, that cardiac patients with an internal locus of control are more compliant to a medication regimen than are cardiac patients with an external locus of control, was not statistically supported at the .05 level,  $F = 2.96 (1,28)$ ,  $p > .05$ . The second hypothesis of the study, that cardiac patients with an internal locus of control are more compliant to an exercise regimen than are cardiac patients with an external locus of control was not statistically supported at the .05 level,  $F = 2.91 (1,28)$ ,  $p > .05$ .

### Discussion of Findings

Locus of control was not found in this study to be statistically associated with compliance to the prescribed medication or exercise regimen in cardiac patients. Because the compliance rate to both medication and exercise regimens was measured in this study by the self-report method, a more objective measurement of compliance may have shown a statistically significant relationship between locus of control and compliance. In this study the self-reported total medication compliance of both groups was 6.1 days or 87% and the total self-reported exercise compliance of both groups was 3.9 days or 55%. These findings are inconsistent with Davis (1968) who stated that one-third of the studies reported a compliance rate of 50% or less and that 40% of the patients openly admitted that they never intended to comply with the physician's recommendations. Sackett (1976) reported compliance rates from 8% to 90% with an average of about 50%.

This study included all subjects in the statistical analysis although 10 of the subjects' scores were at the median. Rotter (1975) indicated that most of the researchers had used a median split to determine internality and externality. However, he warned that when

using median scores, some subjects who were once classified as externals could also be considered as internals in subsequent studies. Roueche and Mink (1976) suggested use of the median split with the Adult Nowicki-Strickland Internal-External Scale (ANS-IE) (Nowicki & Duke, 1974). Conceivably, a sample of more than 30 subjects may have revealed different findings since scores of one-third of the subjects in this study were at the median.

Even though not statistically significant, throughout this study internals tended to be more compliant to the medication regimen (6.5 days a week or 93%) than externals (5.6 days a week or 81%). The same consistency was also observed in exercise compliance with internals reporting an overall compliance rate of 4.6 days a week or 65%, and externals reporting an overall compliance rate of 3.2 days a week or 46%. These findings are consistent with studies by Wenerowicz et al. (1978) who found that internals were more compliant to the prescribed medication regimen than were externals.

Medication compliance was consistently reported more frequently in this study than exercise compliance in both groups across all time intervals. This finding is compatible with Mayo's (1978) review of exercise

compliance literature in which he stated that compliance to the exercise program was a major problem because the exercise prescription demands significant changes in established habits of life style whereas taking medicine changes habits very little.

In conclusion, results from this study failed to statistically support the hypotheses that cardiac patients with an internal locus of control are more compliant to a medication and exercise regimen than cardiac patients with an external locus of control at the .05 level. Because the study results consistently indicated more compliance in internals than in externals in both exercise and medication at a level less than the .05 significance, the findings may have been due to internal weaknesses in the design. The median split affected one-third of the subjects. A larger sample may have decreased this problem. Eliminating the median split and placing all subjects on a continuum from highly external to highly internal may have generated significant results. The highly subjective self-report measurement of medication and exercise compliance may have resulted in inaccurate data. The study results indicated higher rates of compliance to the medication regimen than to the exercise regimen in all subjects across all time intervals.

### Conclusions and Implications

Conclusions from this study are:

1. Locus of control was not shown in this study to be statistically associated with compliance to the medication and exercise regimen of cardiac patients.
2. Absence or presence of reinforcement by the health care team may have affected some degree of variance in the knowledge base of subjects in the study.
3. Cardiac patients in this study were more likely to comply to those health behaviors which did not require a major change in life style.

The implication from this study is:

Although the results of this study failed to show a statistical relationship between locus of control and compliance to the medication and exercise regimen, some cardiac patients failed to fully comply. Further investigation into those behaviors which affect compliance should give direction for planning medication and exercise regimens which elicit compliance. Because nurses spend more time with the patient than any other health professional, they are in a unique position for developing these research studies and designing nursing interventions to increase compliance based on the study results.

Recommendations

Based upon the conclusions, recommendations for further study are:

1. Replication of this study using more subjects and the median split to determine locus of control
2. Replication of this study with elimination of the median split for determining locus of control
3. Replication of this study with a more objective method of reporting compliance
4. Replication of this study using a locus of control scale which is based on health behaviors.

Recommendations for further studies in related areas are:

1. Examination of the effects of reinforcement of internal behaviors and extinction of external behaviors when implementing nursing care for groupf of patients
2. Determination of the effect of locus of control on other health behaviors
3. Development of a reliable, simple, and objective method of measuring compliance.

## APPENDIX A



## MEDICATION INSTRUCTION SHEET

Date \_\_\_\_\_

Name \_\_\_\_\_ Physician \_\_\_\_\_

## MEDICATION ORDERS

Medication	Route
Directions	

Instructions

Medication	Route
Directions	

Instructions

Medication	Route
Directions	

Instructions

Medication	Route
Directions	

Instructions

Medication	Route
Directions	

Instructions

---

## APPENDIX B

EXERCISE INSTRUCTION SHEET

Date \_\_\_\_\_

Name \_\_\_\_\_ Physician \_\_\_\_\_

EXERCISE ORDERS

Exercise  
Directions

Instructions

Exercise  
Directions

Instructions

Exercise  
Directions

Instructions

## APPENDIX C

## SAMPLE MEDICATION INSTRUCTION SHEET

Date February 1, 1980Name M. Smith Physician J. Jones

---

MEDICATION ORDERS

---

Medication	Digoxin 0.125 mg	Route
Directions		Oral
	1 tablet daily	

Instructions Report to physician nausea, loss of appetite,  
or stomach upset.

---

Medication	Lasix 20 mg.	Route
Directions		Oral
	1 tablet daily	

Instructions If stomach upset occurs, take with food or  
milk; take with potassium rich foods, as  
dried fruits, bananas, or orange juice.

---

Medication		Route
Directions		

Instructions

---

Medication		Route
Directions		

Instructions

---

Medication		Route
Directions		

Instructions

---

## APPENDIX D

## SAMPLE EXERCISE INSTRUCTION SHEET

Date February 1, 1980Name M. Smith Physician J. Jones

---

EXERCISE ORDERS

---

Exercise Walk

Directions

15 minutes daily

Instructions Walk at constant pace at highest rate which is comfortable. Discontinue and report to physician if discomfort persists for more than 5 minutes after exercise has stopped.

---

Exercise

Directions

Instructions

---

Exercise

Directions

Instructions

---

## APPENDIX E



TEXAS WOMAN'S UNIVERSITY

Humar. Research Committee

Name of Investigator: Lou Ella Humphrey Center: Dallas  
 Address: 1203 East 33rd St. Date: 10/4/79  
Texarkana, Arkansas

Dear Ms. Humphrey:

Your study entitled Locus of Control and Compliance in Cardiac Patients has been reviewed by a committee of the Human Research Review Committee and it appears to meet our requirements in regard to protection of the individual's rights.

Please be reminded that both the University and the Department of Health, Education and Welfare regulations require that written consents must be obtained from all human subjects in your studies. These forms must be kept on file by you.

Furthermore, should your project change, another review by the Committee is required, according to DHEW regulations.

Sincerely,



Chairman, Human Research  
Review Committee

at Dallas

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TEXAS WOMAN'S UNIVERSITY

DENTON, TEXAS 76204

THE GRADUATE SCHOOL

March 7, 1980

Mrs. Lou Ella Langley Humphrey  
1203 East 33rd Street  
Texarkana, Arkansas 75502

Dear Mrs. Humphrey:

I have received and approved the Prospectus for your research project. Best wishes to you in the research and writing of your project.

Sincerely yours,



Margaret J. Ferrell  
Acting Provost of the  
Graduate School

NF:d1

cc Dr. Beth Vaughan-Wrobel  
Dr. Anne Gudmundsen  
Graduate Office

## APPENDIX F

TEXAS WOMAN'S UNIVERSITY  
COLLEGE OF NURSING

AGENCY PERMISSION FOR CONDUCTING STUDY\*

THE Wadley Hospital

GRANTS TO Lou Ella Humphrey

a student enrolled in a program of nursing leading to a Master's Degree at Texas Woman's University, the privilege of its facilities in order to study the following problem.

Locus of Control and Compliance in Cardiac Patients

The conditions mutually agreed upon are as follows:

1. The agency (may) (may not) be identified in the final report.
2. The names of consultative or administrative personnel in the agency (may) (may not) be identified in the final report.
3. The agency (wants) (does not want) a conference with the student when the report is completed.
4. The agency is (willing) (unwilling) to allow the completed report to be circulated through interlibrary loan.
5. Other \_\_\_\_\_

Date: Oct 11, 1979

Jimmy Bennett, R.N., C.N., Dir. Neg.  
Signature of Agency Personnel

Lou Ella Humphrey  
Signature of Student

Bob C. Humphreys, R.N., Ed.D.  
Signature of Faculty Advisor

\*Fill out & sign three copies to be distributed as follows:  
Original - Student; First copy - Agency; Second copy - TWU College of Nursing.

## APPENDIX G

## ORAL EXPLANATION TO BE GIVEN TO THE PATIENT

"My name is Lou Ella Humphrey. I am a registered nurse enrolled in graduate study at Texas Woman's University in Dallas, Texas. I am conducting research to determine reasons why people take their medicine and do the exercise prescribed by their physician. Your physician has given permission for me to ask you to participate in the study. If you choose to participate, I will administer to you a written survey which asks how you feel about 40 statements. Then I will explain to you about the medicine and exercise your physician wants you to take. I will be calling you about three times in the first month after you have left the hospital to see how you are doing.

Your name will not be used in any way with the results of this study. Your physician will not be told if you have or have not taken your medicine and exercise as he suggested.

Any time you are fatigued and wish to withdraw from the study for fatigue or for any other reasons, you may do so. Your care will not be altered in any way if you choose to or not to participate in the study or if you withdraw at any time.

The results of this study will be used to better plan nursing care for patients like you. At any time you would

like to talk with me about this study or the results, I will be happy to talk with you."

## APPENDIX H



CONSENT FORM

TEXAS WOMAN'S UNIVERSITY

Consent to Act as a Subject for Research and Investigation:

1. I hereby authorize Lou Ella Humphrey, R.N. to perform the following procedures:
  1. Administration of a 15 minute 40 item survey which asks my "yes" or "no" response according to my belief about each statement.
  2. Brief instructions concerning the things that my physician has prescribed for me when I go home.
  3. A series of approximately three contacts, preferably by telephone, by the researcher during the first month I am at home from the hospital to see how I am doing the things my physician has prescribed.
2. The procedures listed in Paragraph 1 has been explained to me by Lou Ella Humphrey, R.N.
3. (a). I understand that the procedures described in Paragraph 1 involved the following possible risks or discomforts:

1. The approximate time of one hour necessary for testing and teaching may fatigue me but I have been assured that I may withdraw from the study at any time without alteration in my care.
2. I may have concern that my identity may be inadvertently used in connection with the results of this study but the researcher has agreed that my identity will not be used.
3. I may have concern that my physician will know if I have not done the things at home that he has prescribed for me, however, the researcher has stated that the physician will be told of general results of this study and then only upon request.
4. I may have concern that my care will be altered if I do not choose to participate in this study, however the researcher has assured me that my care will remain the same regardless of my participation in the study.

(b). I understand that the procedures described in Paragraph 1 have the following potential benefits to myself and/or others:

The results of this study will help my nurses to better plan nursing care for myself and for other patients in

the future. The results of this study may also form the basis of other studies which also will help for planning of better nursing care for myself and others.

4. An offer to answer all of my questions regarding the study has been made. If alternative procedures are more advantageous to me, they have been explained. I understand that I may terminate my participation in the study at any time.

---

Subject's Signature

---

Date

## APPENDIX I

**NOWICKI-STRICKLAND  
INTERNAL-EXTERNAL TEST  
(OPINION SURVEY)**

STERLING  
SWIFT publishing company  
p. o. box 186  
manchaca, texas 78652

## OPINION SURVEY

## INSTRUCTIONS:

Below are a number of questions about various topics. They have been collected from different groups of people and represent a variety of opinions. There are no right or wrong answers to this questionnaire; we are only interested in your opinions on these questions. Please circle "yes" or "no" for each question below.

- |   |     |    |
|---|-----|----|
| 1. Do you believe that most problems will solve themselves if you just don't fool with them?                        | YES | NO |
| 2. Do you believe that you can stop yourself from catching a cold?  | YES | NO |
| 3. Are some people just born lucky?   | YES | NO |
| 4. Most of the time do you feel that getting good grades meant a great deal to you?                                 | YES | NO |
| 5. Are you often blamed for things that just aren't your fault?   | YES | NO |
| 6. Do you believe that if somebody studies hard enough he or she can pass any subject?                              | YES | NO |
| 7. Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?         | YES | NO |
| 8. Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do? | YES | NO |
| 9. Do you feel that most of the time parents listen to what their children have to say?                             | YES | NO |
| 10. Do you believe that wishing can make good things happen?  | YES | NO |
| 11. When you get punished does it usually seem it's for no good reason at all?                                      | YES | NO |
| 12. Most of the time do you find it hard to change a friend's (mind) opinion?                                       | YES | NO |
| 13. Do you think that cheering more than luck helps a team to win?  | YES | NO |
| 14. Did you feel that it was nearly impossible to change your parent's mind about anything?                         | YES | NO |

- |     |   |     |    |
|-----|---|-----|----|
| 15. | Do you believe that parents should allow children to make most of their own decisions ?   | YES | NO |
| 16. | Do you feel that when you do something wrong there's very little you can do to make it right ?                                    | YES | NO |
| 17. | Do you believe that most people are just born good at sports ?  | YES | NO |
| 18. | Are most of the other people your age stronger than you are ?   | YES | NO |
| 19. | Do you feel that one of the best ways to handle most problems is just not to think about them ?                                   | YES | NO |
| 20. | Do you feel that you have a lot of choice in deciding who your friends are ?  | YES | NO |
| 21. | If you find a four leaf clover, do you believe that it might bring you good luck ?  | YES | NO |
| 22. | Did you often feel that whether or not you did your homework had much to do with what kinds of grades you got ?                   | YES | NO |
| 23. | Do you feel that when a person your age is angry at you, there's little you can do to stop him or her ?                           | YES | NO |
| 24. | Have you ever had a good luck charm ?   | YES | NO |
| 25. | Do you believe that whether or not people like you depends on how you act ?   | YES | NO |
| 26. | Did your parents usually help you if you asked them to ?  | YES | NO |
| 27. | Have you felt that when people were angry with you it was usually for no reason at all ?  | YES | NO |
| 28. | Most of the time, do you feel that you can change what might happen tomorrow by what you do today ?                               | YES | NO |
| 29. | Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them ? | YES | NO |
| 30. | Do you think that people can get their own way if they just keep trying ?   | YES | NO |
| 31. | Most of the time do you find it useless to try to get your own way at home ?  | YES | NO |

- |     |  |     |    |
|-----|--|-----|----|
| 32. | Do you feel that when good things happen they happen because of hard work?   | YES | NO |
| 33. | Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?                        | YES | NO |
| 34. | Do you feel that it's easy to get friends to do what you want them to do?  | YES | NO |
| 35. | Do you usually feel that you have little to say about what you get to eat at home?   | YES | NO |
| 36. | Do you feel that when someone doesn't like you there's little you can do about it?   | YES | NO |
| 37. | Did you usually feel that it was almost useless to try in school because most other children were just plain smarter than you are? | YES | NO |
| 38. | Are you the kind of person who believes that planning ahead makes things turn out better?  | YES | NO |
| 39. | Most of the time, do you feel that you have little to say about what your family decides to do?                                    | YES | NO |
| 40. | Do you think it's better to be smart than to be lucky?   | YES | NO |



ADULT NOWICKI-STRICKLAND SCALE ITEMS, ITEM-DIFFICULTIES, AND ITEM-TOTAL  
CORRELATIONS WITH THAT ITEM-MISSING FOR SUBJECTS IN THE COLLEGE AND COMMUNITY SAMPLES

Item		College (n = 154)		Community (n = 33)	
		Cor. <sup>1</sup>	% E <sup>2</sup>	Cor. <sup>1</sup>	% E <sup>2</sup>
(Y)	1. Do you believe that most problems will solve themselves if you just don't fool with them?	.04	10	.06	16
(N)	2. Do you believe that you can stop yourself from catching a cold?	.28	55	.15	32
(Y)	3. Are some people just born lucky?	.12	31	.35	33
(N)	4. Most of the time do you feel that getting good grades meant a great deal to you?	.02	17	.33	36
(Y)	5. Are you often blamed for things that just aren't your fault?	.25	24	.33	26
(N)	6. Do you believe that if somebody studies hard enough he or she can pass any subject?	.25	31	.15	42
(i)	7. Do you feel that most of the time it doesn't pay to try hard because things never turn out right anyway?	.11	3	.20	12
(Y)	8. Do you feel that if things start out well in the morning that it's going to be a good day no matter what you do?	.01	24	.08	21
(N)	9. Do you feel that most of the time parents listen to what their children have to say?	.30	45	.36	47
(y)	10. Do you believe that wishing can make good things happen?	.13	86	.23	11

		<u>College (n = 154)</u>		<u>Community (n = 131)</u>	
Item		Cor. <sup>1</sup>	% E <sup>2</sup>	Cor. <sup>1</sup>	% E <sup>2</sup>
(Y)	11. When you get punished does it usually seem it's for no good reason at all?	.02	10	.43	12
(Y)	12. Most of the time do you find it hard to change a friend's (mind) opinion?	.53	44	.28	40
(N)	13. Do you think that cheering more than luck helps a team to win?	.23	27	.32	19
(Y)	14. Did you feel that it was nearly impossible to change your parent's mind about anything?	.48	17	.40	40
(N)	15. Do you believe that parents should allow children to make most of their own decisions?	.02	6	.18	12
(Y)	16. Do you feel that when you do something wrong there's very little you can do to make it right?	.43	10	.33	19
(Y)	17. Do you believe that most people are just born good at sports?	.46	38	.09	47
(Y)	18. Are most of the other people your age stronger than you are?	.36	20	.07	21
(Y)	19. Do you feel that one of the best ways to handle most problems is just not to think about them?	.01	1	.03	46
(N)	20. Do you feel that you have a lot of choice in deciding who your friends are?	.40	6	.19	10

Item		<u>College (n = 154)</u>		<u>Community (n = 33)</u>	
		Cor. <sup>1</sup>	$\chi^2$	Cor. <sup>1</sup>	$\chi^2$
(Y) 21.	If you find a four leaf clover, do you believe that it might bring you good luck?	.06	24	.22	14
(N) 22.	Did you often feel that whether or not you did your homework had much to do with what kind of grades you got?	.05	10	.21	19
(Y) 23.	Do you feel that when a person your age is angry at you, there's little you can do to stop him or her?	.35	6	.31	14
(Y) 24.	Have you ever had a good luck charm?	.03	38	.17	47
(N) 25.	Do you believe that whether or not people like you depends on how you act?	.11	4	.17	10
(N) 26.	Did your parents usually help you if you asked them to?	.04	1	.09	46
(Y) 27.	Have you felt that when people were angry with you it was usually for no reason at all?	.39	7	.44	10
(N) 28.	Most of the time, do you feel that you can change what might happen tomorrow by what you do today?	.01	1	.08	12
(Y) 29.	Do you believe that when bad things are going to happen they just are going to happen no matter what you try to do to stop them?	.31	21	.28	37
(N) 30.	Do you think that people can get their own way if they just keep trying?	.25	41	.07	16

Item		College (n = 154)		Community (n = 11)	
		Cor. <sup>1</sup>	% E <sup>2</sup>	Cor. <sup>1</sup>	% E <sup>2</sup>
(Y)	31. Most of the time do you find it useless to try to get your own way at home?	.09	6	.60	16
(N)	32. Do you feel that when good things happen they happen because of hard work?	.10	24	.28	26
(Y)	33. Do you feel that when somebody your age wants to be your enemy there's little you can do to change matters?	.45	21	.53	35
(N)	34. Do you feel that it's easy to get friends to do what you want them to do?	.31	51	.28	23
(Y)	35. Do you usually feel that you have little to say about what you get to eat at home?	.56	10	.29	28
(Y)	36. Do you feel that when someone doesn't like you there's little you can do about it?	.14	20	.53	46
(Y)	37. Did you usually feel that it was almost useless to try in school because most other children were just plain smarter than you are?	.16	3	.26	16
(N)	38. Are you the kind of person who believes that planning ahead makes things turn out better?	.17	7	.33	14
(Y)	39. Most of the time, do you feel that you have little to say about what your family decides to do?	.27	10	.39	25
(N)	40. Do you think it's better to be smart than to be lucky?	.30	7	.04	20

<sup>1</sup>Cor. = correlation

<sup>2</sup>% E = % answering in external direction

## APPENDIX J

## MEDICATION COMPLIANCE SHEET

Name \_\_\_\_\_ Telephone \_\_\_\_\_

Address \_\_\_\_\_ Physician \_\_\_\_\_

\_\_\_\_\_ Discharge Date \_\_\_\_\_

Diagnosis \_\_\_\_\_

## MEDICATION ORDERS

Medication \_\_\_\_\_ Route \_\_\_\_\_  
Directions \_\_\_\_\_

Number days in compliance

Week 1	Week 2	Week 4

Medication \_\_\_\_\_ Route \_\_\_\_\_  
Directions \_\_\_\_\_

Number days in compliance

Week 1	Week 2	Week 4

Medication \_\_\_\_\_ Route \_\_\_\_\_  
Directions \_\_\_\_\_

Number days in compliance

Week 1	Week 2	Week 4

Medication \_\_\_\_\_ Route \_\_\_\_\_  
Directions \_\_\_\_\_

Number days in compliance

Week 1	Week 2	Week 4

Medication \_\_\_\_\_ Route \_\_\_\_\_  
Directions \_\_\_\_\_

Number days in compliance

Week 1	Week 2	Week 4

## EXERCISE COMPLIANCE SHEET

Name \_\_\_\_\_ Telephone \_\_\_\_\_

Address \_\_\_\_\_ Physician \_\_\_\_\_

Discharge Date \_\_\_\_\_

Diagnosis \_\_\_\_\_

## EXERCISE ORDERS

Exercise  
Directions

Number days in compliance

Week 1	Week 2	Week 4

Exercise  
Directions

Number days in compliance

Week 1	Week 2	Week 4

Exercise  
Directions

Number days in compliance

Week 1	Week 2	Week 4

## NOTES

Date	Note

ANS-IE Score \_\_\_\_\_ Group Rank \_\_\_\_\_ (n = \_\_\_\_)

## APPENDIX K



## DISTRIBUTION OF LOCUS OF CONTROL SCORES

	Score	Number ( <u>n</u> = 30)
Group 1, Externals		
	24	1
	23	1
	22	1
	21	0
	20	3
	19	4
	18	1
	17	1
	16	1
	15	2
Group 2, Internals		
	14	8
	13	1
	12	2
	11	1
	10	0
	9	2
	8	0
	7	1

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