

LONG TERM FOLLOW-UP OF CARDIAC
REHABILITATION CLIENTS

by

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STATEMENT BY AUTHOR

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This work is dedicated with love
to my mother, Monica Mueller,
who believes that every woman
should have a college education.

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ABSTRACT

The characteristics of 40 clients who had participated in a cardiac exercise rehabilitation program between 1977 and 1981 were described. Selected by convenience sampling, the subjects had had a myocardial infarction and/or open heart surgery or were known high risk cardiac patients. Few retrospective investigations in an area of health care seeking to instill lifelong behavioral changes are known to exist. The instrument "Cardiac Rehabilitation Follow-Up Questionnaire" was investigator-developed and was found to be quantitatively reliable and valid.

The results of this study found that the quality of life of the subjects was high and that the level of compliance with an exercise prescription averaged 48 percent. The most frequently chosen benefit of exercise compliance was "feeling better physically"; the most frequently chosen barrier to compliance was "weather." Significant relationships were found between the quality of life and the benefits of compliance ($r = -.44, p = .02$) and between the benefits of and barriers to compliance with an exercise prescription ($r = .47, p = .002$).

Future studies are needed to support these findings and to further explore the relationships between the quality of life and exercise compliance in cardiac rehabilitation clients.

CHAPTER 1

INTRODUCTION

Cardiac Rehabilitation is the process of actively assisting the known cardiac patient to achieve and maintain his optimal physical, mental, emotional, social and economic usefulness (Wenger and Hellerstein, 1978; Cosmoss, Burke and Swails, 1979). Cardiac rehabilitation programs that offer the known cardiac patient an individualized exercise prescription with ongoing exercise sessions as well as counseling and educational opportunities are presently popularly accepted methods of achieving these goals.

Cardiac rehabilitation centers with a major emphasis on exercise as a prescribed therapeutic regimen were first introduced in the United States in the 1960's (Hellerstein, 1979). To date, numerous studies have been conducted which seek to investigate the efficacy of this treatment (Kannel, McGee and Gordon, 1976; Benfari, 1979; Haskell and Blair, 1980). Physiological data and compliancy rates of persons participating in these programs have been compiled. Despite lack of conclusive evidence that cardiac rehabilitation centers improve morbidity and mortality figures, this tertiary level of preventive health care has become an integral

part of many established health care systems (Shephard, 1979).

With the major portion of the "justification phase" of cardiac rehabilitation completed, it is now possible and timely for one to focus on long term follow-up of the clients who have participated in cardiac exercise rehabilitation programs. It was the intent of the investigator to explore the topics of exercise compliance and the quality of life in persons who had completed a 12 week cardiovascular conditioning program.

Statement of the Problem

What is the former cardiac rehabilitation client's mode of exercise prescription compliance and quality of life after completion of a cardiac conditioning program?

Purpose of the Study

The purpose of the study was to assess and measure the relationship between compliance with an exercise prescription and the quality of life.

Significance

At present, health care providers realize that cognitive knowledge of a disease and the recommended treatment does not ensure a client's compliance with a prescribed therapeutic regimen (Given, Given and Simoni, 1978; Haynes,

Taylor and Sackett, 1979; Tirrel and Hart, 1980). Cardiac rehabilitation is a form of behavior modification which seeks to ingrain permanent lifestyle changes; a lifestyle pattern more conducive to maintaining a high level of well-ness than one's previous lifestyle (Cosmoss et al., 1979). While an objective of any cardiac rehabilitation program is "to prepare the individual and his family for healthy alternatives in lifestyle that might reduce the recurrence of coronary heart disease" (American Heart Association, 1979: 32), what is the long term effectiveness of these programs? A follow-up questionnaire that seeks to assess the former cardiac rehabilitation client's quality of life and long term compliance with an exercise prescription is one means of evaluating the impact of cardiac rehabilitation in retrospect. Furthermore, as one author stated, it may be that "documented objective evidence that cardiac rehabilitation improves its clients' quality of life would more than justify the expense and perpetuate its existence" (Shephard, 1979:539).

Nurses have been acknowledged as an integral member of the cardiac rehabilitation team (Cosmoss et al., 1979; Diethrich, 1979). As a responsible health care professional who recognizes and utilizes the nursing process, it is more than appropriate that this aspect of cardiac rehabilitation be investigated.

Definition of Terms

Change: to make different; to alter one's attitudes, behavior or principles (Funk and Wagnalls Dictionary, 1968: 227).

Compliance: adherence to a prescribed therapeutic regimen; the extent to which a client's exercise routine coincides with his or her exercise prescription (Kochar and Daniels, 1978; Haynes et al., 1979).

Quality of Life: the degree to which an individual is able to satisfy his or her perceived psychophysiological needs; the degree to which the environment is perceived as facilitating or retarding one's functioning (Dalkey, Lewis and Snyder, 1972; Pflaum, 1973).

Conceptual Framework

"The first principle of rehabilitation is not to be satisfied with lifesaving but to be equally as concerned with the quality of living" (Healey, 1970:68). Moreover, it is an inherent belief of the cardiac rehabilitation team member that the client's compliance with his or her exercise prescription will improve that person's quality of life. Therefore, in Figure 1 the construct beliefs, or belief systems are joined to the concepts, compliance and quality of life.

Beliefs have been defined as creeds that an individual lives by, or, more formally stated, as a body of tenets

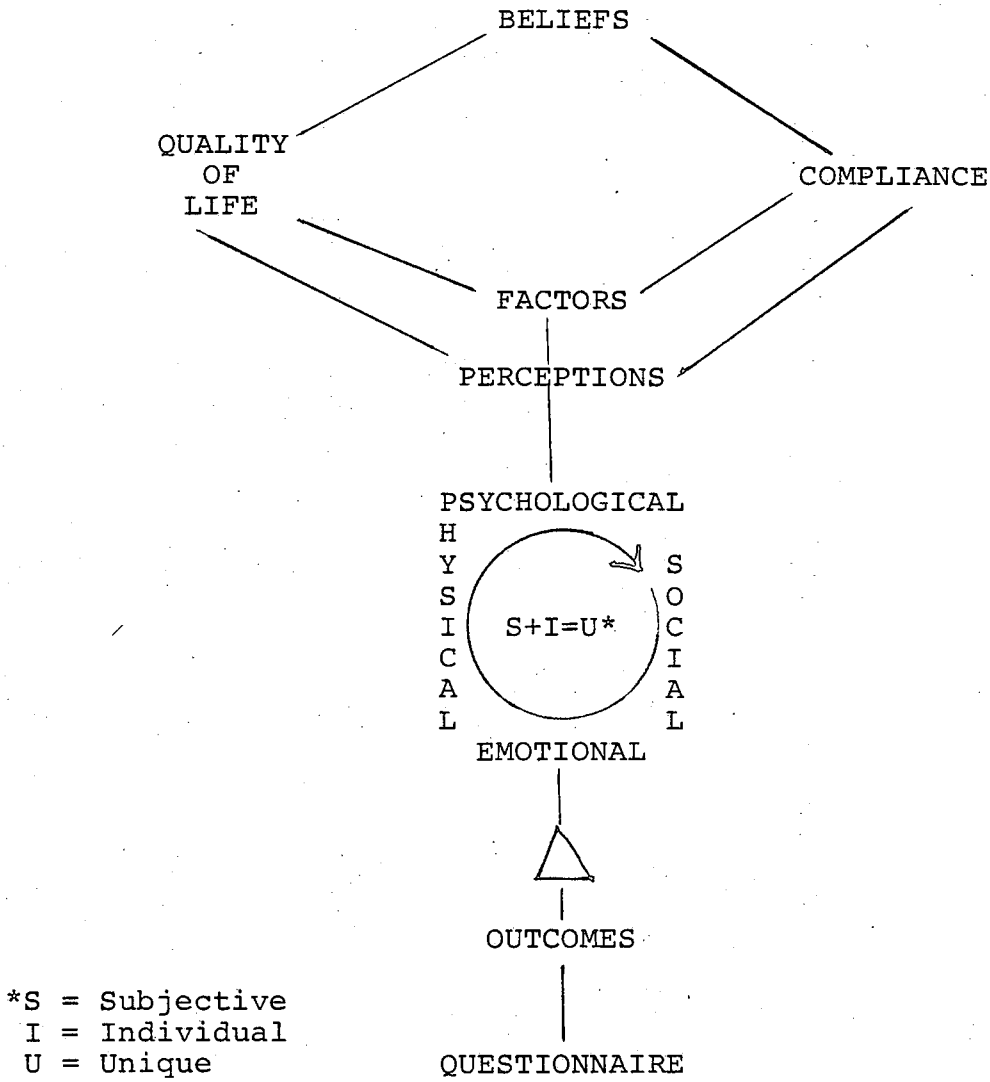


Figure 1. Model of the Conceptual Framework.

that an individual or organization maintains as true (Funk and Wagnalls Dictionary, 1968). Beliefs or belief systems influence the quality of life and health-related compliance behavior (Kruse, Reese and Hart, 1979).

Quality of life and compliance were frequently described in the literature as "subjective" and "individual" in nature (Marston, 1970; American Medical Association, 1974). Yet these terms describe mankind as well. It is one's subjectivity and individual characteristics that account for one's uniqueness (subjective plus individual equals unique; $S + I = U$). This insight was prerequisite to undertaking an investigation of the cardiac rehabilitation participants' quality of life and long term exercise compliance.

Previous attempts to measure the quality of life and/or compliance behavior have resulted in lists of factors, or determinants, components, elements and so forth. These lists, sometimes containing more than 200 factors, understandably have been criticized as contradictory, unsystematic and productive of a multiplicity of findings (Becker, 1976). Yet it is as unrealistic to expect that any list of factors will ever be exhaustive or 100 percent accurate as it is to expect that investigators will ever stop compiling these lists.

Novelty, health, self respect, achievement, status and a zest for living are an example of some of the factors thought to describe the quality of life (Morris and Husman, 1978). Factors sometimes thought to influence compliant health behavior are demographic characteristics, the severity of the disease, the presence of symptoms and the number and type of recommendations (Marston, 1970).

More progressive schools of thought use the term perceptions rather than factors to describe the quality of life and compliance. Perceptions, that is each individual's representation or image of reality, are broader in scope than factors, are conceptually based, and produce more succinct and manageable research data. Furthermore, perceptions seems more appropriate to the tenets of preventive health care (King, 1971; Becker, 1976).

Quality of Life

Several authors have published lists of conceptually based factors that are thought to envelop the quality of life (American Medical Association, 1974; Patterson, 1975; and Crewe, 1980). Careful analysis of the semantics of these lists, ranging from four to 10 or more factors, reveals duplicity of thought. The following five factors, followed by a brief explanation of meaning, were found most representative of the quality of life (Hardy and Cull, 1975). They are:

1. Health: one's general physical condition or state of biophysical function.
2. Function: mobility or one's ability or capacity to carry on with personal living activities in a relatively independent manner.
3. Comfort: the degree that one is free of physical or mental anguish (Hardy, 1975; Crewe, 1980).
4. Emotional Status: the degree that one's ego is stable and intact; includes one's involvement with family, friends and social interaction (Hardy, 1975; Crewe, 1980).
5. Economics: the degree that one is able to provide or possesses the necessities of life for him or herself and any dependents that one may have (American Medical Association, 1974).

Compliance

Rosenstock's Health Belief Model is currently a frequently used means of identifying elements thought to most likely influence compliance (Winslow and Weber, 1980). It evolves from the client's perception of his or her susceptibility to the condition and the risks of its occurrence or reoccurrence, the severity of the disease state and its consequence in terms of lifestyle, and the value of following health-related recommendations. The decision to follow

health recommendations is determined by several factors, such as, a belief in the efficacy of the treatment, the complexity of the prescription and its cost. The determining factors influencing compliance were labeled the benefits of and barriers to compliance by Rosenstock (Winslow and Weber, 1980).

Conclusion

In keeping with current nursing theory, man and his lifecycle are found centermost in the model of the conceptual framework (Figure 1). It is from man that beliefs, compliance, quality of life and outcomes which follow change emanate. The descriptors, physical, social, emotional and psychological well-being comprise the domains of the human experience and consequently can be considered aspects of the quality of life and compliance (Berg, Hallaver and Berg, 1976). Though not included in the model, it was an acknowledged condition that interaction had occurred between the cardiac rehabilitation center, man, and the ever-present external environment.

Man, a term used to describe mankind, refers to the male or female cardiac rehabilitation client and can be broadly interpreted to include the client's family as well. Interaction between the cardiac rehabilitation center and the client results in change which is represented by the

Greek letter delta Δ . Outcomes are the end results of care which follow change (Zimmer, 1974). Quality of life and long term compliance with an exercise prescription are the outcomes that were measured in this investigation. It is believed that the "Long Term Follow-Up of Cardiac Rehabilitation Clients" should yield some new and purposeful information.

CHAPTER 2

REVIEW OF LITERATURE

Few investigations which describe the quality of life and/or long term exercise compliance of clients who have participated in a cardiac rehabilitation program have been conducted. Studies which describe the cancer patient and the renal patients' quality of life have been undertaken (Laborde and Powers, 1980; Newberry, 1980).

Contained in this chapter is a synopsis of the investigations which were instrumental in the development of the current study. The first section addresses "Long Term Compliance with an Exercise Prescription"; the second, "Quality of Life Following Coronary Artery Bypass Surgery"; and the third, "Well Persons' Life Quality Changes After Endurance Conditioning Training." Implications of the investigation(s) were discussed at the close of the first section and after the third section.

Long Term Compliance with an Exercise Prescription

Tirrell and Hart (1980) studied the relationships among health beliefs, knowledge and exercise compliance in patients who had undergone coronary artery bypass surgery.

The sample of 30 consisted of 26 men and 4 women, ranging in ages 45 to 76 years, with an average age of 59 years. The entire population were 10 to 12 months post-operative at the time of interview. All had participated in the same exercise teaching program after discharge from the hospital. At the six week checkup following discharge, the patients were given a treadmill stress test and an exercise prescription based on the results of the stress test. Verbal and written instructions were given for following the exercise prescription and several practice training heart walks were conducted as well.

One purpose of the study (Tirrell and Hart, 1980) was to determine the clients' mode of exercise compliance. Their use of the pulse rate parameters to monitor other strenuous activities of daily living, a key concept of the teaching program, was assessed. Demographic variables that may be related to compliance behavior and the relationships among health beliefs, knowledge of a health regimen and related compliance behavior were investigated as well.

A semi-structured 45-minute long home interview was used to collect the data. A modified form of the 1976 Standardized Compliance Questionnaire developed by Sackett and coworkers was employed to assess health beliefs related to compliance behavior (Tirrell and Hart, 1980).

Summarizing the investigators' more pertinent findings related to mode of exercise compliance, 18, or two-thirds of the sample of 30, were still walking thrice weekly as was prescribed at the time of the interview. But only 5 or 6 of the clients were walking intensely enough to obtain their target training heart rate, which is necessary for a conditioning effect (Tirrell and Hart, 1980).

No significant differences were found between compliance levels and the demographic variables of age, sex, occupation, marital status or time elapsed since surgery. This information obtained by Tirrell and Hart (1980) is consistent with other researchers' findings (Marston, 1970; Haynes et al., 1979; Andrew et al., 1981).

A significant relationship between the health belief "perceived barriers to exercise" and compliance behavior was found by Tirrell and Hart (1980). Weather and bouts of illness, followed by lack of time and interest were the most frequently cited reasons for failure to comply with the exercise prescription. An individual's perception of the efficacy of the exercise treatment was the factor with the next strongest relationship to compliance behavior. Knowledge of the exercise regimen, an "enabling" and necessary prerequisite for behavior modification, was not related to compliance levels (Tirrell and Hart, 1980). Inverse relationships were found between the health beliefs "perceived

severity of the disease" and "susceptibility to a reoccurrence of disease symptoms" and compliance behavior. Tirrell and Hart (1980) attributed these unexpected findings to the cardiac patients' sometimes "unusual" interpretations of some of the statements in the Standardized Compliance Questionnaire. For example, in response to the statement "if you wait long enough you will get over most any illness," many of the subjects agreed, explaining "you'd die and then you'd no longer be ill" (Tirrell and Hart, 1980:491).

The major implication of this study was that longer cardiac exercise programs are needed to insure that cardiac patients continue to exercise in the prescribed manner. The results of the study demonstrated that the verbal and written instructions given to the clients were inadequate methods of promoting exercise compliance. Tirrell and Hart (1980) recommended on the basis of their findings that cardiac exercise programs should be ongoing. And, in order to enhance long term compliance, the health beliefs "perceived barriers to exercise" should be thoroughly assessed for every client. Tirrell and Hart's study (1980) substantiates the need for continual program reevaluation and individualized health care planning to meet consumers' needs. Cardiac exercise rehabilitation strives to induce permanent and sometimes radical lifestyle changes but, as so aptly stated

by Wilmore (1979:686) "it does no good to extol the benefits of exercise if we cannot maintain an active participant."

Quality of Life Following
Coronary Artery Bypass Surgery

Ross et al. (1978) conducted a longitudinal investigation of 200 patients who had undergone coronary artery bypass surgery and their quality of life changes following operation. The average age of the sample was 52.5 years and was composed of 100 men and 100 women. The subjects were interviewed at the time of referral for surgery and at subsequent two, eight and 20 month intervals post-operatively. A standard questionnaire was used for data collection and the subjects' responses over time. Information on physical activity, employment, dependence on others, leisure activities, mood and sexuality was gathered. Subjects were categorized according to the New York Heart Association Classification Index to determine disability grade and according to the World Health Organization Dyspnea Scale (Ross et al., 1978).

Results of this study showed that a significant improvement for 120 (73 percent) of the subjects was a marked decrease in dependence on others at the eighth month interview. It was at this time also that one was most likely to resume one's previous leisure time activities. Whereas only 20 (12 percent) of the sample denied no limitation of

physical activity pre-operatively, this number rose to 111 (68 percent) at the twentieth month post-operative interview. Fear of exertion increased and was the major reason for limited activity immediately following hospital discharge. Twenty months after open-heart surgery 59 (74 percent) of the male population were either employed or listed as capable of gainful employment. Post-operatively the number of females employed in full or part-time jobs increased. Throughout the length of the study there were favorable trends in use of leisure time, mood and sexual relationships. An improvement in mood status post-operatively was usually concurrent with resumption of employment and/or one's previous activities. The research results found in this study led the authors, Ross et al. (1978) to conclude that there was a definite improvement in the quality of life for the majority of coronary artery bypass surgery patients post-operatively.

LaMendola and Pellegrini (1979) investigated life quality changes in patients who were six months to three years or more post-coronary artery bypass surgery. The sample was composed of 95 adults, 79 men and 16 women. The average age of the sample was 57 years at the time of the telephone interview. A structured questionnaire was used to collect data and demographic characteristics were collected from the subjects' medical records.

Factors considered important to measure life quality were social situation, that is, who and what helped the most after surgery, also physical limitations and work status. An independence measure developed by New (LaMendola and Pellegrini, 1979) was used to index perceived physical limitations.

Results of this study showed that for the 85 subjects who were married, one's spouse was the person named as most important in their recovery in all categories of time since surgery. Hospital personnel were more important to patients who had recently undergone surgery but after a year, family members were named as most helpful in their recovery. Sixty of the sample of 95 chose physical activity or an affiliative experience as "what" was most helpful in their recovery; the remaining 35 chose the category "rest/uncertain." The findings of those who had no perceived physical limitations of normal activity and those who had some limitations of normal activity were similarly divided. Data analysis revealed that the patients who valued physical activity or an affiliative experience were more likely to perceive themselves as having no physical limitations than those who chose "rest/uncertain" as most helpful in their post-operative recovery (LaMendola and Pellegrini, 1979).

Well Persons Life Quality Changes
Following an Endurance
Conditioning Program

Morris and Husman (1978) conducted an experimental study which measured well persons' life quality changes after participating in an endurance conditioning program. The hypothesis set forth by the investigators was that students participating in an endurance conditioning program would have higher life quality scores upon completion of the 15 week long training program than students who had not participated in the program. The control group consisted of 31 students (26 males and five females) who were not enrolled in any formal exercise program. The experimental group consisted of 10 males and 10 females who were selected from a general university conditioning class. Twenty one years was the average age for both groups.

Pflaum's Life Quality Inventory Scale (1973) which divides life quality into four major sections: biophysical functioning, self-development and personal growth, primary social functioning in face-to-face interactions and secondary social functioning in group or institutional settings was Morris and Husman's measurement tool for assessing life quality changes (1978).

Morris and Husman found that the control group's test and retest Life Quality scores from the beginning and the end of the semester did not change. There was a

significant increase in the experimental group's test and retest Life Quality scores computed at the same time intervals. These results led them to surmise that in agreement with other researchers' published works (Glasser, 1976; Ismail and Young, 1977; Kostrubala, 1976; Martin, 1977; and Morgan, 1970) endurance exercise and conditioning can improve one's self-esteem, self-respect and self-confidence; thus one's total life outlook and the quality of one's life can be positively affected by endurance exercise.

Implications of Quality of Life Studies

Implications of quality of life studies on "Long Term Follow-Up of Cardiac Rehabilitation Clients" were several. In the three publications, the meaning of the quality of life was alluded to but never defined. The authors' choice of measurement tool was the reader's only means of determining how they were defining life quality. Theoretically, a standardized, uniform quality of life tool would increase the validity of quality of life studies. At the time the studies by Ross et al. (1978) and LaMendola and Pellegrini (1979) were conducted the morbidity and mortality statistics as an indicator of the efficacy of coronary artery bypass surgery were unfavorable. However, as argued by the aforementioned authors, the benefits of the surgery far outweighed its risks in terms of life quality

improvements. Moreover, "any considerations that coronary artery bypass surgery is a luxury item implies that there is a cheaper alternative, for these patients there was none" (Ross et al., 1978:8). The plight of cardiac rehabilitation programs is similar. Thus far, cardiac exercise rehabilitation has not been shown to significantly decrease the morbidity and mortality figures for its participants (Oldridge, 1979). Cost benefit factors, such as continued work productivity are currently under investigation, but other data indicative of quality of life assessment in those who participate in cardiac exercise rehabilitation programs remain negligible (Shephard, 1979).

Morris and Husman's study (1978) of well persons' life quality changes following endurance conditioning training is an early attempt to quantitatively measure life quality's relation to physical activity. The study's major drawbacks lie in its small sample size and the use of physical education majors in the control group. It seems unlikely that physical education majors do not engage in endurance-type activities.

To conclude, in spite of these studies different approaches to measuring the quality of life, the present world economic situation mandates that more studies of this nature be undertaken. Investigations of long term compliance with an exercise prescription and the former clients'

quality of life are required to more firmly support and justify the continued existence of cardiac rehabilitation programs in the future (Shephard, 1979).

CHAPTER 3

METHODOLOGY

In this chapter the design of the study, the setting and sample criteria, the method of data collection, the measurement tool and the method of data analysis are presented.

Design

The design of this study was descriptive. Using clients who had participated in a cardiac rehabilitation and exercise program, the relationship between the quality of life and long term compliance with an exercise prescription was assessed and measured.

The instrument entitled "Cardiac Rehabilitation Follow-Up Questionnaire" (Appendix C) was developed by the investigator. It was composed of two sections, Part I "Quality of Life," and Part II "Compliance."

Setting

The investigation was conducted through a cardiac rehabilitation center in a metropolitan city in the Southwestern United States. This outpatient facility was associated with a private community oriented hospital. Admission of clients to the program was by physician referral only.

The exercise program offered at the rehabilitation center was 12 weeks in length and met thrice weekly for an hour on an outdoor walking-jogging track which was an eighth of a mile long. Indoor facilities were available in case of inclement weather. Participants in this program were medically supervised, telemetry monitored and given an intensity graduated aerobic exercise prescription. The latter was based on the results of their performance on a submaximal exercise stress test. Clients were then taught the basics of an exercise prescription: how to exercise, how long and how often to exercise, and their target training heart rate. A target training heart rate is the intensity of exercise one must attain in order to obtain a conditioning effect (Astrand and Rodahl, 1977). Every exercise session, led by an exercise physiologist or a registered nurse, consisted of a warm-up stretching session, walking and/or running on the track, and a cool-down period. Clients were taught to take their pulse before, during and after exercise. The clients' heart rate as recorded by EKG was announced over an intercom at various intervals while exercising.

Free cardiac education classes and pamphlets aimed at reducing the main known risk factors for arteriosclerotic heart disease were made available to the participants of the cardiac rehabilitation and exercise program.

Sample

One of the directors of the cardiac rehabilitation center was contacted and a letter was sent to the program's board of directors stating the investigator's proposed research questions, the purpose of the study and method of data collection. Following receipt of the University of Arizona's Ethical Review approval, the directors of the program then gave the investigator verbal permission to utilize their facility. Names, addresses and telephone numbers of 60 clients who had participated in the cardiac rehabilitation and exercise program were obtained from the center's medical records. To obtain an adequate number of subjects for the study it was necessary to go back in the records to 1977. The majority of the subjects in the program had had a myocardial infarction and/or open heart surgery and the remaining few were designated "high risk" for coronary artery disease.

Information from the cardiac rehabilitation center revealed that while the actual format of the exercise sessions had not changed since 1977, gradually, and concurrent with the addition of an exercise physiologist to the cardiac rehabilitation staff, the program has become more structured over the years. Since that time, every exercise session consists of a warm-up stretching period, walking and running, and a cool-down period. More than ever, the necessity of

taking one's pulse rate while exercising is being stressed at exercise sessions, as well as attaining one's target heart rate. One change in terminology is that, the phrase "exercise prescription" is now much more widely used in 1980 and 1981 than it was in 1977.

In data analysis, the clients' responses from 1977-78, 1979, 1980 and 1981, were compared so that any significant differences were determined. The criteria for inclusion in the study were that the subjects could read, write and speak English and were more than 21 years of age.

Ethical Review Approval

The study was reviewed and approved as exempt from the Human Subjects Review Committee. The committee's request that each subject be given a disclaimer statement to read prior to completing the questionnaire was followed (Appendix D). The Human Subjects Approval Form was filed in the office of the Director of Research, College of Nursing, University of Arizona.

Method of Data Collection

Fifty subjects, or their spouses or relatives when they were not available, were contacted by telephone. The other 10 subjects' phones had been disconnected or they were otherwise not available. Following a brief explanation of purpose similar to that found on the disclaimer statement

(Appendix A), the subjects' cooperation in completing the questionnaire was enlisted. Forty-six of the clients contacted agreed to read and return the questionnaire if it were mailed to them. Anonymity and confidentiality of response were assured.

The subjects were then sent the disclaimer statement, a Personal Information Form (Appendix B) and the Cardiac Rehabilitation Follow-Up Questionnaire (Appendix C), accompanied by a stamped return envelope.

The investigator waited two weeks before recontacting subjects by phone who had not returned the mailed questionnaire. Data collection was completed after three weeks. Forty of the questionnaires were returned.

The major advantages of using the mailed questionnaire to collect data was that interviewer bias was decreased, subjects could answer it at their leisure, and it made the best possible use of the investigator's personal resources (Polit and Hungler, 1978). One of the drawbacks of using a mailed questionnaire, was that the investigator was not immediately available to answer inquiries the respondents may have had while completing it. In addition, questionnaires are subject to the bias of self-report, and it is impossible to determine the effect of non-respondents on the investigation's final results (Krampitz and Pavlovich, 1981).

Pilot Study

Four members of an ongoing cardiac rehabilitation and exercise program were asked to review the questionnaire and comment on its readability and clarity of meaning. The four subjects in this pilot test found the directions for use and the statements on the questionnaire very clear and their meanings obvious. At their suggestion, two questions which were thought redundant were deleted from the questionnaire.

Measurement Tool

The Cardiac Rehabilitation Follow-Up Questionnaire (Appendix C) measures the quality of life and long term compliance with an exercise prescription. McCorkle and Young's "Symptom Distress Scale" (1978) initiated the thought processes that led to the development of the scales in the questionnaire. No suitable previously tested instrument which measures these concepts was found in the literature. Presented in two sections, Part I addresses the five components thought to most fully envelop one's perception of the quality of life. They were: health, function, comfort, emotional status and economics (Cobb, 1974). Part II addresses the level of exercise compliance and one's perceptions of the benefits of and barriers to compliance.

Using a Likert scale, Part I, Quality of Life, contains two statements per life quality component and two

statements designed to assess one's overall perception of life quality. Some of the 12 statements in Part I were positive in tone and the remainder were negative. Respondents were asked to describe their reaction to the statement by choosing one of the following answers: Agree Strongly, Agree, Uncertain, Disagree, Disagree Strongly. The statements in Appendix C were labeled according to the quality of life component measured for this reader's convenience, but were not so identified in the mailed questionnaire.

To limit response set, statements were ordered so that the components of health, function, comfort, emotional status and economics were randomly spaced. The only restriction placed was that two "overall" statements could not follow one another.

Part II: Long Term Compliance contains eight Likert Scale statements that measure the reported level of compliance with an exercise prescription. Seven of the statements address different aspects of compliance with an exercise prescription (including frequency, duration and intensity of exercise) and the last statement addresses one's "overall" perception of compliance with the exercise recommendations. Possible answer choices in this section were: Always, Almost Always, Sometimes, Rarely and Never.

In addition, Part II contains two multiple choice questions and an open ended statement. The first multiple

choice statement addresses the benefits of compliance, the other multiple choice statement and the open ended statement address the client's perceived barriers to compliance with the exercise prescription.

Scoring the Instrument

The Cardiac Rehabilitation Follow-Up Questionnaire is internally scored. In Part I: Quality of Life, the response "Agree Strongly" was rated five, "Agree" was rated four, "Uncertain" was rated three, "Disagree" was rated two and "Disagree Strongly" was rated one.¹ In Part II: Long Term Compliance, the eight Likert scaled statements were similarly rated. The responses "Never" through "Always" were rated one to five consecutively. Questions nine and 10, reasons why one continues to exercise or doesn't always continue to exercise in the prescribed manner (the benefits of and barriers to compliance) and the open ended statement, Question 11 "I would be more likely to follow my exercise prescription more closely if. . . ." were nominally scored.

Reliability and Validity of the Instrument

The following steps were undertaken to determine the degree that the "Cardiac Rehabilitation Questionnaire" was

1. Due to the phrasing of QL#2, it was necessary to reverse the ratings of QL#2 so its meaning corresponded with the rest of the scale.

a reliable and valid instrument. It was a prerequisite in the development of a "new" instrument that a pilot study be done to minimize construction error and insure acceptability of the questionnaire. The pilot study has already been described. Subject error, discussed in the "Method of Data Collection" section is minimized by making the format of the questionnaire straightforward and directions for responding to the questionnaire explicit.

The quantitative assessment of the reliability and validity of the instrument was determined concurrently by computation of the data results. Internal consistency, one measure of reliability, was performed utilizing a Spearman Brown Split Half Reliability coefficient for Part I: Quality of Life and a standardized Alpha coefficient correlation for Part II: Level of Long Term Compliance. The Spearman Brown Split Half coefficient is appropriate for measuring bivariate variables in a 12 item scale (Nie et al., 1975). The standardized Alpha coefficient correlation is suitable for measuring different aspects of the same concept (Polit and Hungler, 1978). After consulting with an experienced nurse researcher, an approximate value of .30 to .60 was strived for when comparing two statements that measured the same component, i.e., "comfort." A value of .30 to .60 indicated that the two statements were similar

but not redundant. Comparing one component of life quality with another, such as emotional status with economics, should be in a correlational range of .40-.70. The comparison of the "overall" statement to one of the component statements of life quality, such as health, should yield a slightly higher correlation than .60. Since the questionnaire was a newly developed instrument, .60 was an acceptable criterion for determining internal consistency.

Standardized Alpha coefficient correlation scores, measuring Part II Long Term Compliance (questions one through eight), most desirably should be .60 or more. "Overall" perception of compliance was compared to questions one through seven by a Pearson coefficient correlation.

Face and content validity was determined by a panel of experts: three nurse educators, a nurse researcher, and the cardiac rehabilitation center's board of directors. The board of directors is composed of several cardiologists, registered nurses and exercise physiologists. Content validity of Parts I and II was further ascertained by a thorough review of the literature for similar instruments (Pflaum, 1973; Neugarten, Havighurst and Tobin, 1961; Ross et al., 1978; Morris and Husman, 1978; Haynes et al., 1979; LaMendola and Pellegrini, 1979; Crewe, 1980; and Newberry, 1980). The exercise prescription and admission criteria of the cardiac

rehabilitation center were also reviewed. The "overall" questions in Parts I and II provide a type of criterion-related validity by indexing one criterion and comparing it to another by using a Pearson correlation (Polit and Hungler, 1978).

Though a thorough review of the available literature was undertaken in the development of the measurement tool, it was realized that it may not be representative of the entire domains of the quality of life and compliance with an exercise prescription.

Demographic Data

Demographic data were gathered on the Personal Information Form (Appendix B) which accompanied the questionnaire. Subjects were asked to provide their age, sex, occupational status, use of leisure time, and their desire to work. The last was asked by LaMendola and Pellegrini (1979) in their investigation of the cardiac patient's quality of life (the subject's desire to work).

This form also asked if the client had been hospitalized or otherwise physically incapacitated from exercising since completing the cardiac rehabilitation program, and if they were presently enrolled in any formal exercise program. Information of this kind was thought relevant due to the retrospective nature of the investigation.

Data Analysis

The primary purpose of the study was to investigate the relationships between the quality of life and the modes of compliance with an exercise prescription. The majority of data collected was interval scaled and appropriate statistical methods were employed in data analysis.

Pearson correlation was a measure of association used on summated scores for the benefits of and barriers to compliance (Nie et al., 1975). Multiple regression technique was chosen to predict the relationship of the following components of life quality: health, function, comfort, and overall life quality to the level of exercise compliance and the perceived benefits of and barriers to compliance.

The responses to the multiple choice statements and the open ended statement, as well as the demographic data, were categorized and grouped according to frequency procedure and mode.

CHAPTER 4

ANALYSIS OF THE DATA

This chapter presents the findings obtained from the Personal Information Form and the Cardiac Rehabilitation Follow-Up Questionnaire.

Characteristics of the Sample

Forty of the 46 questionnaires were returned. The subjects' ages, sex, occupational status, exercise habits, use of leisure time and dates enrolled in the cardiac exercise program were collected from the Personal Information Form. The sample consisted of 32 males and eight females (Table 1). The mean age of the sample was 60 years, with a range of 37-77 years. Eighteen of the subjects were employed, and the majority of those worked the standard 40 hour week; but a few worked more or less than 40 hours/week. Twenty one of the subjects were retired; 13 of those retired were more than 65 years of age. One subject, a 50 year old female, classified herself as "unemployed." Only four of those retired/unemployed indicated a desire to work; five did not respond to the question, and 13 stated that they did not desire to work.

Table 1. Characteristics of Subjects who Participated
in a Cardiac Rehabilitation Program (N = 40).

<u>Sex/Age/Occupa-</u> <u>tional Status</u>	<u>Number of</u> <u>Patients</u>	<u>Percent</u>
<u>Sex</u>		
Male	32	80
Female	8	20
Total	40	100
<u>Age in Years</u>		
Less than 40	1	2
40-49	5	13
50-59	14	35
60-69	13	33
70-79	7	17
Total	40	100
<u>Occupational Status</u>		
Employed	18	45
Unemployed	1	3
Retired	21	52
Total	40	100

Thirty-two of the subjects had sustained a myocardial infarction and/or open heart surgery; the remaining eight were high risk cardiac patients. Response to the inquiry about physical incapacitations indicated that eight of the subjects had been physically unable to exercise for a period of three weeks to three months due to a variety of health problems. Health problems incapacitating the subjects were stroke, asthma, pneumonitis, back problems, and arthritis.

Five of the subjects participated in the cardiac exercise rehabilitation program in 1977-78, eight in 1979, 19 in 1980, six in 1981 and two did not respond to the question (Table 2). The majority of the subjects had participated in the program for the recommended three months, but a few reported maintaining involvement with the program for a two-year period, and one reported a four-year involvement.

Only three of the 40 subjects indicated that they were currently enrolled in a formal exercise program. The reported use of leisure time was as follows. Twenty-five of the subjects reported involvement in sedentary activities such as reading, watching television, playing cards or board games, and needlework. Thirty-four of the subjects reported "light activities," such as housekeeping, gardening or yard work, travelling, socializing, shopping and woodworking.

Table 2. Enrollment Periods of Subjects in a Cardiac Rehabilitation Program (N = 40).

Date/Length of Enrollment	Number of Patients	Percent
<u>Date of Enrollment</u>		
1977-78	5	12.5
1979	8	20.0
1980	19	47.5
1981	6	15.0
Missing	2	5.0
Total	40	100.0
<u>Length of Enrollment (in months)</u>		
Less than 4	25	62.5
4-11	9	22.5
12-24	4	10.0
25-48	1	2.5
Missing	1	2.5
Total	40	100.0

More "moderate activities" were reported by 24 of the subjects and included walking, running, swimming, hiking, bicycling, golf and tennis.

Quality of Life Scores

The highest score possible on the Quality of Life scale was 60 and the lowest score possible was 12. Distribution of the mean scores was arbitrarily categorized high, medium and low (Table 3). The number of low score responses for each of the 12 statements ranged from one to eight out of 60 possible responses. The responses marked Uncertain, labeled medium, ranged from one to seven. High satisfaction with perceived life quality ranged from 26 to 40 responses.

The subjects' responses were rated from one to five. Mean item scores for each of the 12 statements ranged from 3.77 for QL#4 Health to a high of 4.80 for QL#3 Function. The mean total score for the sample was 49.17.

Reliability and Validity of the Instrument

The overall reliability of the Quality of Life scale computed by the equal length Spearman Brown technique was .90. Reliability coefficients of the two items measuring each of the six subscales were all positive (Table 4). The standardized item alphas for health, emotional status, function and economics met the criteria correlation range of

Table 3. Distribution of Quality of Life Scores (N = 32-40).*

Item Number	Subscale	Quality of Life Scores			N	Mean Score
		Low (1-2)	Medium (3)	High (4-5)		
QL 1	Comfort	3	2	33	38	4.10
QL 10		8	1	29	38	3.84
QL 4	Health	5	7	28	40	3.77
QL 7		3	3	26	32	4.00
QL 5	Emotional Status	1	-	39	40	4.27
QL 12		5	-	34	39	3.79
QL 6	Function	2	5	33	40	4.08
QL 8		-	-	40	40	4.80
QL 2	Economics	5	1	33	39	4.07
QL 11		2	2	36	40	4.10
QL 3	Overall	3	3	34	40	4.00
QL 9		1	1	38	40	4.40
Total Sample						49.17

* N varies since some statements were either left blank or marked Not Applicable.

.30-.60. The alpha and standardized item alpha for comfort and overall quality of life exceeded .80.

Table 4. Quality of Life Subscales: Reliability Coefficients (N = 29)*

Subscale	Statement #	Alpha	Standardized Item Alpha
Comfort	QL 1 & 10	.85	.85
Health	QL 4 & 7	.52	.52
Emotional Status	QL 5 & 12	.30	.30
Function	QL 6 & 8	.24	.31
Economics	QL 2 & 11	.27	.32
Overall	QL 3 & 9	.81	.85

* N is less than 40 since not every statement was answered.

Pearson coefficient correlations comparing one subscale to another are found in Table 5. Subscales meeting the criteria correlation range of .45-.70 were health and comfort (.49), function and comfort (.52) and function and health (.69). The correlation between emotional status and comfort (.06) was so low that it indicated practically no relationship.

Finally, significant relationships were found between the overall quality of life and the other subscales (excluding economics). Only overall and health (.68) met the stated criteria of greater than .60 correlation.

Table 5. Quality of Life Subscales: Pearson Correlation Coefficients (N = 31-40).*

Subscale	Comfort	Health	Emotional Status	Function	Economics
Health	.49 ^a 31				
Emotional Status	.06 35	.38 ^b 31			
Function	.52 ^c 36	.69 ^c 32	.40 ^b 39		
Economics	.27 35	.38 ^a 31	.30 38	.37 ^a 39	
Overall	.40 ^a 36	.68 ^c 32	.35 ^a 39	.50 ^c 40	.22 39

* N varies since not every statement was answered.

a. $p < .05$

b. $p < .01$

c. $p < .001$

The criterion validity of the scale, as indexed by the overall subscale, was assessed using Pearson Correlation technique and a significant and positive relationship was found ($r = .70$, $p < .001$).

Compliance Scores

The highest score possible on the Compliance scale was 40, signifying 100 percent compliance and the lowest possible score was eight or zero percent compliance. The mean total score for the sample was 23.40, indicating that

the overall level of compliance with an exercise prescription averaged 48 percent. Compliance scores were arbitrarily categorized low (scores of 8-18), medium (scores of 19-29) and high (scores of 30-40). The frequency distribution of the 32 subjects who fully completed this portion of the questionnaire are shown in Table 6. Seven subjects' levels of exercise compliance were rated low, 18 were rated medium and seven subjects were rated high.

Table 6. Frequency Distribution of Exercise Compliance Scores (N = 32).

Scores	Low (8-18)	Medium (19-29)	High (30-40)
	8	19	30
	8	20	31
	8	20	33
	8	20	33
	8	22	33
	13	23	35
	16	24	38
		26	
		26	
		27	
		27	
		27	
		27	
		27	
		28	
		28	
		28	
		28	
f =	7	18	7

Mean item scores for each of the eight statements were also calculated (Table 7). A score of one indicated never complying with that aspect of the exercise prescription, and a score of five indicated always complying. The range of the mean item scores was 2.23 for C#4 "I take my pulse at recommended intervals. . . ." to 3.22 for C#1 "I exercise as often as recommended. . . ." The mean item score for C-8 "I follow all or most of the exercise prescription" was 2.75, midway between the lowest and highest scores.

Table 7. Mean Item Scores on the Compliance Scale (N = 32).

Item	Mean Score
C #1	3.22
C #2	3.20
C #3	2.57
C #4	2.23
C #5	2.60
C #6	3.20
C #7	3.00
C #8	2.75

Compliance Correlations

In Table 8, the correlation matrix for the eight items on the compliance scale are presented. This was computed since there are essentially four parts to every

Table 8. Correlation Matrix for Eight Items on the Compliance Scale
(N = 32).*

Items	C 1	C 2	C 3	C 4	C 5	C 6	C 7	C 8
C 1								
C 2	.94							
C 3	.44	.38						
C 4	.29	.20	.87					
C 5	.52	.55	.28	-.01				
C 6	.58	.53	.72	.51	.67			
C 7	.39	.35	.86	.83	.21	.63		
C 8	.59	.54	.79	.62	.56	.87	.76	

* N = 32 because not all scales were completely answered.

exercise prescription: the method or mode of exercise, the duration, intensity and frequency of exercise (Astrand and Rodahl, 1977).

Every correlation, except that between C#4 and C#5, was positive. An increase in one aspect of exercise compliance corresponded with an increase in another aspect of exercise compliance. The correlation coefficient between C#4 and C#5, taking one's pulse at recommended intervals and following the warm-up procedure, was so low (-.01) that it indicated essentially no relationship. Another low sensitivity correlation was C#2 and C#4 (.20), duration of exercise and pulse taking at recommended intervals.

Most of the items had zero order correlations of .30 or above. Items of highest correlation were C#1 and C#2, frequency and duration of exercise (.94) and C#3 and C#7, pulse taking and exercising at one's training heart rate (.86). Those who scored high on the scale for frequency of exercise also scored high on the scale for duration of exercise. Similarly, those who scored high on pulse taking were more likely to score high on training as intensely as recommended.

Appropriately, the overall compliance statement (C#8) correlated moderately to strongly with the seven other items on the scale. The correlation range was .54-.87. The low

value pertains to C#2, duration of exercise and the high value refers to C#6, cool-down procedure.

Reliability and Validity of the Instrument

Reliability coefficient alpha and standardized item alpha were calculated for the Compliance scale. Reliability coefficient alpha was .91 and standardized item alpha was .91. These estimates were quite high for an untested instrument.

The criterion validity of the scale, indexed by the inclusion of an overall statement (C-8) was computed using the Pearson Correlation technique. The magnitude of the relationship was .81 and it was found statistically significant ($p < .001$).

Benefits of Compliance

The data, Benefits of Compliance with an exercise prescription was assessed by multiple selection question 9 on Part II of the questionnaire. Nominally scored, the data were categorized by rank order of frequency chosen (Table 9). The most frequently chosen response was "I feel better physically," marked by 31 of the subjects. The response "my family and/or friends tell me I should" was least chosen ($f = 11$).

Only five of the sample responded to the category "Other." Typical responses in this category were: "I want

Table 9. Reasons Subjects Continue to Exercise.*

Benefits	Frequency of Responses
I feel better physically.	31
I feel better emotionally.	29
It's good for my health.	29
My physician, nurse or other health professionals tell me I should.	22
I look better.	15
My family and/or friends tell me I should.	11
Other	5

* Based on responses of 40 subjects.

to," "I enjoy it," "it keeps my weight/blood pressure down," "I have to be active in my work."

Barriers to Compliance

The number of perceived barriers to exercises compliance (question 10) was assessed, scored and categorized in the same manner as Benefits of Compliance. Comments placed in the category "Other" (f = 10) were often the same or similar to responses to the open ended statement (question 11), and therefore are discussed in the following section. The signs and symptoms of cardiac distress: angina, shortness of breath, weakness and fatigue, were among the

barriers to compliance chosen least frequently (f = 4, 3, 4) (Table 10). Weather (f = 23), often qualified by the subjects as heat, was the most frequently chosen barrier to compliance with an exercise prescription. The questionnaires were completed during the summer months in an area where the average daytime temperatures are 100-105°F. No one selected "didn't understand the prescription," but two subjects did state that they never received an exercise prescription.

Overcoming Non-Compliance with an Exercise Prescription

This topic was addressed by the open ended statement (Part II, #11), "I would be more likely to follow my exercise prescription more closely if. . . ." and the response to the category 'Other' in Barriers to Compliance (Part II, #10). The subjects' responses to these questions are summarized on Table 11. Six of the subjects responded that they would prefer another type of exercise rather than walking or jogging and, that a free exercise program or more exercise programs appropriate for those with cardiac problems would increase their rate of compliance. At the time of data collection, the cardiac rehabilitation program from which the sample was drawn was the only one in a city with a population of one half million. Additionally, most insur-

Table 10. Reasons Subjects did not always Exercise.*

Barriers	Frequency of Responses
Weather	23
Lack of time	14
Other _____	10
Other health problems	9
Lack of interest	6
Other types of pain with exercise	6
Chest pain (angina)	4
Shortness of breath	4
Weakness, fatigue	3
Didn't want to overdo it	2
Didn't understand the prescription	0

*Based on responses of 40 subjects.

Table 11. Rank Order of Responses regarding
Non-Compliance (N = 18).*

Responses	Frequency of Responses
Other type of exercise and/or program available	6
It's lonely/I'd like company	4
Change my lifestyle/be more self-disciplined	4
I feel okay and see my physician regularly	2
If I had stayed in the cardiac rehabilitation program	2
Pulse taking seems unnecessary and is inconvenient	1

* Total N = 18.

ance companies did not cover the cost of the program beyond the three month period.

Relationships between the Quality
of Life and Compliance

No significant relationships were found between the scores for the quality of life, level of compliance and the number of perceived barriers to compliance. Pearson correlation did show that the Quality of Life scale and the number of perceived benefits of exercise compliance were inversely and significantly related ($r = -.44$, $p = .02$).

The only other significant relationship found was between the benefits of and barriers to compliance ($r = .47$, $p = .002$).

Analysis of Variance

Due to the expanse of the time period that the subjects responding to the questionnaire were enrolled in the cardiac rehabilitation program (1977-81), an ANOVA was computed for the quality of life and compliance scales. The F test failed to provide evidence that there were any significant differences in the responses to the quality of life and compliance scales when the time periods 1977-78, 1979, 1980 and 1981 group mean scores were compared.

Multiple Regression

The predictive value of the six subscales of "Quality of Life" on the Level of Compliance scale was analyzed using multiple regression technique. The subscale Health explained so little in variance that its values were not entered by the computer. The subscales Comfort, Emotional Status, Function, Economics and Overall life quality were only able to explain any change in the compliance score approximately seven percent of the time. This was not significant.

CHAPTER 5

DISCUSSION OF FINDINGS AND RECOMMENDATIONS

In this chapter, the findings of the study are related to the conceptual framework and the literature review. Implications of the study and recommendations for future studies are also presented.

Interpretation of the Results

The interpretation of the findings is divided into four subsections: Quality of Life, Level of Exercise Compliance, the Benefits of and Barriers to Compliance, and the Reliability and Validity of the Instrument.

Quality of Life

The purpose of this study was to measure the relationships between the quality of life and exercise compliance. Only significant findings shall be discussed.

A significant inverse relationship ($p = .02$, $r = -.44$) was found between the responses to the Quality of Life scale and the number of perceived benefits of compliance. Subjects who scored low on the Quality of Life scale perceived more benefits of complying with the exercise prescription

than those who scored high. The lowest group mean score ($\bar{x} = 3.77$) on the scale was for the component Health. One interpretation of these results, related to the Health Belief Model variable "severity of illness," may be that those who were least satisfied with the quality of their life and/or health were more likely to perceive that compliance with the exercise prescription was beneficial to them (Haynes et al., 1979).

The total group mean score for the Quality of Life was 49 out of a possible 60 points. This was high and was reflected in the distribution scores. Mean item scores indicated that the sample agreed most strongly with the statement referring to their ability to perform the activities of daily living (QL#8). Though scales of this nature are known to produce a "halo effect," it seems valid to assert that the population responding to the questionnaire was engaged in a lifestyle that was physiologically and emotionally satisfying to them (Polit and Hungler, 1978).

Level of Compliance

Level of compliance scores calculated were approximate to other researchers' findings (Shephard, 1979; Tirrell and Hart, 1980). About half (18) of the sample ($N = 32$) were still following some aspect(s) of the exercise prescription and seven were highly compliant. Three or four subjects

indicated that they were following their "own" exercise prescription which included swimming and/or bicycling, and two responded that they hadn't received an exercise prescription. In reference to the last comment, it seems likely that not every client was familiar with the terminology or that the word prescription had a different meaning for them.

Tirrell and Hart (1980), who asked similar questions about exercise compliance, stated that the "rigidity" of the instrument in part accounted for the low level of compliance scores. In this study as well as in Tirrell and Hart's investigation (1980), areas of highest compliance were the frequency and duration of exercise; pulse taking activities were areas of lowest compliance. It may be that emphasis on pulse taking may not be warranted in a long term exercise compliance tool. Subjects involved in this study and Tirrell and Hart's investigation have said that pulse taking is inconvenient and unnecessary. After a couple months of exercising, one recognizes the "training pace" and needed only spot checks on their pulse rate once or twice weekly. Other unavoidable "barriers" which lower exercise compliance were weather and physical incapacitation. The extreme heat in the Southwestern desert during summer months is not conducive to outdoor exercise or health for this population. It is a possibility that at sometime in

the course of a year or so one may be physically prevented from exercise due to health problems.

The low to moderate level (48 percent) of total compliance reported by the subjects supports the claim that follow-up of clients enrolled in a cardiac rehabilitation program is indicated if the long-range objectives of these programs "permanent lifestyle changes conducive to healthier living" is to be fulfilled (American Heart Association, 1979; Shephard, 1979; Tirrell and Hart, 1980).

Benefits of and Barriers to Compliance

A significant relationship ($r = .47$, $p = .002$) was found between the number of perceived benefits of exercise compliance and the barriers to compliance. Those who perceived the greater number of benefits of complying with the prescription were likely to perceive the greater number of barriers to compliance as well. In other words, those who chose several benefits of exercise compliance also chose several barriers to compliance. A logical explanation may be that this relationship occurred due to the design of the multiple selection statements that pertained to these topics. Directions read: "Circle one or more phrases. . . ." Respondents who circled two or three phrases on one question were likely to do the same when answering the other.

Unlike Tirrell and Hart's investigation (1980), no significant relationship between the number of perceived barriers to exercise compliance and the level of compliance (an inverse relationship) was found. In part, this may be due to differences in research design.

Weather and lack of time, the two most frequently chosen Barriers to Compliance, have been cited by other authors as major obstacles (Shephard, 1979; Tirrell and Hart, 1980). Similar to Tirrell and Hart's (1980) investigation report, some subjects stated that they did not think it necessary to comply with the exercise recommendations because "I go to the Doctor and feel all right." This rationale may indicate denial of disease or that greater emphasis on the benefits of exercise need to be stressed by the subjects' personal physicians.

Reliability and Validity of the Questionnaire

The high estimates of the Quality of Life scale's reliability coefficient (.90) and that of the Compliance scale (.91) led to the conclusion that they were reliable instruments.

The estimated criterion validity of both scales was found to be quite high also (.70, .81, respectively), even though it must be realized that in part, the small number of

items per scale and subscales could have artificially inflated the values (Baggaley, 1964).

Implications of the Sample's Characteristics

The Personal Information Form was included in the questionnaire for purposes of description and assessment. Some of the more pertinent data gathered from this form and the subjects' high rate of response will be discussed.

The "desire to work" question focused on productivity rather than occupational status as an influencing factor on one's perception of the quality of life (LaMendola and Pellegrini, 1979). Including the 18 employed subjects in the "desire to work" category supplied the information that 81 percent of the sample ($n = 22$) who "desired to work" were employed.

The "use of leisure time" question related to one's perception of the quality of life and provided a broader examination of the population's lifestyle. Answers ranged from sedentary activities such as reading or television watching to hiking and playing tennis. Socializing and travelling were mentioned by some of the sample as well. The variety of answers supplied further validated the high total mean score of the Quality of Life scale.

Though only three of the subjects indicated that they were currently involved in a formal exercise program,

several other subjects indicated that they would be interested in joining one for "added motivation" if it were available, economical and conveniently located.

It was considered of note that 14 (36 percent) of the sample chose to extend their participation in the cardiac rehabilitation program beyond the recommended three month time period. This type of behavior is suggestive of a belief in the efficacy of the prescribed treatment, a variable in the Health Belief Model (Haynes, 1979). Depending on one's outlook, it could also be interpreted as dependent behavior, possibly stemming from one's fear of exertion (Ross et al., 1978).

Finally, the midway placement of the "overall compliance" mean item score between the highest and lowest scores tends to support the veracity of the subjects in completing the questionnaires. Also, the high return rate of 87 percent of the mailed questionnaires not only virtually eliminated the risk of response bias, but can be interpreted as supporting the conclusion that the subjects involved in this study were actively and satisfactorily engaged in the process called life.

Recommendations

Based on the findings of this study, the following recommendations were made.

Reliability and Validity

Part I: Quality of Life.

1. Rephrase statements one, five, ten, and 12, which refer to emotional status and comfort, so that they may test more similar domains of thought, and thereby raise their level of internal consistency.
2. Rephrase statements one and 10, Comfort, and three and nine, Overall Life Quality, so that they are not so similar in meaning. If designing a shorter scale, it would be possible to delete one of these items/subscales without changing the internal consistency of the scale.

Part II: Compliance Scale.

3. After reevaluating the mode of deliverance pertaining to pulse taking in the program, examine the suitability and weight that this concept deserves in a long term follow-up study.
4. Change the multiple selection statements numbers nine and 10 so that the phrases are numbered in rank order of importance by the subjects.
5. Administer the Quality of Life scale and the Compliance scale with another similar, tested instrument to establish its construct validity.

Future Studies

Using the redesigned Cardiac Rehabilitation Follow-Up Questionnaire:

6. Replicate studies with a larger sample population drawn from another cardiac rehabilitation program for the purpose of supporting this study's findings and for further examination of the relationship between the level of compliance and the barriers to compliance.
7. Readminister the questionnaire to this study's population after a period of time has elapsed (18-36 months) for comparative purposes.

Innovations

8. Expand the parameters of an exercise prescription so that it can be modified by the client to include more than one mode of exercise.
9. Encourage the acceptance of cardiac patients who have completed a cardiac exercise course in community-based exercise programs.
10. Establish a registered nurse clinician as a liaison person for those clients who wish to participate in community exercise programs and have completed a cardiac exercise program.

11. Involve nurse clinicians in the establishment of a formal recall program which assesses the former participants' in cardiac rehabilitation programs level of compliance and quality of life over an extended period of time.

CHAPTER 6

SUMMARY OF THE STUDY

This study was designed to assess and measure the relationships between the former cardiac rehabilitation client's quality of life and compliance with an exercise prescription.

The conceptual framework of the investigation was based on Belief Systems, a construct whose importance in health-related behavior was stressed by Simonton and Simonton (Kruse, 1979). Belief Systems were thought to influence one's perception of the quality of life and compliance. Rosenstock's Health Belief Model supported the investigation's approach to compliance behavior (Haynes, 1979). The five factors: health, comfort, function, emotional status and economics were the foundations for the quality of life (Healy, 1970; Cobb, 1974).

At the time of this investigation, retrospective studies of cardiac rehabilitation clients were scarce, yet it is an area of health care that seeks to instill permanent behavioral changes. In part, compliance findings were supported in the literature by Shephard (1979) and Tirrell and Hart (1980). To date, no research is known to exist that

quantitatively analyzes the former cardiac rehabilitation client's quality of life.

A convenience sample of 40 subjects who had participated in a cardiac exercise rehabilitation program between 1977-81 was selected. The method of data collection was by a mailed, investigator-developed questionnaire. Computations run concurrent with data analysis revealed that the Cardiac Rehabilitation Follow-Up Questionnaire was a reliable and valid instrument. The questionnaire contained two Likert scales which measured the quality of life and level of exercise compliance. Two multiple selection statements and an open ended statement were included to assess the subjects' perceptions of the benefits of and barriers to compliance. A Personal Information Form was sent with the questionnaire for the purpose of describing the characteristics of the sample.

The results of this study yielded two significant relationships, those between the Quality of Life scale and the perceived number of benefits of compliance ($r = -.44$, $p = .02$) and another between the perceived number of benefits of and barriers to compliance ($r = .47$, $p = .002$). The benefit of exercise compliance cited most often was "feeling better physically." The barrier to exercise compliance cited most often was "weather." The mean group score for

the Quality of Life scale was rated "high." The level of compliance mean scores averaged 48 percent.

Multiple regression technique found that the quality of life scores were not predictive of the level of compliance scores. Analysis of variance in responses by dates enrolled in the cardiac exercise program showed no significant differences in quality of life or compliance scores existed.

Recommendations for future studies included: reconstruction and retesting of the Cardiac Rehabilitation Follow-Up Questionnaire to improve its reliability and validity; replicating this study on a larger sample size to support its findings; readministering the redesigned questionnaire to the same sample after an interim of 18-36 months has elapsed; expanding the parameters of an exercise prescription to include more than one mode of exercise; the admission of those who had completed a cardiac rehabilitation program in community exercise programs; and the involvement of a nurse clinician in a liaison role position and in the periodic recall of those who have participated in these programs for the purpose of reassessing their quality of life and exercise compliance.

APPENDIX A

DISCLAIMER FOR STUDY

DISCLAIMER FOR STUDY

TO WHOM IT MAY CONCERN:

The records at St. Joseph's C.R.C. show that you participated in their cardiac exercise rehabilitation program and received an exercise prescription from them. With their permission you are being asked to voluntarily participate in the completion of the enclosed questionnaire entitled "Cardiac Rehabilitation Follow-Up Questionnaire." The purpose of this study is to examine and evaluate the long term effectiveness of a cardiac exercise rehabilitation program. One way of accomplishing this task is by asking persons like yourself about their current exercise habits and certain aspects of their present manner of living. Information of this kind is necessary to maintain and improve existing standards of health care.

About 15 minutes of your time will be required for completion of this questionnaire and will indicate your consent as a willing participant in this study. You may choose to answer only some or none of the questions without incurring any ill will. You need not place your name or address anywhere on the questionnaire unless you wish to receive a summary of the results of this study. A summary of the entire group's responses only will be shared with the staff at the C.R.C. All information received will be kept strictly confidential.

Return envelopes in the mailed questionnaires will be coded in a method known only by the investigator for the sole purpose of recontacting those persons who do not return it. If you are returning the questionnaire by mail, you are urged to do so within a week of receiving it.

Again, I wish to assure you that your responses will remain anonymous and ask that you answer the questions as accurately as possible. Thank you for your time and consideration. If you have any questions regarding this study, please feel free to contact the investigator at the address below.



Lorraine Mueller, R.N., B.S.N.
College of Nursing
The University of Arizona
Tucson, Arizona 85721
626-6154

APPENDIX B

PERSONAL INFORMATION FORM

PERSONAL INFORMATION FORM

This information will help the investigator categorize your response. Please circle or answer accordingly.

1. Age: _____
2. Sex: MALE FEMALE
3. Are you: EMPLOYED UNEMPLOYED or RETIREED?

If employed, how many hours/week do you work? _____

If unemployed or retired, do you desire to work? YES NO
4. How do you spend your leisure time? _____

5. If not working (unemployed or retired), how do you usually spend your day? _____

6. Are you presently enrolled in any formal exercise program?
YES NO
If YES, what kind? _____
And how often does it meet? _____
7. Have you been hospitalized or otherwise physically unable or prevented from following your exercise prescription?
YES NO
If YES, for how long? _____
And for what reason? HOSPITALIZED
 PHYSICALLY UNABLE
 OTHER (specify) _____
- **8. Time period you were involved in C.R.C. program:
From _____ to _____
 mon./yr. mon./yr.

****VERY IMPORTANT THAT THIS LAST QUESTION IS ANSWERED:**
This information is essential to the study.

APPENDIX C

CARDIAC REHABILITATION
FOLLOW-UP QUESTIONNAIRE

CARDIAC REHABILITATION FOLLOW-UP QUESTIONNAIRE

PART I: This part of the questionnaire deals with certain aspects of your current manner of living. Please circle the one response which most closely describes your reaction to the statement.

Possible Responses: SA = Strongly Agree
 A = Agree
 U = Uncertain
 D = Disagree
 SD = Strongly Disagree

Quality of LifeStatements

- | | | | | | | |
|---------------------------|---|----|---|---|---|----|
| <u>Comfort</u> : | 1. In general I am not bothered by any of the signs and symptoms of heart disease such as shortness of breath, unusual fatigue or weakness. | SA | A | U | D | SD |
| <u>Economics</u> : | 2. I worry constantly about money, bills, finances and/or inflation. | SA | A | U | D | SD |
| <u>Overall</u> : | 3. At present I am satisfied with my life and have plans for the future. | SA | A | U | D | SD |
| <u>Health</u> : | 4. Usually I am satisfied with the state of my health. | SA | A | U | D | SD |
| <u>Emotional Status</u> : | 5. Usually I think of myself as a worthwhile person who can give and receive love. | SA | A | U | D | SD |
| <u>Function</u> : | 6. I can pursue activities in work and/or leisure that are important to me. | SA | A | U | D | SD |
| <u>Health</u> : | 7. I feel that I have recovered from my heart attack and/or open heart surgery well enough to have the energy to pursue my personal goals. | SA | A | U | D | SD |
| <u>Function</u> : | 8. I am able to accomplish my basic needs of eating, grooming and shopping quite independently of anyone else's help. | SA | A | U | D | SD |

<u>Overall:</u>	9.	Generally my life is meaningful to me and I look forward to the future.	SA	A	U	D	SD
<u>Comfort:</u>	10.	Chest pain (angina) never interferes with any activity I wish to undertake.	SA	A	U	D	SD
<u>Economics:</u>	11.	My financial income is adequate to provide for my needs.	SA	A	U	D	SD
<u>Emotional Status:</u>	12.	Generally my participation in groups or clubs is fulfilling to me.	SA	A	U	D	SD

PART II: This part of the questionnaire asks about your current exercise habits. Information of this kind is important in determining the strengths and weaknesses of an exercise prescription! Therefore please answer these statements as accurately and honestly as possible by circling the response(s) most appropriate to you. IF YOU NO LONGER EXERCISE MARK HERE _____ AND PROCEED TO QUESTIONS 10 & 11.

There is <u>one</u> possible response <u>only</u> for Questions 1-8.	A = Always
	AA = Almost Always
	S = Sometimes
	R = Rarely
	N = Never

Level of Compliance

Statements

1.	I exercise as often as recommended by my exercise prescription.	A	AA	S	R	N
2.	I exercise as long as recommended by my exercise prescription.	A	AA	S	R	N
3.	I take my pulse when I exercise.	A	AA	S	R	N
4.	I take my pulse at the recommended intervals when exercising.	A	AA	S	R	N
5.	I follow the recommended warm-up procedure.	A	AA	S	R	N
6.	I follow the recommended cool-down procedure.	A	AA	S	R	N

7. I exercise at my recommended training heart rate. A AA S R N

Overall Compliance

8. I follow all or most of the recommendations made by my exercise prescription from the C.R.C. A AA S R N

IN THE NEXT TWO STATEMENTS, PLEASE CIRCLE ANY OF THE PHRASES (CIRCLE ONE OR MORE PHRASES) WHICH BEST DESCRIBE YOU.

Benefits of Compliance

9. Reasons that I continue to exercise:

My physician, nurse or other health professionals tell me I should.

My family and/or friends tell me I should.

I feel better emotionally.

I feel better physically.

I look better.

It's good for my health.

Other (specify): _____

Barriers to Compliance

10. Reasons you may not always exercise exactly as prescribed:

Lack of time

Lack of interest

Chest pain (angina) Other health problems

Weakness, fatigue Shortness of breath

Weather Didn't understand the prescription

Other types of pain with exercise

Other (specify): _____

11. I would be more likely to follow my exercise prescription more closely if (if this statement could apply to you please complete in your own words):

 Thank you for filling out the questionnaire! Please feel free to add any comments you may have and/or your name and address in the space below if you want a summary of the completed study's results.

APPENDIX D

UNIVERSITY OF ARIZONA
COLLEGE OF NURSING
MEMORANDUM

UNIVERSITY OF ARIZONA COLLEGE OF
NURSING MEMORANDUM

TO: Lorraine Mueller
3536 E. Flower Street, Tucson, 85716

FROM: Ada Sue Hinshaw, R.N., Ph.D.
Director of Research

Margarita Kay, R.N., Ph.D.
Chairperson, Research Committee

DATE: August 17, 1981

RE: Human Subjects Review: "Long Term Follow-Up of
Cardiac Rehabilitation Clients"

Your project has been reviewed and approved as exempt from University review by the College of Nursing Ethical Review Sub-committee of the Research Committee, and the Director of Research. A consent form with subject signature is not required for projects exempt from full University review. Please use only a disclaimer format for subjects to read before giving their oral consent to the research. The Human Subjects Project Approval Form is filed in the office of the Director of Research, if you need access to it.

We wish you a valuable and stimulating experience with your research.

ASH:ss
4/81

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