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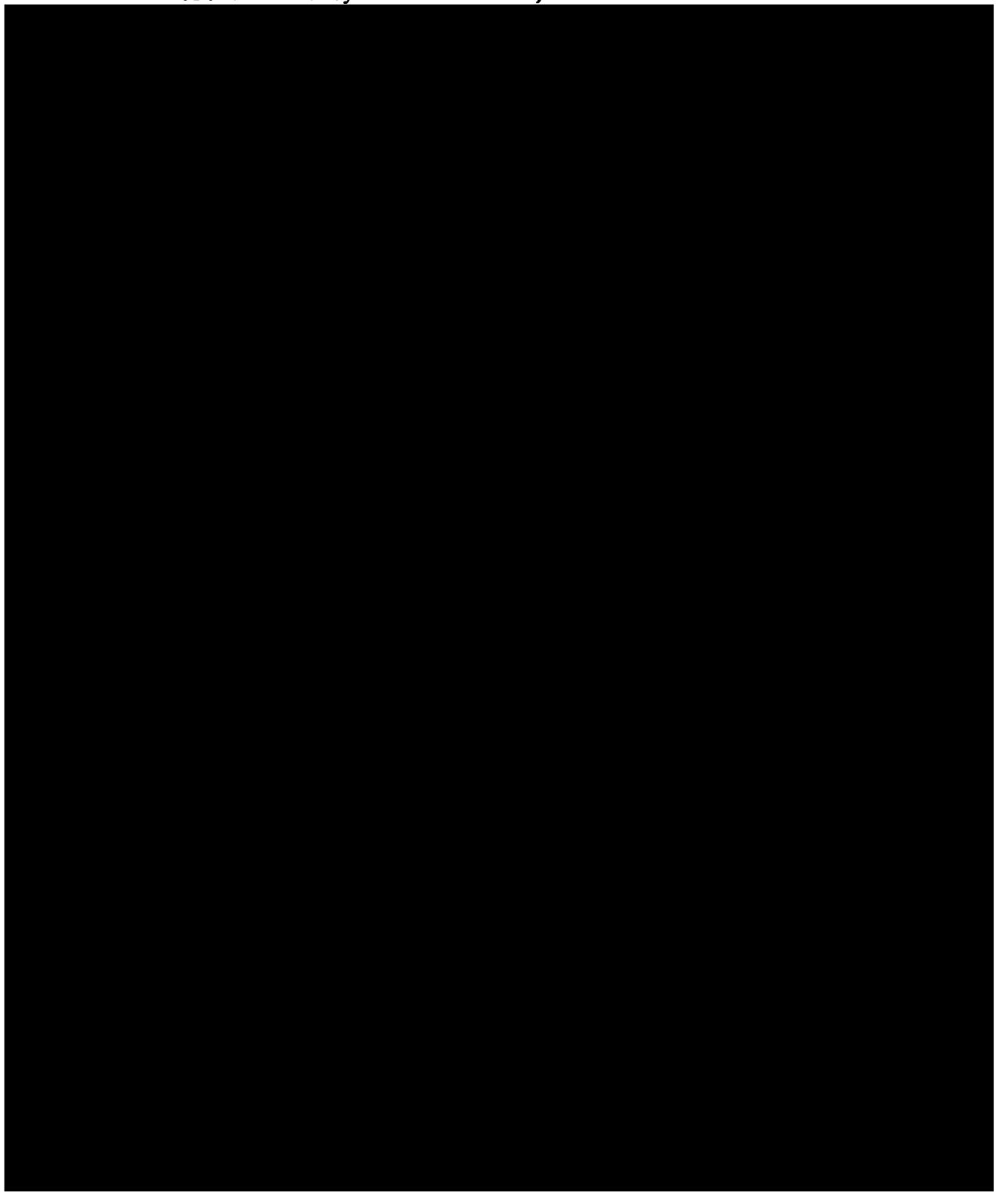
Survivors of Sudden Cardiac Death:

The Medical Psycosocial Factors Related to Self-Reports of

Physical Health, Mental Health and Perceived Health Status

by

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ABSTRACT

Survivors of Sudden Cardiac Death:
The Medical and Psycosocial Factors Related to Self-Reports of Physical Health, Mental Health and Perceived Health Status

This study examined the relationship of selected medical and psychosocial factors to self-reports of physical health, mental health and perceived health status in 61 survivors of sudden cardiac death (SCD). Additional descriptive data on the survivors' rate of work return, sexual functioning and mental status changes were also generated.

Data for this cross-sectional correlational study were gathered through chart reviews, patient interviews and structured questionnaires. The standardized instruments employed included the McCorkle Symptom Distress Scale, the Norbeck Social Support Questionnaire, and the Rand Corporation's Physical Functioning Index, Mental Health Index and General Health Index. Descriptive, correlational, discriminant and multiple regression statistics were used to analyze the data.

Compared to a national sample, SCD survivors reported significantly poorer physical functioning ($p < 0.001$), less favorable health perception ($p < 0.001$) but equally favorable mental health status. However, a subgroup of younger survivors (≤ 50 years) reported significant psychological distress ($p < 0.001$). Illness severity, symptom

distress and age significantly discriminated between survivor reports of physical health ($p < 0.0001$). Although age, symptom distress and cognitive appraisal of arrest/illness impact were significantly related to survivor reports of mental health ($p < 0.001$) and perceived health status ($p < 0.01$), hierarchical multiple regression analysis indicated only symptom distress accounted for a significant portion of the variance in these measures (28% and 39%, respectively, $p < 0.001$).

Illness severity was the major factor affecting initial work return (31 of 41 subjects) and subsequent work status (62%) among SCD survivors over a mean follow-up of 21 ± 8 months. Seventy-eight percent of the survivors sexually active prior to cardiac arrest resumed coitus although 55% of these were less active, primarily because of symptoms. Twenty-five survivors (41%) reported changes in memory, concentration or intellectual functions since the occurrence of cardiac arrest, but less then 10% of these had not resumed independent social activities and/or shopping.

The occurrence of symptoms significantly predicts long term SCD survivor reports of physical health, mental health and perceived health status. Other factors influencing survivor reports on these measures are age, illness severity and cognitive appraisal of arrest/illness impact. Social support as measured in this study was not significantly related to either mental health or perceived health status.

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CHAPTER ONE

INTRODUCTION

The long term recovery status of patients who have been resuscitated successfully from one or more episodes of sudden cardiac death was examined is this study. Aborted sudden cardiac death is a relatively new phenomenon resulting from the development and implementation of basic life support services and educational programs which have familiarized an increasing number of individuals with cardiopulmonary resuscitation. The growing success of these programs both within and outside the hospital setting has been well documented (Myerburg, 1981; Minuck and Perkins, 1970). Prior to the inception of coronary care units, sudden cardiac death was often deemed an act of fate before which the physician was largely helpless (Lown, 1979). But with the institution of cardiac monitoring, it was recognized that the most frequent mechanism underlying this event is primary ventricular fibrillation, a potentially reversible disturbance of myocardial conduction that is not necessarily associated with heart failure, shock or as an agonal event (Weinberg, 1978).

Mortality statistics indicate that approximately two-thirds of the 600,000 cardiac deaths occurring annually occur suddenly, and usually outside the hospital. In addition, 55% of these fatalities occur within 30 minutes of the onset of symptoms (Schroeder, 1977). Hence, one of the more widely used definitions of sudden cardiac death in the literature is an unexpected death occurring within one hour of onset of symptoms, where no other cause is suggested by medical history (Kannel, Doyle,

McNamara et al., 1975). Weinberg (1978), in reviewing the epidemiological data on sudden cardiac death, describes the patient at greatest risk for this event as a middle aged male with significant coronary artery disease (CAD). He notes that post mortem studies of these patients have revealed that up to 90% of the patients have greater than 75% narrowing of at least one, but frequently two or more, coronary arteries, though the presence of CAD is unknown in approximately 55% before the onset of symptoms. Recent angiographic and hemodynamic studies of survivors of the sudden death syndrome have not only confirmed the incidence of significant coronary artery disease among these patients, but have shown that 30-66% of them also have significant left ventricular abnormalities; i.e., elevated left ventricular end diastolic pressures, decreased ejection fraction (less than 40%) and moderate to severe left ventricular hypokinesis (Myerburg, Conde, Sung et al., 1980; Tresh, Grove, Keelan et al., 1981). However, Tresh (1981) points out there is a significant minority (10-30%) of patients whose underlying myocardial electrical instability is not associated with CAD but with valvular defects, cardiomyopathies and/or no known cardiac disease (primary arrhythmia).

While significant coronary artery disease is a major factor associated with the occurrence of sudden death, the initial assumption that sudden death occurred in the milieu of an acute coronary event has been proven unjustified. Baum, Alvarez and Cobb (1973) found that only 34 of 67 survivors of pre-hospital cardiac arrest had evidence of an acute infarction while Shaefer and Cobb (1975) found only a 17% incidence of ventricular fibrillation associated with acute myocardial

infarction out of 234 patients who had been successfully resuscitated from prehospital sudden cardiac death. However, whether the initial event of ventricular fibrillation occurs concomitantly with an acute coronary thrombosis does appear to affect subsequent survivor morbidity and mortality. Baum (1974) in his report on 146 survivors of prehospital sudden death found that 24-30% had a recurrence of ventricular fibrillation, sudden death or both within one year and 47% had a recurrence within two years. However, he also found that these high recurrence rates did not apply to those patients whose ventricular fibrillation was associated with transmural myocardial infarction as measured by LDH isoenzymes and develpment of Q waves on ECG. These patients had a 14% two-year mortality rate after hospital discharge; a mortality rate similar to non-cardiac arrest myocardial infarction patients (Goldberg, Szklo, Tonascia, Kennedy, 1979). Thus it appears there are two subsets of patients who develop sudden death: patients with ventricular fibrillation in association with myocardial infarction whose long term prognosis is relatively good and patients without evidence of myocardial infarction whose long term prognosis is relatively poor.

Since only a minority of sudden cardiac death victims demonstrate evidence of myocardial infarction and up to 30% have little or no evidence of coronary artery disease, it would appear that other pathological mechanisms may be contributing to the onset of this event. Histopathological studies of the myocardiums of sudden death victims have shown that the predominant pattern in a substantial majority of cases is disruption of sarcomeres in focal areas of the heart (Baroldi,

1975). These lesions are characterized by coagulation of the contractile proteins from adjacent sarcomeres to form transverse contraction bands and are morphologically similar to the lesions described in patients with pheochromocytoma and various stress or catecholamine induced myocardial necroses (Eliot, Todd, Pieper & Clayton, 1979). To what extent these lesions contribute to the production of lethal arrhythmias is unknown, but Lown (1979) has espoused the position that in the presence of myocardial electrical instability, certain psychological and behavioral aspects may operate as acute triggers for ventricular fibrillation in predisposed individuals.

Several retrospective studies of sudden death have suggested a relationship between acute and chronic stress and the onset of this fatal event. Engel (1971), using reports in the obituaries, analyzed the circumstances surrounding 170 cases of sudden cardiac death. He described three major categories of life events in which sudden death tended to occur: following a major loss such as a close person, status, or self-esteem; during periods of personal danger or threat; and during periods of relief or triumph. The author suggests that the physiological responses associated with emotional arousal and psychological uncertainty of major life changes may result in vasodepressor syncope in the healthy individual and sudden death in the person with a defective cardiovascular system. In assessing the validity of this postulate, Rahe and Romo (1974) interviewed the widows of 126 sudden cardiac death patients, and utilized the Schedule for Recent Events, a tool developed on the assumption that typical life changes can be stress producing according to their significance to the average individual. Results from this study showed that a statistically

significant ($p < 0.005$) build-up of life changes had occurred in these subjects in the six months prior to symptom onset. On the other hand, Myers and Dewar (1975), in a study comparing 100 men dying suddenly from coronary disease with 100 men with nonfatal myocardial infarction, found that acute psychological stress was the most significant factor associated with sudden death. Twenty-three of their cases had experienced an acute stress in the 30 minutes prior to the fatal event and 40 had experienced such stress in the preceding 24 hours. In another retrospective study, Rissanen, Romo and Stiltanen (1978) found that acute stress had occurred in 23 (19%) of their cases and was associated with rapid death; 14 of these patients died instantly. Chronic stress, on the other hand, which occurred in 25% of the patients, was associated with prodromal symptoms such as chest pain, heaviness of the arms and dyspnea, and death was delayed for several hours. The most common antecedent symptom in 32% of these patients was unusual fatigue, a symptom consistent with both decreased cardiac function and depression.

The relationship of depression to the occurrence of sudden cardiac death and complex ventricular ectopy has been receiving increasing attention (Orth-Gomer, Edwards, Erhardt, et al., 1980). Greene, Goldstein and Moss (1972) who interviewed the widows of 26 sudden cardiac death victims found that 80% of the victims had symptoms of depression for a week to several weeks prior to the fatal event. The sudden death then occurred in a setting of arousal engendered by either increased work, activity or situations of anxiety or anger. In a 10 year prospective study of 65 survivors of myocardial infarction

matched with 65 controls, Bruhn, Paredes, Adsett and Wolf (1975) also found that depression along with the joyless striving, characteristic of the "Sisyphus reaction", and extreme Type "A" behavior were significant predictors of sudden cardiac death.

While the postulates of both Lown and Engel are given some support by the studies presented, the association between both acute and chronic stress and the occurrence of sudden death remains equivocal. Psychosocial stress may in fact act as an acute trigger for ventricular fibrillation in a specific susceptible population, but its main effect could also be through the aegis of biologically deleterious coping strategies such as smoking, excessive alcohol consumption and overwork, which patients may employ to reduce the uncomfortable emotions associated with stress. For example, Myers and Dewar (1975) found that their sudden death cases were heavier smokers than the 100 non-fatal cases of myocardial infarction composing their control group. In addition, the fatal event tended to occur 1 hour after the evening meal which contained a large consumption of alcohol. A combined analysis of the sudden death cases occurring in the Albany-Framingham studies reveals that cigarette smoking and overweight were not only associated with an increased incidence of sudden death in both groups, but were distinctly related to the proportion of deaths that were sudden among the Framingham cases (Doyle, Kannel, McNamara et al., 1976). In a comparative study of 64 white women having sudden death and 64 age-match neighborhood controls, Talbott, Kuller, Detre, et al. (1977) found that the women dying suddenly were significantly differentiated

from the controls by a history of psychiatric illness, particularly depression, more cigarettes smoked and heavier alcohol consumption.

While the potential causes and risk factors associated with sudden cardiac death, as well as the treatment of the underlying myocardial electrical instability which characterizes this patient population have stimulated an array of empirical research, there remains a virtually untouched domain of scientific inquiry: that is, post sudden death recovery. Preliminary recovery data on this population are limited to several small (10-38 subjects) investigations following the institution of cardiac arrest procedures in the hospital (Dlin, Stern & Poliakoff, 1974; Dobson, Tattersfield, Adler & McNicol, 1971; Druss & Kornfeld, 1967; Dupont, Flensted-Jensen & Sandoe, 1969; Minuck & Perkins, 1970). The most comprehensive of these investigations was done by Dobson et al. (1971) who studied 20 male patients surviving cardiac arrest in association with acute myocardial infarction. In this study, patients were interviewed at least 6 months after the arrest had occurred. Additionally the patients underwent a complete physical evaluation, as well as a psychological assessment.

Results from this study showed that 16 of the 20 patients were aware a cardiac arrest had occurred even though only 3 had been informed of its occurrence by the medical staff. These patients discussed ambivalent feelings toward having survived and believed a discussion of the event in the hospital would have relieved their post discharge anxiety. Fifteen of these patients were judged to have made satisfactory or moderately satisfactory adjustments in terms of psychological status, return to work and resumption of activities. Five

patients continued to demonstrate major disturbances in mood, including insomnia, irritability and loss of self-esteem, and had greatly curtailed both their social and physical activities. The authors suggested that poor rehabilitation was associated with persisting physical disabilities and personality factors rather than with specific features of the cardiac arrest.

The findings of the previous study are provocative in that they suggest both a range of potential outcomes and a relationship between selected medical and psychosocial factors and recovery. However, this study as well as the other preliminary investigations only addresses those patients having in-hospital cardiac arrest in association with myocardial infarction. Since the majority of sudden cardiac deaths occur in the community and current data indicate that 55-83% of those individuals who survive this event do not have documented myocardial infarctions, the lack of any data on the subsequent functional status of this larger population of aborted sudden death patients is notable.

There are several factors that apparently have contributed to the lack of empirical data on the recovery status of aborted sudden death patients in this population. Initially, the priorities regarding sudden cardiac research were to identify the potential victim and to develop mechanisms for preventing or controlling the underlying myocardial electrical instability (Lown, 1979). Hence the development of extended nursing roles in the coronary care units, community paramedical teams and cardiopulmonary resuscitation programs, antiarrhythmic therapies and invasive and noninvasive cardiac diagnostic studies. Secondly, while the number of sudden cardiac deaths occurring annually is

approximately 400,000, the number of successful resuscitations, particularly out of hospital remains relatively small. Myerburg (1981) in reviewing the results of the Miami community emergency intervention program found that of 352 consecutive resuscitative events observed between 1975 and 1978, 220 patients presented with ventricular fibrillation, 87 of whom lived to be admitted to the hospital and 51 of whom were ultimately discharged alive; 24 patients had rapid sustained ventricular tachycardia, 21 of whom were successfully resuscitated and 16 discharged alive; and 109 had bradyarrhythmias or asystole of whom only 9 were admitted to the hospital alive and none lived to discharge. Ninety percent of the deaths following successful resuscitation were due either to "low output states, anoxic encephalopathy, or terminal sepsis after prolonged respiratory support in encephalphathic patients; less than 5% of the deaths were due to the recurrence of malignant arrhythmias" (p. 3). The author did not note whether or not any of the long term survivors had incurred neurological deficits as the result of this event. Likewise, the occurrence rate of neurological deficits in survivors of in-hospital cardiac arrest is equally unclear though it is generally acknowledged that moderate to severe deficits have occurred in some patients.

A third factor contributing to the paucity of information regarding the recovery of this population has been the general dispersal of these patients throughout the medical care system. Only recently has the practice of referring sudden death survivors to a university medical center for the purpose of assessing the reproducibility of their arrhythmia under laboratory conditions to determine or evaluate therapy

brought about a situation which makes these patients accessible to the researcher. Finally, the major emphasis in the cardiac recovery literature has been on outcomes following myocardial infarction. This emphasis was apropos since the leading cause of illness, disability and death in the United States for most of this century has been myocardial infarction.

This paucity of reported recovery data on patients who had survived sudden death syndrome and its impact of this investigator's clinical practice were the primary impetuses from which this study evolved. Currently an aspect of this investigator's practice is the follow-up evaluation of patients who have undergone electrophysiologic drug testing for malignant ventricular arrhythmias. During these evaluations it became increasingly evident that despite the success of specific medical interventions in preventing the recurrence of the patient's arrhythmia, a wide variety of patient outcomes were being observed. While some patients appeared quickly to resume pre-illness physical, work and social activities, others delayed or failed to resume these activities. In some of these latter recoveries the individual's underlying cardiac dysfunction appeared to be a major factor, while in others psychological factors appeared to play a dominant role. Feelings of loss, occasionally profound, and/or a sense of persistent vulnerability and fear of recurrence appeared related to some patient decisions whether or not to resume some or all of their former activities. While these clinically observed outcomes were not strikingly dissimilar from those described in the literature on recovery following acute coronary artery disease, a unique commonality appeared to

differentiate these patients from the larger non-arrest cardiac patient group; i.e., the survivors' awareness that they had experienced "medical" death and had been returned to life.

To what extent these survivors of sudden death syndrome viewed their return to life positively, negatively or ambivalently as suggested by Dobson (1971) was not known. However, the investigator's clinical observations tended to suggest that those patients who appraised this event in terms of loss or ongoing threat were more likely to have persistent mood disturbances and to have curtailed many of their former activities. The responses of patients to an illness experience and the factors which may be predictive of those responses are of particular interest to nursing. In a recent social policy statement, the American Nurses Association (1980) advanced a definition of nursing as "the diagnosis and treatment of human responses to actual or potential health problems" (p.8). This conceptualization of nursing implies that the nurse needs knowledge of the possible relationships among actual or potential health problems, the human response systems (physical, emotional, cognitive, family, social, cultural) and clinical decision making (Loomis & Wood, 1983). Hence, it is important for nurses working with survivors of sudden cardiac death not only to understand the physiologic response to an acute health deviation, but also the human responses which may provoke, coexist or result from this acute event. Before appropriate clinical interventions can be developed, investigations which identify the possible patterns of human responses to this acute health deviation as well as the relationship of pertinent variables to these responses are needed.

Data then that documents the functional health status of survivors of sudden cardiac death and the relationship of selected medical and psychosocial factors to that level of function would begin to fill the gap in the current cardiac recovery literature. Such data would help identify; (a) the incidence and duration of untoward responses following aborted sudden death; (b) the differences, if any, among the patient perceptions of the impact of this event on their lives and their recovery outcomes; (c) the interaction among selected medical and psychosocial factors and their relationship to subsequent functional health status; and (d) the human responses of survivors that are amenable to intervention by health care personnel.

Purpose

The primary purpose of this study was to determine the long term functional health status of patients who had survived sudden cardiac death. Functional health status was viewed as a multidimensional concept involving both physical and emotional dimensions as well as the survivors' perception of their health in general. In addition preliminary outcome data on such factors as work return and sexual functioning were sought. The objective was to generate data on the adjustment status of patients in this population. These data would then be compared to established national norms to determine whether or not significant differences were occurring. The documentation of adjustment status, particularly the incidence of untoward responses, would be helpful in assessing current intervention strategies, as well

as provide a basis for developing new or modified approaches to patient care.

A second major goal was to determine how the survivors appraised the impact of having sustained a cardiac arrest on their current well being and to what extent these appraisals influenced or mediated their long term adjustment status. Such data would assist in documenting the role of cognitive processes in determining behavioral outcomes following life threatening illness. In addition, these data would provide the theoretical basis for future nursing intervention strategies.

The third major goal of this research was to determine what demographic, illness related, and social factors best predicted the survivors' current cognitive appraisal of the event and their long term adjustment status. Generating predictive data would be useful in assessing potential health problems.

CHAPTER TWO

CONCEPTUAL FRAMEWORK AND REVIEW OF LITERATURE

The Crises of Physical Illness Model developed by Moos and Tsu (1977) was used to organize and develop the conceptual framework for this study. This model was chosen to explain the complex interaction of medical and psychosocial processes in recovery because of its emphasis on the role of cognitive processes in determining the physiological and behavioral outcomes of illness. Experimental studies both in clinical and laboratory settings have shown that it is the subject's perception or appraisal of his or her control over the experimental stressor that mediates the degree of physiological arousal and psychological distress reported (Gal & Lazarus, 1975; Klein, Garrity & Gelein, 1974; Levi, 1972; DeSilva & Lown, 1978). These studies lend support to the hypothesis that particular aspects of a stress inducing situation, such as a major life threatening illness, will not necessarily impact negatively on health outcomes as long as these situations are appraised as controllable or at least potentially controllable. Indeed, studies addressing rehabilitative outcomes following serious illness have shown that the most seriously ill patients are not always those who have the poorest adjustment in terms of subsequent physical, psychological and social functioning (Cassem & Hackett, 1977; Dobson et al., Garrity & Klein, 1975). Rather satisfactory outcomes as measured by such variables as return to work, preillness physical activity and morale have been associated with

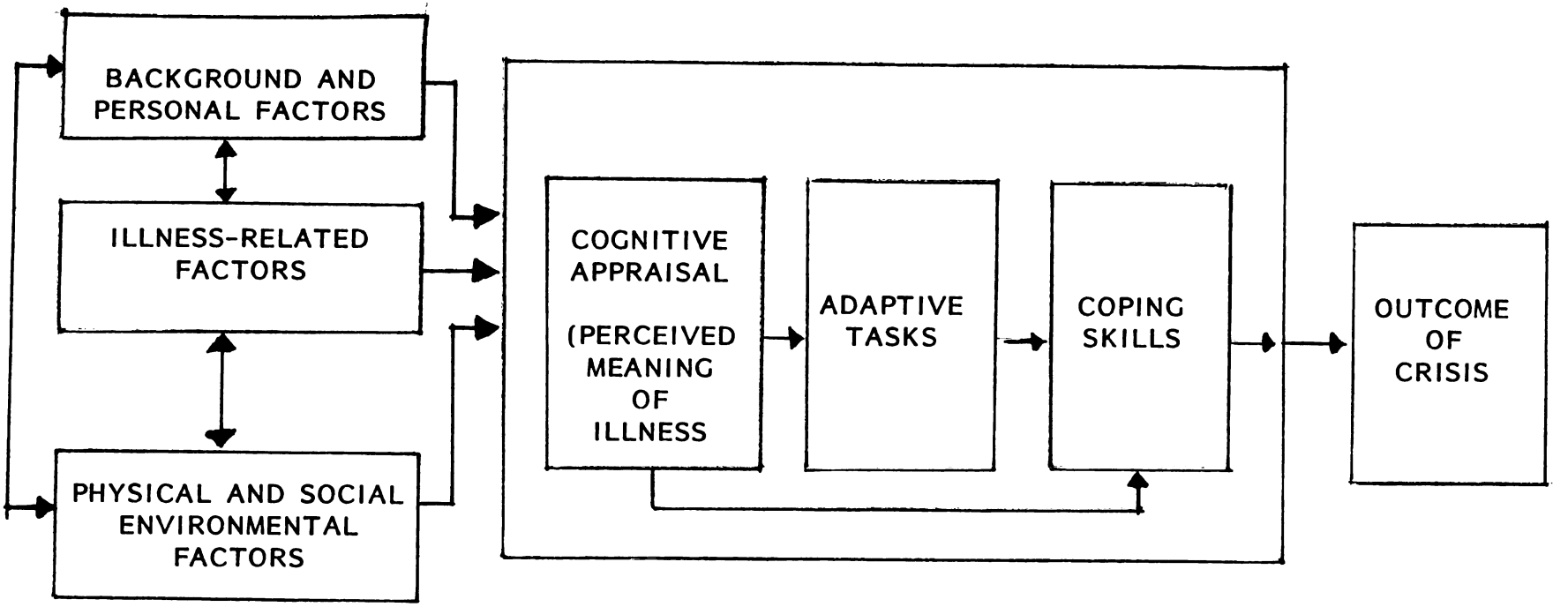


Figure 2-1

THE CRISIS OF PHYSICAL ILLNESS AND INJURY MODEL

From: Moos, R.H. and Tsu, V.D., (1977). Coping With Physical Illness. New York, New York: Plenum Medical Book Company.

the patient's perception of his health status (Garrity, 1973), evidence of having been able to cope well with other problems of adult life (Cay, 1982; Folger and Appels, 1982; Gruen, 1971; Pancheri et al., 1978), and the social or environmental incentives which may act to facilitate or inhibit adjustment (Weinblatt, Ruberman, Goldberg et al., 1978). The Crisis of Physical Illness Model provides a format for addressing these issues. Four basic assumptions underlie this conceptual model: (a) serious physical illness or injury represents a life crisis; (b) the individual's cognitive appraisal of the significance of this life crisis sets forth basic adaptive tasks to which various coping strategies can be applied; (c) the individual's appraisal of the life crisis, the adaptive tasks facing him or her, and his or her choice of coping strategies are influenced by three sets of determinants: background and personal characteristics, illness related factors, and features of the physical and sociocultural environment; and (d) all these factors together determine the outcome or level of wellness achieved by the individual (See Figure 2-1).

The concepts inherent in these assumptions are identified and reviewed in relation to theories of stress, coping and arrhythmogenesis. Specific variables examined in this study are derived from this discussion and include demographic characteristics of the patient, illness severity, symptom distress, social support, cognitive appraisal, current physical function, mental health and self-health perceptions. The intervening process oriented variables identified in this framework, i.e., tasks of recovery and coping strategies, will be addressed in future research. Figure 2-2 presents the modified version of the Crisis of Illness model used for this study.

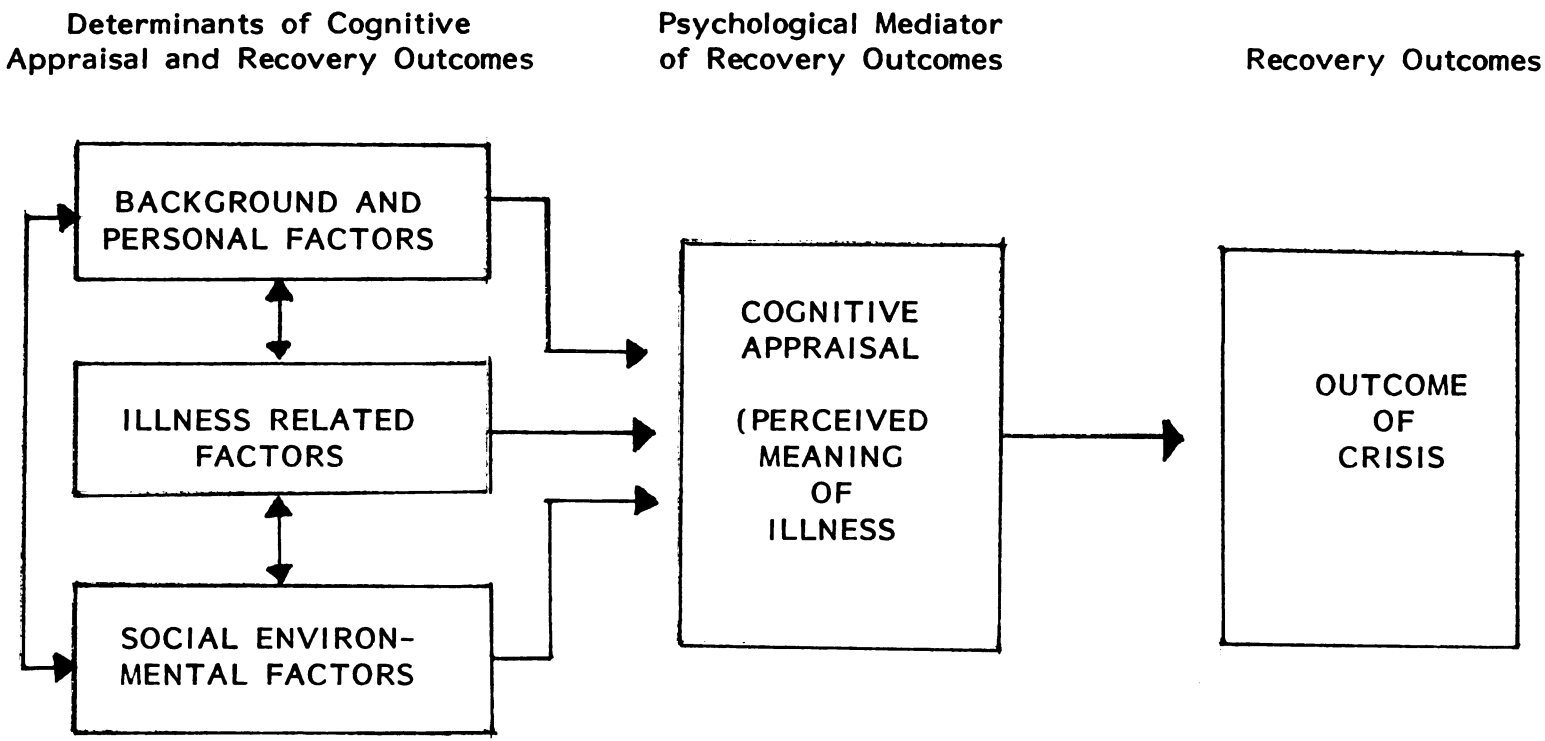


Figure 2-2

MODIFIED CRISIS OF PHYSICAL ILLNESS OR INJURY MODEL

Aborted Sudden Death as a Life Crisis

A life crisis is an emotionally hazardous moment of transition, loss or threat of a loss (Whitlock, 1978). It is characterized by real or perceived changes in one's relationship with oneself, with a significant other or with a particular life situation. It may involve the interjection of new and threatening, or potentially threatening people or events into one's life, or it may initiate significant changes in status, roles or interpersonal relationships. Because a life crisis is a period of marked cognitive and emotional disorganization during which the individual struggles to adjust by applying a variety of problem solving strategies and/or psychological defense mechanisms, it is by definition self-limiting (Caplan, 1961). That is, some resolution or balance is achieved within a few days or weeks if only temporarily, because extreme psychological disorganization is as incompatible with life as is extreme physiological disorganization. According to Caplan (1961), the resolution that is achieved is dependent upon the individual's ability to withstand stress, the degree of reality based problem solving utilized and the individual's repertoire of effective coping skills. Thus, a life crisis may promote personal growth and maturation or it may result in persistent and disabling symptoms of anxiety and depression or changes in character and lifestyle.

It would seem that there is little doubt that the sudden and unexpected onset of a life threatening arrhythmia, with its attendant hemodynamic compromise necessitating prompt resuscitative efforts would constitute a stressful event of major proportions for most patients. In addition to the realization that one has come close to dying, the sudden

cardiac death survivor must also confront the physical discomforts and separation from family and peer relationships associated with hospitalization; uncertainties regarding prognosis; the ability or the desirability of resuming previous lifestyle activities as well as an assault on their self image as capable, healthy individuals. The early descriptive studies of Druss and Kornfeld (1967), Dobson et al. (1971), and Dlin et al. (1974) each provide some support for the proposition that aborted sudden death does represent a stressful event of major proportions for the majority of these patients.

The initial cognitive and behavioral responses of patients to the occurrence of cardiac arrest and resuscitation as described by Dlin and colleagues clearly illustrate the stressful impact of this event. These authors were at first impressed by the outward calm projected by the majority of the 30 patients they interviewed a few hours to several days after the event. However, their interviews revealed that this outward calm masked a multitude of patient reactions. Despite varying lengths of amnesia, most of these patients were able to recall vividly the events around their arrest: the moment their heart "stopped," their thoughts in the seconds before lapsing into unconsciousness, aspects of the resuscitation. Patients reported they were bewildered and confused by these memory flashes; some feared for their sanity. All the patients reported experiencing the feeling "I am dead" at the time of the arrest or during the resuscitation. For a few patients, the authors did not report the number, this idea persisted after their return to consciousness. During the time that these latter patients continued to

believe they were dead, the authors noted that they showed a marked indifference to their environment, sometimes undergoing painful procedures without overt response. Dlin views this behavior as an adaptive reaction to an overwhelming threat, that is, death itself, rather than a psychosis. This psychologically defensive posture has also been noted to a greater or lesser degree in severely burned patients during the acute emergency period (Hamburg, Hamburg & DeGoza, 1953), survivors of airline disasters (Frederick, 1981), and flood victims (Titchener & Kapp, 1981). In effect, this response reduces the patient's awareness of his or her current situation, thus preventing the person from being overwhelmed by emotional distress and allowing him or her to make a more gradual transition to the tasks of recovery (Hamburg, 1974). The strong identification with having been dead reported by these patients was also noted by Druss and Kornfeld (1967) and Dobson and colleagues (1971) in their follow-up studies on survivors of cardiac arrest. Significantly, these studies included patients who had survived cardiac arrest for at least 6 weeks and up to 2 years, indicating that the perception of having been dead is not only a strong initial response, but tends to persist over time.

While death is an accepted consequence of living, most people know little about the process of dying and human beings tend to fear what is unknown. Yet, the preliminary data on survivors of sudden cardiac death indicate these patients believe that they have experienced this process and survived. According to crisis theory, the manner in which these patients resolve the conflicts inherent in facing their own mortality, may result in varied patterns from growth and maturation to

disabling symptoms of anxiety and depression with concomitant changes in character and life style (Aquilera, Messich, and Farrell, 1970).

For example, Druss and Kornfeld (1967) in a comparative study of ten cardiac arrest and ten nonarrest myocardial infarction survivors noted that both groups were bothered by persistent symptoms of insomnia, anxiety, restlessness and irritability up to a year after hospitalization. Likewise, some patients in each group exaggerated their physical disabilities to the extent of taking early retirement or sharply curtailing or discontinuing sexual relations and other social activities. While these results are probably skewed because six of the patients were interviewed after a short 6 week period, they are not dissimilar from those described by Dobson et al. (1971). These authors studied 20 patients who had survived cardiac arrest for at least 6 months and up to 2 years. Results from this investigation demonstrated a range of adjustment patterns including five patients who had little or no mood disturbance and returned early to work and five patients who had major mood disturbances and delayed work return up to 1 year after hospital discharge. The remaining ten patients had intermediate results. The authors suggested that poor rehabilitation was associated with persistent physical disabilities and personality factors rather than specific features of the cardiac arrest. No control group was used in this study.

In contrast to the above studies, two other reports emphasizing the long term prognosis of patients surviving in-hospital cardiac arrest associated with myocardial infarction found that serious emotional

disturbances were rare. Dupont et al. (1969) cited only one patient of 38 in whom definite signs of anxiety neurosis had developed. Minuck and Perkins (1970) found that 73% of their 15 patients who had been gainfully employed prior to caridac arrest returned to their pre-arrest occupations. In this study only one patient who could have returned to work retired voluntarily. The conclusions of both these studies were that the physical and occupational status of post-cardiac arrest patients did not differ significantly from non-arrest myocardial infarction patients.

Thus, the preliminary data on patients surviving cardiac arrest indicate that diverse patterns of adjustment do occur and that these patterns are influenced by psychological as well as physical factors.

The Psychological Mediators of Life Crises

In the past decade, serious illness has increasingly been viewed as multifactoral in nature. A broad spectrum of physical, psychological, social and cultural factors have been identified as influencing not only the onset of illness, but its course and subsequent outcomes. The Crisis of Physical Illness Model identifies three psychological processes or constructs as important mediators influencing the course of illness and recovery outcomes. These dynamic interdependent processes include cognitive appraisal or the perceived meaning of illness, the tasks of recovery, and coping skills. Of these, cognitive appraisal is viewed as the most influential in mediating recovery outcomes (Krantz, 1980; Moos and Tsu, 1977).

Cognitive Appraisal

The concept of cognitive appraisal is a recurring theme in the stress and coping literature and has been defined broadly as the individual's ongoing evaluation of events in terms of their significance for his or her well being (Adams & Lindeman, 1974; Cohen & Lazarus, 1979; Hamburg, 1974; Lazarus, 1966; 1978; Moos & Tsu, 1977). As research on the short and long term effects of stress developed, it became increasingly obvious that endeavoring to apply normative cause and effect relationships to specific variables was unfruitful. Rather, in order to understand the waxing and waning of emotional and behavioral responses in a particular stressful situation, it was necessary to ascertain the way the individual was interpreting both the situation and the resources he had for managing it (Adams & Lindeman, 1974; Gruen, 1971; Tichener & Kapp, 1981). Thus, cognitive appraisal has come to be viewed as the primary psychological mediator of person/environment encounters.

Lazarus (1966; 1978) has described cognitive appraisal as a two-pronged interdependent process. He refers to the assessment of the significance of an event for one's well-being as primary appraisal and the assessment of one's coping resources and options for dealing with the encounter, secondary appraisal. However, these interdependent processes do not necessarily follow each other in time, but rather influence each other. For example, knowledge that one has the tools at his disposal to neutralize or tolerate a harm or threat can dispel the perception of danger just as well as knowledge that one is in jeopardy can mobilize a problem solving search for what can or cannot

be done about the situation (Lazarus & Launier, 1978). It is, therefore, the content being addressed that differentiates these two processes.

Primary appraisals may be: irrelevant, that is, have no immediate implications for one's well-being; benign-positive, that is, signify safety or well-being and result in positively toned emotions such as joy, contentment or relief; or they may be stressful. Lazarus (1966; 1978) identifies three subtypes of stressful appraisals: (a) harm/loss, referring to events such as bereavement, loss of a limb, self-esteem or social status where the damage or injury has already occurred; (b) threat, referring to situations in which harm or loss is anticipated; and (c) challenge, referring to situations in which the demands of the encounter are seen as difficult but not impossible given existing or acquirable skills. A stressful appraisal produces negatively toned feelings such as anxiety, anger, guilt or envy because the demands inherent in the situation are perceived by the individual as taxing or exceeding his or her resources for managing them. Because primary appraisal is a cognitive activity, it is also subject to change. That is, as new information or feedback from the person/environment relationship occurs, as well as from reflection as this transaction proceeds, reappraisals may take place. For example, in Dobson and colleagues' (1971) study of survivors of cardiac arrest, one man clearly expressed the reappraisals that occurred in most of the patient group: "There is a feeling of disappointment. . .you were formerly strong and manly [harm/loss], now you are weak and have to think before you leap

[threat]. . .at the same time it feels marvelous to think I am still around after what happened. . .it's a second time around [challenge]" (p. 209).

While primary appraisal concerns itself with the question, "What if anything is at stake here?" secondary appraisal concerns itself with the question, "What if anything can be done about it?" The action taken about what to do, whether conscious and deliberate or unconscious and automatic, is called coping. Since most important stressful encounters, such as life threatening illness, are comprised of many specific encounters over time, the individual so involved needs information about personal and social resources, the adequacy of fit between coping modes and the demands of the situation, as well as the potential for new problems that may result from specific coping activities. A research example which supports this point of view can be found in a study by Gruen (1971). This researcher randomized 70 patients having a first heart attack into a treatment and control group to assess the effects of a modified crisis intervention therapy on the cardiac recovery process.

The goals of this brief therapy technique are the psychological resolution of the individuals' current crisis and the restoration or improvement of their precrisis level of functioning. Crisis therapy involves an assessment of: (a) the persons' perception of the crisis and the extent they perceive it has disrupted his life; (b) the effects of this disruption on the others in their environment; (c) their inner strengths; (d) the coping skills they may have used successfully in the past but are not now using; and (e) the people in their life who might be of assistance in resolving the crisis or who might provide emotional

support. The intervention component of this therapy includes assisting individuals to: (a) gain an intellectual understanding of the crisis; (b) bring their present feelings into the open; (c) examine alternate ways of coping; and (d) use or develop supportive relationships. Finally, those coping mechanisms that they use successfully are reinforced and the progress that they make both toward controlling their tension and anxiety and in making realistic plans for the future are reexamined and validated (Aquilera, Missaick & Farrell, 1970). Treated patients were seen almost every day during hospitalization to identify and develop psychological resources and to facilitate coping.

In reporting his results, Gruen acknowledged that he had deleted eight patients from each group from the final analysis of the data. He had done this because his initial assessment of these patients revealed that they were so well adjusted, in terms of realistic future plans and emotional control, that therapy for the experimental subjects would have been superflous and the outcomes for the control group subjects tended to mask the marked differences between the groups. Differences between the remaining subjects were significant at $p < 0.05$ or greater for several dependent variables. The treated group had significantly fewer days in the intensive care unit, fewer days in the hospital, less congestive heart failure and superaventricular arrhythmia, less anxiety and depression and greater return to normal activity four months after heart attack. Thus, those patients who had sufficient coping resources along with those who were assisted to develop these resources had fewer complications and more rapid recoveries than the untreated patients.

A later study by Cromwell and colleagues (1977) found results similar to those reported by Gruen though the intervention approaches in this study were quite different. The authors of this well controlled study investigated the effects of three nursing interventions (patient education, early exercise, and social interaction), alone or in combination, on myocardial infarction recovery outcomes. Their results showed that patients who had received information about their disease process combined with either exercise or social interaction also had the fewest days in the CCU, days in the hospital, and complications, and the earliest return to pre-illness activity. Interestingly, those patients who had received information alone, like the control patients, tended to have the poorest outcomes on these dependent variables. Based on these findings the authors concluded that information alone tended to increase patient distress, but when information was presented with a concurrent mechanism for relieving or diffusing tensions it had a positive influence on recovery.

These studies also provide empirical support for the proposition that cognitive appraisal is the primary psychological mediator of stressful person/environment encounters. In both studies the experimental subjects were provided with information about heart disease which enabled them either to validate or reassess their appraisal of the significance of this event for their own well-being. In addition, those subjects in the Gruen study, who had significantly fewer biopsychological problems and a more rapid recovery had either already appraised that they had sufficient coping resources to tolerate the implications of this life threatening illness or were directly or indirectly

assisted to utilize these resources. In contrast, subjects in the untreated control groups as well as those in the Cromwell study who had received information alone had the poorest outcomes. These findings indicate that reappraisals based on new knowledge without concurrent feedback that enables the individual to deal with the real or imagined implications of this knowledge, is as detrimental as no knowledge at all to the person's efforts to bring some balance between the demands of the situation and his or her ability to deal with them.

The empirical evidence to date indicates that patients who have survived acute cardiac disease have variable long term recovery outcomes. According to the Crisis of Physical Illness or Injury Model which is being used to guide the development of the conceptual framework of this study, a central variable mediating recovery outcomes is the patient's cognitive appraisal of his illness. Yet, despite the emphasis given this variable in various stress and coping paradigms, there are currently no illness/recovery studies that directly address this variable or its measurement.

Determinants of Recovery Outcome

Moos and Tsu (1977) have identified three categories of determinants that they believe influence the overall appraisal of illness and subsequent recovery outcomes. These categories include: background and personal characteristics, illness related factors and the individual's socio-cultural environment.

Background and personal characteristics. The psychological and intellectual resources that an individual has at his or her disposal for assessing and managing a life crisis are largely determined by his or

her background and personal characteristics (Mechanic, 1977; Moos & Tsu, 1977). These characteristics include such socio-demographic variables as age, sex, ethnicity, religious affiliation and educational level, as well as such personality traits as sociability, ambition, emotional stability and intellectual capacity (Lazarus & Blackfield-Cohen, 1976; Stockmeier, 1976). However, while these socio-demographic and personality factors are considered risk factors for the development of symptomatic coronary artery disease (Friedman, Byers, Rosenman, et al., 1970; Jenkins, 1971, 1976) and the occurrence of sudden cardiac death (Talbott et al., 1977; Weinberg, 1978), their relationship to the individual's perception of, and response to, these events has not been as systematically investigated.

In general, the post-hospital recovery literature following symptomatic coronary heart disease falls into three general categories; psychosocial adjustment, occupational adjustment, and morbidity and mortality. The literature addressing psychosocial adjustment tends to support the contention that individuals' coping and adaptive responses are a product of their subjective evaluation of their illness experience. For example, the incidence of varying degrees of anxiety and depression during the post-hospital period, which according to the postulates underlying the conceptual framework of this study result from negative or stressful appraisals, have been well documented (Bruhn, Chandler & Wolf, 1969; Croog & Levine, 1977; Hinohara, 1970; Wishnie, Cassem & Hackett, 1971). Additionally, poor psychological adjustment, particularly depression, has been found to contribute to patient delay or failure to return to work (Garrity, 1973; Hinohara,

1970; Stern, Pascale & Ackerman, 1977), failure to return to pre-illness sexual functioning (Dobson et al., 1971; Mann, Yates & Raftery, 1981), and increased incidence of morbidity and mortality (Bruhn et al., 1969; Stern et al., 1977). On the other hand, the degree of emotional distress experienced by these patients rarely has been related to the severity of their underlying physiological dysfunction (Cay, Vetter & Philip, 1973; Garrity, 1973; Stern et al., 1977; Wynn, 1967).

A. Sociodemographic Factors. While there appears to be a moderately strong relationship between psychological adjustment following symptomatic coronary artery disease and other recovery outcomes, the relationship of sociodemographic characteristics and personality traits to psychological adjustment and other recovery outcomes is unclear. In one of the more ambitious studies addressing socio-demographic variables and psychological status after myocardial infarction, Garrity (1973) found that in 61 male patients, neither age, socio-economic status, activeness nor social involvement predicted morale after 6 months. Similarly, Bruhn and colleagues (1969; 1971) did not find that age was a factor in their subjects' psychological status or long term survival. However, Rhodda, Miller and Bruhn (1971) found that younger male patients (50) were significantly more anxious than older patients when compared to controls 5 years after infarction, while Stern and colleagues (1977) found younger age significantly associated with depression. The relationship of age to vocational adjustment is also equivocal (Garrity, 1973; Weinblatt, 1966). However, greater age is associated with a higher incidence of morbidity and mortality (Weinblatt, Shapiro, Frank et al., 1968). It should be noted that the unclear

relationship of age to recovery work status may simply reflect the propensity of individuals in this society to retire by a certain age, the type of work involvement, i.e., white collar versus blue collar, or the availability of generous early retirement programs.

Less indefinite is the relationship of sex and socioeconomic status to post-infarction recovery outcome. Women survivors despite their smaller numbers have been found to have a higher incidence of depression than male survivors (Bruhn et al., 1969; Stern et al., 1977). Additionally, this finding has been consistently associated with a higher incidence of morbidity and mortality, limited work return and sexual functioning in women survivors (Moss, DeCamilla et al., 1977; Stern, 1977; Wenger, 1982). Stern and colleagues (1977) describe the women in their study as ambitious, competitive, having work goals outside the home and as using work as a mechanism to cope with intrapersonal tensions. The authors contend that because of the activity restrictions and the occasional over-protective attitudes of husbands during the convalescent period, these women experienced a felt loss of role status which contributed significantly to their depression. However, these latter factors have also been related to poor adjustment in male survivors though their subsequent morbidity and mortality are significantly lower (Cassem & Hackett, 1977).

Higher educational level, occupational status and in one study religious affiliation (Croog & Levine, 1977) have been associated with greater proportion and rate of return to work and decreased morbidity and mortality (Croog & Levine, 1977; Garrity, 1973; Higgins & Pooler, 1968), but the relationship of these variables to the occurrence of

post-hospital distress is largely undetermined. In an early in-hospital recovery study of myocardial infarction patients, Rosen and Bibring (1966) found that white collar workers were significantly more anxious than blue collar workers, but in a later replication of that study Hackett and Cassem (1976) did not find any significant differences in anxiety between these two occupational groups.

B. Personality Factors. Personality traits, as measured by the Minnesota Multiphasic Personality Inventory (MMPI) have shown that post-hospital myocardial infarction patients experiencing emotional distress typically deviated from the published norms or tested controls on the neurotic triad: Hypochondriasis, Depression and Hysteria (Hellerstein & Friedman, 1970; Ruskin, Stein, Shelsky, 1970). Dobson and colleagues (1971) have shown that the patients who had the greatest upset and poorest functional status following myocardial infarction complicated by cardiac arrest also had the highest neurotism scores as measured by the Eysenck Personality Inventory.

However, it is not known whether these findings reflect premorbid traits or the effects of a life threatening illness. Prospective studies have indicated an increased risk of incurring symptomatic coronary artery disease among patients demonstrating the Type A behavior pattern (Rosenman, Brand, Scholtz et al., 1976). Yet with the exception of one study that relates greater Type A behavior in women to increased mortality, limited work return and poor sexual functioning (Stern et al., 1977), there are no current studies relating Type A behavior to subsequent recovery outcomes (Doehrman, 1977). However, based on the supposition that altering Type A behavior will improve

health outcomes, there is currently a large study underway in which approximately 300 post-infarction patients are receiving a broadly based modification treatment program over a 5 year period (Chesney & Rosenman, 1982). Preliminary results from this program indicate that patients who have received this program are experiencing fewer reinfarctions and are demonstrating fewer Type A behaviors than patients in the control group (Thoresen, Telch & Eagleston, 1981).

In sum, while studies investigating recovery following symptomatic coronary heart disease and sudden death have provided evidence that specific socio-demographic and personality factors influence outcomes, these relationships have not been fully identified.

Illness related factors. The cardiac electrophysiological dysfunction most often related to sudden cardiac death is ventricular fibrillation. This arrhythmia as well as other cardiac arrhythmias results from abnormalities in the electrophysiological properties of cardiac cells in one or more regions of the heart and/or from changes in the myocardial musculature. These localized changes in the extracellular environment, intracellular composition and cell membrane permeability as well as disparities in fiber stretch and interconnections between cell types arise from a variety of factors including impaired oxygen and substrate transport, unequal ion and metabolic accumulation, autonomic innervation and myocardial aneurysms (Bigger, Drisdal, Heissenbuttel, Weld & Wit, 1977). The electrophysiological effects of these changes include: (a) increased rate of diastolic depolarization of Purkinje fibers; (b) decreases in resting transmembrane potentials with concomitant decreases in conduction

velocity; (c) changes in the duration and amplitude of action potentials; and (d) increases or decreases in the duration of refractory periods (Mazzolini, 1973). These changes in transmembrane potentials may generate ectopic activity by three different electrophysiological mechanisms: Enhanced or abnormal automaticity, re-entry and triggered activity.

A. Arrhythmogenic Mechanisms. Automaticity is defined as the ability of specialized cells in the heart to initiate action potentials without external stimuli (Wit & Rosen, 1981). In healthy myocardial tissue only the sinoatrial (SA) node exhibits automaticity, although cells in the atria, the atrioventricular (AV) node and the HISA-Purkinje system have potential automaticity. The inherent automaticity of the SA node is due to the gradual loss of nodal membrane negativity during the diastolic interval or phase 4 of the cardiac action potential (Berne & Levy, 1977). The ionic currents responsible for these changes in transmembrane potentials have been attributed to the gradual diminishing of the outward ionic current carried by potassium in the presence of an inward current carried by sodium and calcium through channels in the cell membrane. The kinetics of these currents result in the accumulation of positive changes intracellularly, thereby shifting the resting transmembrane potential towards threshold potential. Catecholamine release by the sympathetic nervous system facilitates the inward currents, thus increasing the slope of phase 4 and the rate of depolarizations, while vagal activity, through the action of acetylcholine, depresses the slope of phase 4, thus decreasing the rate of depolarization in these cells.

Under normal conditions, the automaticity of the SA node initiates cardiac impulses at a rate sufficiently high to overdrive any other potential automatic cells in the cardiac conduction system. However, when the rate of SA nodal activation decreases either because of enhanced vagal activity, SA node disease, or because impulse conduction from the sinus node to the atrium or from the atrium to the ventricles is somehow impaired, a shift in pacemaker sites is likely to occur. In these instances, the removal of overdrive suppression by the SA node allows the resting transmembrane potential of subsidiary pacemaker cells to decline during the diastolic interval and reach threshold prior to impulses generated from the sinus node. Such escape rhythms often arise in the AV node because pacemaker cells in this region have higher intrinsic rates than pacemaker cells in the ventricles.

Enhanced pacemaker activity may also cause a shift in impulse generation to an ectopic site. For example, norepinephrine released locally from sympathetic nerve endings at discrete sites in the myocardium may accelerate the diastolic depolarization of pacemaker cells enabling them to reach threshold before they are activated by a sinus impulse (Wit & Rosen, 1981). Rosen & Reder (1981) in a review of arrhythmogenic mechanisms have stressed that the key to recognizing normal and/or enhanced automaticity from abnormal automatic mechanisms clinically is the response of these rhythms to overdrive pacing. Normal or enhanced automaticity will be supressed by short bursts of overdrive pacing whereas abnormal automatic rhythms will either immediately resume their initial rate or assume the rate of the overdrive pacemaker following stimulation.

Little is known about the mechanisms responsible for and the characteristics of abnormal automaticity except that it tends to occur when the resting transmembrane potential of atrial and ventricular myocardial cells or Purkinje fibers are experimentally reduced to less than -60mV. Bigger and colleagues (1977) have shown that subendocardial canine Purkinje fibers demonstrate spontaneous diastolic depolarization under conditions of ischemia. They noted that this abnormal rhythm tended to arise when the normal resting membrane potential of these fibers shifted from -90mV to -60mV. These authors hypothesized that the most likely mechanism responsible for this change in diastolic potential was an inward current of sodium and calcium through the slow membrane channels, since the fast sodium channels are largely inoperative at -60mV and the outward potassium current is depressed or inoperative. Wit and Rosen (1981) suggest that the slow response and/or depressed fast response action potentials that occur because of the low levels of membrane potential that favor abnormal automaticity, create an area of slowed conduction which may promote transient or complete unidirectional conduction block and facilitate the development of re-entry arrhythmias.

Re-entry ectopy occurs when a cardiac impulse does not die out completely after exciting the myocardium, but persists and re-excites some region through which it has passed previously (Berne & Levy, 1977). It does not usually occur in the normal heart because conduction velocities and refractoriness are fairly homogeneous. However, in the ischemic or diseased myocardium, decreases in resting transmembrane potentials and amplitude of the action potential impair

not only the velocity of conduction, but may either shorten or lengthen the refractory periods in the affected area.

Since conduction of the cardiac impulse results from one cell exciting another, the size and rapidity of the local depolarizing current affects the number of cells that can be brought quickly to threshold. The size and rapidity of the local currents is determined by the speed and amplitude of the upstroke (Phase 0 of the action potential) of the depolarization wave. When the speed and amplitude of the depolarization wave is depressed, conduction in the area slows and transient or complete unidirectional block may develop, thus facilitating the development of a re-entry circuit.

Bigger and colleagues (1977) have described the development of this phenomena during an experimental infarction in dogs. They noted that conduction of cardiac impulses through the ischemic zone slowed markedly and long delays between the activation of the endocardium and epicardium developed. In addition, as ischemia persisted, electrical activity within the zone began to persist for longer and longer periods of time after each sinus impulse. Eventually this electrical activity exceeded the refractory periods of the less affected or non-affected tissue adjacent to it, entered into the repolarized tissue and re-excited it. In a similar manner, an area of depressed conduction can block (entrance block) a normally conducted impulse because the area of depressed conduction is still refractory. After depolarizing the unaffected adjacent cells, the excitation wave may then enter the now repolarized depressed area and depolarize it. Depending upon the phase of repolarization in the adjacent cells, this excitation wave may

then be blocked (exit block), or re-enter and re-excite the surrounding cells.

Until recently abnormal automaticity resulting from an ectopic pacemaker and abnormal conduction resulting from conduction delay, block, or re-entry circuits were considered the two major classifications of arrhythmogenic mechanisms. However, a third mechanism called triggered impulses or triggered activity has been identified. While the applicability of triggered ectopic activity to clinical arrhythmia generation remains speculative because its electrophysiological characteristics have mainly been studied in isolated tissues in the laboratory, this phenomenon has been receiving increasing attention in the literature. Cranefield (1977) has defined triggered activity as repetitive activity arising from afterdepolarizations. Afterdepolarization is a term which has been used to describe the inward current of positive ions into the cell membrane during or after the final repolarization process of an action potential. These inward currents may or may not reach threshold to elicit a coupled extrasystole or a run of tachycardia. The significance of afterdepolarizations rests in the fact that their occurrence is solely dependent upon the action potential that precedes them. That is, unlike automatic pacemaker rhythms these rhythms do not arise de novo. The development of afterdepolarizations or oscillatory afterpotentials have been experimentally associated with cardiac glycosides, hypoxia, elevated PCO_2, hyperkalemia, rheumatic disease and cardiomyopathies.

Two types of afterdepolarizations have been described: early afterdepolarizations, which occur during phase 3 of the action potential,

and delayed afterdepolarizations, which occur when the repolarization process is complete or nearly complete. Early afterdepolarizations occur at membrane potentials of approximately -50mV and it is hypothesized that the mechanism responsible for their initiation is similar to the altered membrane conduction favoring the development of abnormal automaticity. Delayed afterdepolarizations may result from two different mechanisms. Digitalis induced delayed afterdepolarizations have been attributed to a transient inward current of sodium which is modulated by calcium influx. Those not associated with digitalis appear to be due to an inward calcium current because blockage of the slow inward current by verapamil decreases the amplitude of the afterdepolarizations (Cranefield, 1977; Tsien & Carpenter, 1978). A third characteristic that may differentiate these two types of afterdepolarizations is the heart rate at which they tend to occur. The probability that a delayed afterdepolarization will reach threshold is enhanced by an increase in sinus or drive rate, i.e., the amplitude of delayed afterdepolarizations tends to increase with shorter cycle lengths. In contrast, early afterdepolarizations have been observed most frequently at long cycle lengths (Rosen & Reder, 1981). As noted earlier, no clinical cardiac arrhythmias have been as yet ascribed to triggered activity, although Wit and Rosen (1981) in their review of this phenomenon speculate that the electrophysiological characteristics of some paroxysmal junctional tachycardias, particularly if they were initiated by an acceleration in sinus rhythm or by an atrial premature contraction, may be caused by this mechanism.

The role of myocardial ischemia with or without infarction in the development of ectopic rhythms, particularly life threatening ventricular tachyarrhythmias, has been well documented (Bigger et al., 1977), although life threatening arrythmias can also occur in patients without any known cardiac disease (Reichenbach, Moss & Meyer, 1977). However, the pathology most frequently associated with myocardial ischemia and life threatening arrhythmias is severe coronary artery disease, but as Tresh (1981) points out, in 10%-30% of the patients with these arrhythmias the underlying electrical instability is due to other causes such as valvular defects or cardiomyopathies. Finally, successful resuscitation from ventricular tachyarrhythmias or sudden cardiac death is associated with the initial electrical mechanism of the event (ventricular tachycardia, ventricular fibrillation, bradyarrhythmia/asystole), time until onset of resuscitation and duration of the arrhythmia. However, long term survival following successful resuscitation has been found to be highly related to prior cardiac symptomatology, whether or not the event occurred with acute infarction and other hemodynamic and electrophysiological characteristics of the patient (Myerburg, Conde, Sung et al., 1980; Reinchenbach et al., 1977).

B. Illness Severity. The relationship of disease severity to survival following ventricular fibrillation (VF) or sudden cardiac death (SCD) has been examined in several retrospective studies. Initially, it was assumed that prehospital SCD occurred in the milieu of an acute coronary artery thrombosis or occlusion as was often the case with in-hospital VF even though this relationship had not been substantiated

by pathological studies (Reinchenbach et al., 1977). However, as data on prehospital survivors of ventricular fibrillation accumulated it became apparent that this arrhythmic event was infrequently associated with acute transmural myocardial infarction. In an early analysis of 67 long term survivors of prehospital ventricular fibrillation, Baum, Alvarez and Cobb (1973) found that acute myocardial infarction was associated with only 34 (51%) of these events. In addition, they found that over a mean follow-up period of 10 months (range 13 days to 2-1/2 years) 9 of the 67 survivors had recurrent sudden death. The majority of these deaths occurred in patients who had developed VF not associated with acute myocardial infarction (31% versus 8% by life table analysis). These findings were later replicated by Schaefer and Cobb (1975). These authors retrospectively examined the cause of death in 234 patients who had been successfully resuscitated, hospitalized and discharged home over a 51 month period. Recurrent ventricular fibrillation and/or sudden death occurred in 57 of 183 (31%) patients whose initial episode was primary VF, that is, VF not associated with acute myocardial infarction; only 2 of the 38 (5%) patients whose initial episode of VF was associated with transmural infarction had recurrent sudden death. The authors submit these study results suggest two propositions: (a) patients who experience VF in association with acute myocardial infarction are unlikely to have a recurrence once the acutely infarcted area heals; and (b) patients who have recurrent VF/SCD are more likely to have an ongoing disease process that favors the recurrence of this event.

Follow-up studies of both myocardial infarction patients and patients resuscitated from prehospital sudden death not associated with infarction who experience either a new occurrence or a recurrence of ventricular fibrillation or sudden death have shown that these patients have pathological and functional characteristics in common. For example, post-myocardial infarction patients who have sudden cardiac death in the recovery period characteristically have a history of previous myocardial infarction, moderate to severe left ventricular dysfunction as measured in various studies by such factors as ejection fraction, left end diastolic pressures or the New York Heart Association grade III or IV for Congestive Heart Failure, and frequent and/or complex ventricular ectopy on predischarge Holter recordings (Davies, DeCamilla, Bayer & Moss, 1979; Moss, DeCamilla & Davies, 1977; Schulze, Strauss & Pitt, 1977; Vismara, Zakauddin, Forrester et al., 1977). Similarly Weaver and colleagues (1976), in an angiographic and hemodynamic study of 64 prehospital VF patients have shown that those patients who have recurrent VF/SCD in the post hospital period differ from those patients who have a single VF episode in that they have significantly more triple vessel disease ($p < 0.01$), lower ejection fractions ($p < 0.05$), and more severe abnormalities of left ventricular contraction ($p < 0.001$). In addition, these factors appear to discriminate between long and short term survivors of prehospital sudden death whether they are treated by medical means alone or by both medical and surgical approaches (Tresh, Grove, Keelan et al., 1981).

Myocardial electrical instability as determined by programmed ventricular stimulation studies has also been found to predict sudden death in these patient populations. Greene, Reid and Schaeffer (1978) examined the value of a single right ventricular pacing stimulus during the vulnerable period of the T wave while controlling heart rate with atrial pacing in predicting subsequent VF and/or SCD in 50 patients with symptomatic ventricular tachycardia, 48 survivors of myocardial infarction and 12 normal subjects. This conservative testing technique produced a repetitive ventricular response (two or more ventricular premature beats) in 44 of the 50 patients with recurrent ventricular tachycardia and in 19 of the 48 survivors of myocardial infarction. No repetitive responses were elicited in the 12 normal subjects. After 1 year, 7 of the 50 ventricular tachycardia patients had sudden death despite intensive experimental antiarrhythmic therapy and 15 of the 19 patients with repetitive responses and recent myocardial infarction had symptomatic ventricular tachycardia or sudden cardiac death; only 4 of 29 patients with myocardial infarction and no repetitive ventricular response had sudden cardiac death ($p < 0.001$). The twelve normal patients were all alive and without sudden death or symptomatic ventricular tachycardia at 1 year. These authors suggest that the repetitive ventricular responses elicited by programmed electrophysiological stimulation identifies patients with life threatening ventricular instability independently of other risk factors such as prior myocardial infarction, extent of coronary artery disease or left ventricular dysfunction since these factors were evenly distributed in their sample. However, subsequent programmed stimulation studies

death in a mean follow-up period of 16 ± 9 months. These authors suggest that the chief value of electrophysiological testing may be in identifying those patients who appear to have a low risk of recurrent sudden death.

These studies of morbidity and mortality following acute myocardial infarction and/or aborted sudden cardiac death suggest an inverse relationship between illness severity and long term survival. However, the relationship of illness severity and other outcome variables is less clear. In his review of the psychosocial recovery literature following myocardial infarction, Doehrman (1977) noted that the relationship of illness severity to psychological adjustment was at best equivocal and needed further investigation before any definitive statements could be made. Likewise, such variables as age, blue collar work status, educational level, self health perceptions and degree of emotional distress were better predictors of subsequent return to work than illness severity as measured by the presence or absence of complications (congestive heart failure, angina, arrhythmias, conduction defects). In two studies which compared outcomes between patients whose myocardial infarction was uncomplicated and those whose myocardial infarction was complicated by cardiac arrest, Minuck and Perkins (1970) did not find any significant differences in subsequent occupational adjustment and Druss and Kornfeld (1967) did not find any differences in the degree of emotional distress experienced by these patient groups. Yet, Dobson and colleagues (1971) in their follow-up study of 20 patients with myocardial infarction complicated by cardiac arrest noted that the moderate and poor adjusters tended to have a higher

situational changes. He found that high symptom reporters tended to be "female, from a conflict ridden home, anxious, socially insecure, oriented toward and/or seeking to please members of the opposite sex, with an unhealthy life style in relation to that of the low symptom reporter" (p. 155). He suggests this dispositional style is an extension of early family training that fostered insecurity and positively reinforced symptom reporting. Thus Dobson's finding that patients reporting the greatest delay in return to work also had the highest incidence of physical and psychological symptomatology (insomnia, irritability, anxiety, etc.) may be reflective of a situational change, i.e., life threatening illness, that exacerbated the individual's disposition toward feelings of insecurity and anxiety. These feelings have been found to increase the sympatho-adrenal discharge of catecholamines (Levi, 1972), and these hormones have been related to the occurrence of ventricular ectopy, angina and congestive heart failure in patients with known ischemic heart disease (Klein & Garrity, Gelein, 1974; Rosenfeld & Miller, 1975; Taggert et al., 1969).

While the propensity to report symptoms would seem to result from both perceptual and cognitive processes as well as dispositional and situational factors, there is little known about how symptom reporting relates to adaptive outcomes. Certainly the perception and reporting of symptoms is a cross cultural phenomena, but individuals can fail to perceive or report symptoms, over or under report symptoms, or misperceive and/or misreport symptoms. Obviously, the result of any of these errors in symptom perception or reporting could have far reaching effects on the health care received and subsequent outcomes.

Social and environmental factors. Specific features of an individual's physical and social environment can contribute to the stresses encountered during recovery from serious illness or can serve as sources of aide and support. Moos and Tsu (1977) cite the esthetic qualities of one's physical surroundings including the amount of personal space available and the degree of sensory stimulation as important factors influencing cognitive function, mood and general morale. Adams and Lindeman (1974) note that the actual physical environment of the patient's home may pose great problems for the patient with compromised cardiopulmonary function. These patients may find their physical and social activities unduly restricted because their home is located in a hilly area or requires extensive stair climbing. Equally and perhaps more important for recovery is the type and amount of support that the patient receives from his spouse, family, friends and community. Dobson et al. (1971) and Cassem and Hackett (1977) found that recovery following acute coronary heart disease was slowed within the context of spousal interpersonal conflict and Daggett (1980) has shown that the perception of strong social support among recovering cardiac patients enhanced self perceptions of health and significantly reduced vigilance ($p < 0.01$). Vigilance is a cognitive coping style which in a study by Cromwell and colleagues (1977) was found to be associated with early fatality following myocardial infarction.

The role of the patient's personal support system in either modulating or directly affecting the onset of illness and the course of recovery has been receiving increasing attention in the literature.

However, there is little conceptual agreement in the literature on what constitutes social support or how it functions to protect the individual from the impact of stressful environmental transactions. Theorists such as Cobb (1976) and Kaplan, Cassel and Gore (1977) after reinterpreting the data from several studies on health outcomes have advanced the proposition that social supports buffer the effects of stressful life events by facilitating coping and adaptation. Berkman (1982) in a recent critique of studies addressing social networks and the onset of acute heart disease found support for this hypothesis among those studies investigating the impact of occupational stress. There was no increased risk of heart disease or psychological impairment among those individuals who reported supportive relationships with supervisors, coworkers and/or spouses, but there was a significant association between occupational stress and heart disease risk and/or psychological impairment in those subjects reporting little or no support from these sources. Indirect evidence supporting the buffering hypothesis can also be found in studies addressing recovery following acute heart disease. Pancheri et al. (1978) found that poor physical recovery (continued chest pain, poor left ventricular function, conduction defects or persistence of arrhythmias), present in 33 of 58 patients admitted to the coronary care unit was significantly related to a history of work related problems including difficulties with superiors and co-workers ($p < 0.001$) and nonsignificantly related to current family conflicts. Stern et al. (1977) found that sudden cardiac death in women survivors of myocardial infarction was associated with conflictual spousal relationships. Both these studies seem to indicate that the lack

of perceived support or the negative tone of the perceived support can have an adverse impact on health outcomes.

There is also evidence in the literature that social supports may have a direct effect on health outcomes. Berkman and Syme (1979) in a follow-up study of 5,000 individuals over a 9 year period, found that socially isolated individuals who were characterized by being unmarried, having few or no relatives or friends and few or no memberships in churches or clubs had a mortality rate more than twice as high as those individuals reporting the most social contacts. In addition, these authors found that the association between the individual's social network and mortality was independent of their prior health status, socioeconomic status and health practices. This study indicates that the number of relationships or contacts that the individual has may be as important for health outcomes as the quality of those relationships.

A recent study by Schaefer, Coyne and Lazarus (1981) supports the need for viewing social support as a multidimensional concept as well as the need for researchers to develop more specific hypotheses about the nature of the relationship between specific aspects of social support and adaptational outcomes. These authors examined the relationships of social support defined as the perceived emotional, tangible and informational support received, social network defined as the number of people on whom the individual depended and/or who depended on him/her and psychological functioning as measured by the Hopkins Symptom Checklist and the Bradburn Morale Scale. The sample consisted of 100 middle aged adults who had participated in an earlier population survey conducted by the Human Population Laboratory of the

California State Health Department. Results from this study indicate that social network and social support are empirically separable variables that have different relationships to psychological functioning. Social network size was found to be significantly related to morale ($p < 0.05$), thus replicating the earlier finding of Berkman and Syme. However, the association between the social support variable and morale was significantly stronger ($p < 0.001$). The authors suggest that the difference in effect size between these two variables results from an often overlooked factor in social support research, that is the inherent demands, conflicts and constraints that occur in interpersonal relationships and which may result in some relationships being perceived as less supportive than others.

A second set of major findings in this report was the relationship of the individual components of social support to psychological functioning. The lack of perceived emotional and tangible support was significantly associated with symptoms of depression and negative morale ($p < 0.001$). A nonsignificant trend between these variables and symptoms of anxiety and somatization was found. Informational support on the other hand was positively related to morale.

Lastly the demographic variables of sex, income and employment status were found to influence the level and sources of support available to the individual. For example, men reported they received the largest amount of emotional support from their wives, whereas, the women reported that they received as much emotional support from friends and relatives as they did from their husbands. Interestingly, employed women were found to have the smallest network scores but

higher overall emotional support scores than unemployed women. However, unlike the unemployed women, employed women reported that they received the least support from their husbands. This finding supports the conclusions of Stern et al. (1977) that women survivors of myocardial infarction who are at risk for sudden cardiac death tend to cope with the demands or conflicts in their marriage relationships by focusing on their work and work relationships. These authors suggest that the perceived loss of role status and support system that these women experience, as well as the inappropriate over-protectiveness of their husbands is strongly associated with the higher incidence of post hospital depression in these patients. The significance of the association between depression and the onset of sudden cardiac death has been well documented (Bruhn et al., 1975; Greene et al., 1972; Stern et al., 1977).

Kahn (1979) has also proposed that the concept of social support should be assessed not only in terms of its structural or network components which he has labeled the individual's convoy, but also for the quality of the interactions between the individual and convoy members. He defines the interaction qualities of social support as: "the expression of positive affect of one person toward the other; the affirmation or endorsement of another person's behavior, perceptions, or expressed views; and the giving of symbolic or material aid to another" (p. 85). Thus, the key elements in a supportive transaction between convoy members from this conceptualization of social support are affect, affirmation and aid. These elements are not dissimilar from two of the three components of social support (emotional and tangible) identified by Schaefer and colleagues (1982).

Norbeck, Lindsey and Carrieri (1981; 1983) have developed a social support questionnaire based on Kahn's conceptualization of the properties of social support. In a series of studies, these authors have demonstrated the construct, concurrent and predictive validity of this instrument, as well as its stability and sensitivity to changes in the individual's convoy over time. The results from these studies further support the need to approach the measurement of social support from both a structural and functional perspective. Unlike Schaefer et al. (1982), these authors assessed not only the relationship of size of network to outcome variables, but also assessed the association of two other structural components of network, duration of relationship and frequency of contact in their analysis. A hierarchical multiple regression analysis was employed to test for main effects and interactions of both the structural and functional properties of social support and life stress on the total negative mood score obtained on the Profile of Mood States (McNair, Lorr & Droppeleman, 1971).

The amount of variance in negative mood scores accounted for by the social support subscales and their interactions with life stress was 19% for the functional scales (affect, affirmation and aid) and 20% for the network subscales. In addition, a significant main effect was found for the duration of relationship which accounted for 11.7% of the variance in negative mood and two significant interactions (life stress and duration of relationship and life stress and aid) were identified. These latter findings provide additional support for the stress buffering effects on health outcomes proposed by Cobb (1976) and Kaplan et al. (1977).

For this study on recovery following aborted sudden cardiac death, both the network and functional components of social support as defined by Kahn (1979) and measured by the Norbeck Social Support Questionnaire (1981; 1983) were used to determine the relationship of these variables to the survivor's subjective appraisal of illness and their reports of current health status.

Recovery Outcomes Following Aborted Sudden Cardiac Death

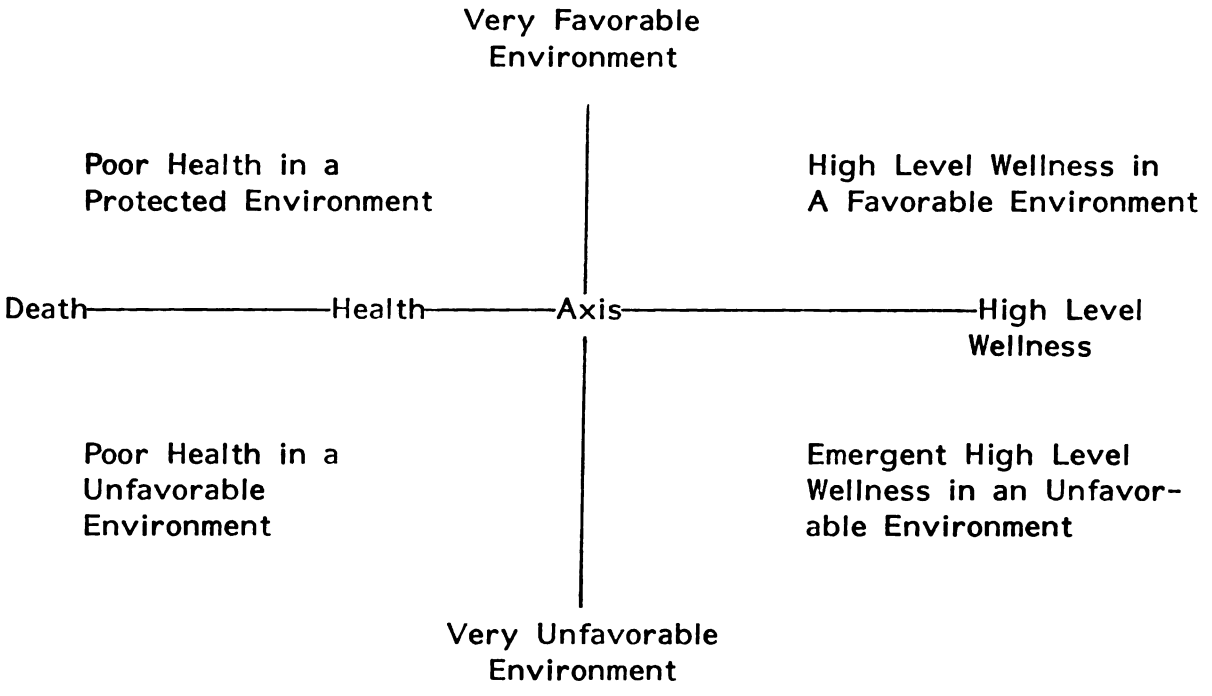
The stated goals of health care interventions by both nursing and medicine include: (a) restoration of the highest possible level of health or wellness in individuals affected by illness or injury; (b) the promotion and maintenance of health or wellness; and (c) the prevention of potential health problems. These goals provide the foundation for the American Nurses' Association's (1980) definition of nursing as "the diagnosis and treatment of human response to actual or potential health problems" (p. 8).

The nursing profession views health or wellness as a multidimensional concept involving dynamic and interactive responses to multiple internal and external variables whose end point is the maximization of each individual's human potential (Dunn, 1959; Jones & Garrett, 1977). Like illness, health/wellness involves the whole person, but unlike illness the concept of health/wellness emphasizes a positive approach to living. The current perception of health is derived from the World Health Organization's (1946) definition of health, e.g., "a state of complete physical, mental and social well being and not merely the absence of disease or infirmity," which initially provided the impetus to view health as a multidemensional concept and from theorists

such as Dunn (1959) and Engel (1962) who expanded this definition to include the influences of environmental and developmental factors on health at any given time. Engel proposed that health exists when the individual is successfully adapting to its environment in a manner that is free from undue stress, capable of growth and/or maturation and provides for the maintenance of integrated and effective activity. Since neither our internal nor external environment is ever static, this definition suggests that health is a process involving continued adjustments and adaptations to environmental changes.

Dunn's (1959) definition of health emphasizes high level wellness which he defines as a dynamic process oriented toward maximizing human potential rather than the more passive process of adapting to one's environment which he considers consistent with good health. Inherent in Dunn's definition of high level wellness are three basic assumptions: (a) the progress toward wellness is in the direction of consistently higher levels of function; (b) that the future is sufficiently open ended so that the individual is challenged to pursue his potential; and (c) that the individual is an integrated organism consisting of body, mind and spirit who affects and is affected by his or her environment. Because developmental and environmental influences affect the attainment of high level wellness, Dunn views health and illness in terms of a graduated scale which he calls the "health grid." The health grid consists of two axis (see Figure 2-3): (a) the environmental axis consists of the physical and socioeconomic components of the environment, and (b) the health axis which ranges from death to

Figure 2-3



From: Dunn, H.L. (1961). High level wellness. Arlington, VA: R. W. Beatty Company.

optimal wellness. The areas between these two convergent points represent various states of health or illness in relationship to the supportiveness or nonsupportiveness of the environment.

However, operationalizing the definition of health so that health can be measured, studied or maintained has proven to be somewhat of an elusive procedure though strides have recently been made in this direction. Hettler (1980) has recently identified and operationalized six basic dimensions of health or wellness. These include:

1. The intellectual dimension or the degree to which an individual engages his or her mind in creative, stimulating mental activities. An intellectual person is one who uses the resources available to expand his or her knowledge and skills, along with expanding their potential for sharing with others.

2. The emotional dimension or the degree to which one has an awareness and acceptance of one's own feelings. This dimension includes extent of positive and enthusiastic perception about oneself and one's life and it also includes the capacity to control appropriately one's feelings and related behavior, including a realistic assessment of one's limitations.

3. The physical dimension or the degree to which one maintains cardiovascular flexibility and strength; to engage in behaviors that help prevent or detect early illness; and maintains diet and activity levels consistent with developmental age.

4. The social dimension or the degree to which one contributes to the common welfare of one's community. This dimension emphasizes the interaction and interdependence of one with others.

5. The occupational dimension or the degree of satisfaction gained from one's work and the degree to which one is enriched by that work.

6. The spiritual dimension or one's ongoing involvement in seeking meaning and purpose in human existence. This dimension includes a deep appreciation for the depth and expanse of life and natural forces that exist within the universe.

Ware and colleagues (1980) utilized the World Health Organization's definition of health to develop their model of health and to operationalize the physical, mental and social dimensions of health. These authors viewed the components as distinct yet probably interrelated variables. Given this potential for interrelations, the model developed by this group of researchers specified an underlying general health concept which was defined as general health perceptions common to the physical, mental and social dimensions of health. However, Ware's model also specifies that each of these dimensions be evaluated separately. The initial model hypothesizing the relationships among the three major dimensions of individual health status and general perceptions of health consisted of three overlapping circles with a hatched area that illustrated the general health status factor (see Figure 2-4).

The operational definitions of the health status dimensions and the general health factor are summarized as follows:

1. Physical health was defined in terms of functional status. Functional status refers to the performance or capacity to perform a variety of activities that are normal for an individual in good health. These activities include self-care activities, physical activities (e.g., walking, running); role activities (job or school) and household activities (moving furniture, dusting).

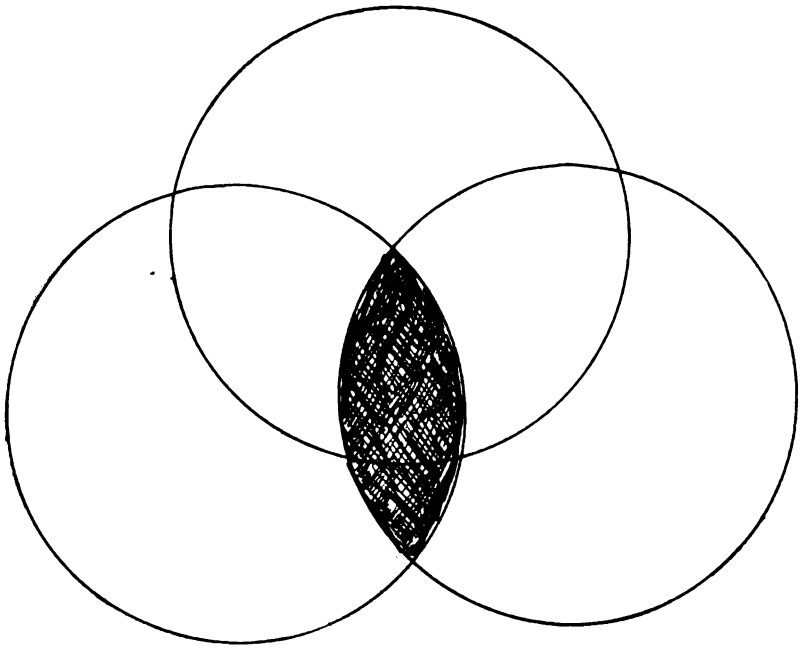


Figure 2-4

HEALTH STATUS MODEL

Conceptualization and Measurement of Health for Adults on HIS: Rand Corporation, Santa Monica, CA. 1978

2. Mental health was defined in terms of both affective disorders and positive aspects of mental health including psychological well being. The operationalization of the mental health constructs focused chiefly on psychological state rather than on the manifestations of mental problems such as somatic states.

3. Social health was operationally defined in terms of interactions, i.e., quality and frequency of contact as well as activities indicating social participation.

4. General health perception differs from the other measures of health status in that respondents are asked for an assessment or

self-rating of their health in general. General health perceptions were defined in respect to time (prior, current, future health), resistance to illness, health worry and concern and sickness orientation. Both favorable and unfavorable definitions of health were developed.

Since the initial conceptualization of health status in terms of the three major dimensions and the general health concept, extensive testing of instruments and analysis of data gathered on 6,000 respondents has resulted in a more refined definition of health by these authors. Currently personal health status is conceptualized as being composed of the mental and physical health dimensions as well as general health perceptions. However, social health as originally defined by these authors has not been found to be highly related to either measures of physical, mental or general health perceptions but is rather viewed as an external factor which only intermittently influences the others.

This later model of health status was used in this study to assess the recovery health status of survivors of aborted sudden cardiac death.

The primary purpose of this study was to determine the long term functional health status of survivors of sudden cardiac death syndrome. The focus was on ascertaining whether selected medical and psychosocial characteristics of the survivors contributed to differences in their functional health status, e.g., physical, mental and perceived health. This was accomplished through examining the relationships among the survivors' age, sex, illness severity, symptom distress, social support, appraisals of arrest/illness impact and their self- reports of physical, mental and perceived health status (see Figure 2-5).

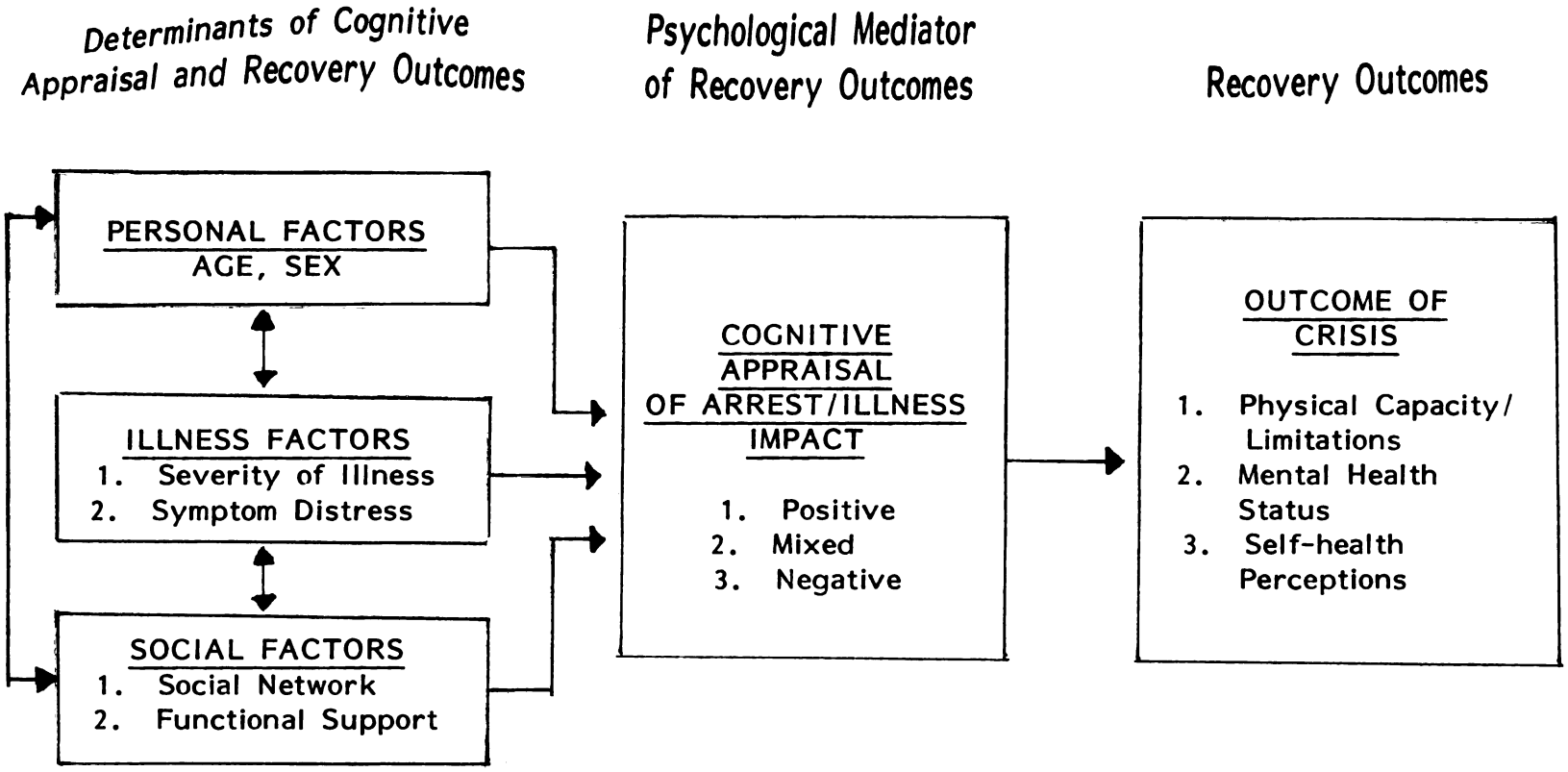


Figure 2-5

ABORTED SUDDEN CARDIAC DEATH STUDY MODEL

CHAPTER THREE

PROBLEM STATEMENT AND HYPOTHESES

The potential causes and medical treatment of sudden cardiac death have been receiving increasing attention in the cardiac literature. There remains, however, a virtually untouched domain of scientific inquiry, that is, the study of what happens to those who recover from sudden cardiac death. The conceptual framework of this study provided a structure for posing the major research question, specific questions and hypotheses addressed in this investigation.

The major research question explored in this study was: What are the relationships among selected medical and psychosocial factors and the functional health status of patients who have survived sudden cardiac death?

Specific Research Questions

1. What are the biopsychosocial characteristics of the study sample?
   a. demographics: age, gender, marital stauts, race, education
   b. illness realted: illness severity, symptom distress
   c. social support: network and functional
   d. cognitive appraisals: positive, mixed, negative

2. Are there differences between the study sample and the population of sudden death survivors from which they were drawn?
   a. age, gender, follow-up time
   b. cardiac arrest features
   c. pathology

d. cardiac therapy/therapies

3. What are the survivor's self reports of recovery status in terms of the following selected variables?

   a. work return

   b. resumption of sexual activity

   c. changes in mental status

   d. health status scores: physical health, mental health, self-health perceptions

4. How do the health status scores obtained from the study sample compare with the normative data reported by other researchers?

5. Does the length of time since the cardiac arrest event affect survivor reports of physical health, mental health and health perceptions?

6. Is there a relationship among selected demographic factors (age, gender), illness related (illness severity, sympton distress) and social support (network and functional) characteristics of the survivors?

7. Do survivors who appraise the impact of the cardiac arrest/illness experience as positive, mixed or negative (stressful) differ on any of the following?

   a. demographics: age, gender

   b. illness related: illness severity, symptom distress

c. social support: total network, total functional

d. health status scores: physical health, mental health, self-health perceptions

8. What are the relationships and interrelations among demographic, illness related and social support characteristics of the survivors and their self-reports of physical functioning?

9. What are the relationships and interrelations among demographic, illness related, social support and cognitive appraisal characteristics of the survivors and their self-reports of mental health?

10. What are the relationships and interrelations among demographic, illness related, social support and cognitive appraisal characteristics of the survivors and their self-reports of general health perceptions?

Study Hypotheses

1. Of the study variables, only age, illness severity and symptom distress will significantly differentiate survivor reports of physical health.

2. Of the study variables, only demographics (age, sex), symptom distress, social support (network and functional) and cognitive appraisal of illness impact will be significantly related to survivor reports of mental health.

3. Of the study variables, only illness severity, symptom distress, and cognitive appraisal of illness impact will be significantly related to survivor reports of self-health perceptions.

Operational Definitions

Aborted sudden death. Documented ventricular fibrillation, ventricular tachycardia, or brady/asystole with concomitant loss of consciousness that was converted to a hemodynamically stable cardiac rhythm following cardiopulmonary resuscitation.

Prehospital aborted sudden death. Documented ventricular fibrillation, ventricular tachycardia or brady/asystole with concomitant loss of consciousness that occurred in the home, work or other non-hospital setting and was converted to a hemodynamically stable cardiac rhythm following cardiopulmonary resuscitation.

Inhospital aborted sudden death. Documented ventricular fibrillation, ventricular tachycardia or brady/asystole with concomitant loss of consciousness that occurred within the physical plant of the hospital to a patient, visitor or other individual and was converted to a hemodynamically stable cardiac rhythm following cardiopulmonary resuscitation.

Myocardial infarction. Myocardial ischemia of sufficient intensity and duration to produce the characteristic clinical picture (severe chest pain, dyspnea, diaphoresis, severe anxiety, etc.), elevation of enzymes (CPK-MB, SGOT, LDH) and electrocardiographic changes (abnormal Q waves).

Ventricular fibrillation. A severe derangement of cardiac rhythm characterized by the absence of distinct QRS complexes, ST segments and T waves on the electrocardiograph and clinically by the absence of a pulse pressure, blood pressure, respiratory effort and loss of consciousness.

Symptomatic ventricular tachycardia. A derangement of cardiac rhythm characterized by a sustained run of rapid (110-250 ventricular depolarizations that have a QRS duration greater than 0.12 seconds on the electrocardiograph and clinically by loss of consciousness, nonpalpable pulse pressure, and nondiscernable blood pressure. Respiratory effort may or may not be present.

Demographic factors. Age: Chronological age as reported in the medical records and reaffirmed by self-reports of the survivor during interview. Sex: Gender as reported in the medical records.

Illness severity. The score attained on the Severity of Illness Index. This ordinal scale ranks the survivors into one of five categories from least risk (I) to highest risk (V) according to the presence or absence of specific clinical characteristics. The four prognostically significant factors are age, previous myocardial infarction, cardiomyopathy and NYNA grade III or IV for congestive heart failure at hospital discharge. Category I includes survivors less than 65 years of age with no cardiomyopathy nor congestive heart failure grade III or IV, Category II includes survivors greater than 65 years of age with no previous myocardial infarction etc.

Symptom distress. Self reports of the somatic, concentration and affective discomfort presently being experienced by the patient as measured by the Symptom Distress Scale. Degree of distress is measured on a five-point bipolar scale, with "1" designating the least amount of distress or no distress for a specific symptom to "5" designating extreme distress. The range of possible scores is from 13 through 65.

Social support. Self-reports of the number of persons on whom the patient relies for expressions of affirmation, positive affect and for exchanging symbolic or material aid as measured by the Norbeck Social Support Questionnaire (NSSQ). Total Network: The total number of individuals listed by the survivor on the NSSQ network list. Total functional: The summed ratings of affect, affirmation and aid assigned by the survivor for each network member listed on the NSSQ.

Appraisal of illness. Self-reports of survivors' appraisal of their illness and recovery experience as inferentially derived from patient responses during the interview. Cognitive appraisals categories include benign/positive, mixed and negative and are scored one, two and three respectively.

Health status. The net impact of somatic, behavioral and environmental forces on the individuals' subjective assessment of their physical or mental health and the objective information they have about their health and their evaluation of that information. Health status is viewed as a multidimensional construct encompassing such concepts as physical capacities, personal limitations, psychological distress, positive

well being and perceptions of current, prior and future health as measured by the Personal Functioning Index, the General Health Index and the Mental Health Index.

Components of Health Status

Physical health. The performance of or the capacity to perform a variety of activities including self-care, mobility, role and household activities that are normal for adults in good health as measured by the Personal Functioning Index. Scores on this ordinal scale range from "0", indicating poorest personal function to "5", indicating optimal function.

Mental health. Self-reports of affective mood state on a bipolar scale from distress through neutral to a sense of positive well being as measured by the Mental Health Index. Scores on this instrument range from "40", representing severe distress, to "226", representing positive well being.

Self-health perceptions. Self-reports of personal health ratings including current health, prior health, health outlook, health worry/concern, and sickness orientation which reflect both individual concerns about different levels of physical and mental health and individual differences in the importance placed on these components as measured by the General Health Rating Index. Scores on the instrument range from "22", representing poor ratings of health, to "110", representing high ratings of general health.

Recovery status. A global term which encompasses not only the functional health status of survivors, e.g., physical, mental and perceived health status; but also survivor reports of work return, sexual functioning and changes in mental status.

CHAPTER FOUR

METHODS OF DATA COLLECTION AND DATA ANALYSIS

In this chapter the study design, data collection methods and data analysis used in this investigation of long term recovery following aborted sudden cardiac death are described. The Crisis of Illness or Injury model (Moos and Tsu, 1977) which served as a guide for the development of the conceptual framework, the identification of study variables and the research questions also provided the structure for the selection of the study design, research instruments and data analytic methods.

Study Design

A cross-sectional survey descriptive design was used to ascertain the recovery status of patients who had survived sudden cardiac death and the relationship of selected variables to their reports of current functional status. This study design was selected primarily because it allowed for the examination of multiple variables and the relationships among these variables (Brink and Wood, 1978). Since the current scientific work related to recovery of patients surviving cardiac arrest is limited, it was determined that there was a need for descriptive data, which would add to the present body of knowledge. In addition, it is known that recovery following life threatening illness is associated with multiple patient and illness related factors. Yet, there are severe gaps in knowledge about the direction and magnitude of these associations. Lastly, an aim of this study was to begin to document the recovery

status of survivors of sudden cardiac death so that intervention strategies could be reassessed and/or developed. Thus a study design that allowed for the examination and description of both simple and complex associations among the variables under study was deemed appropriate.

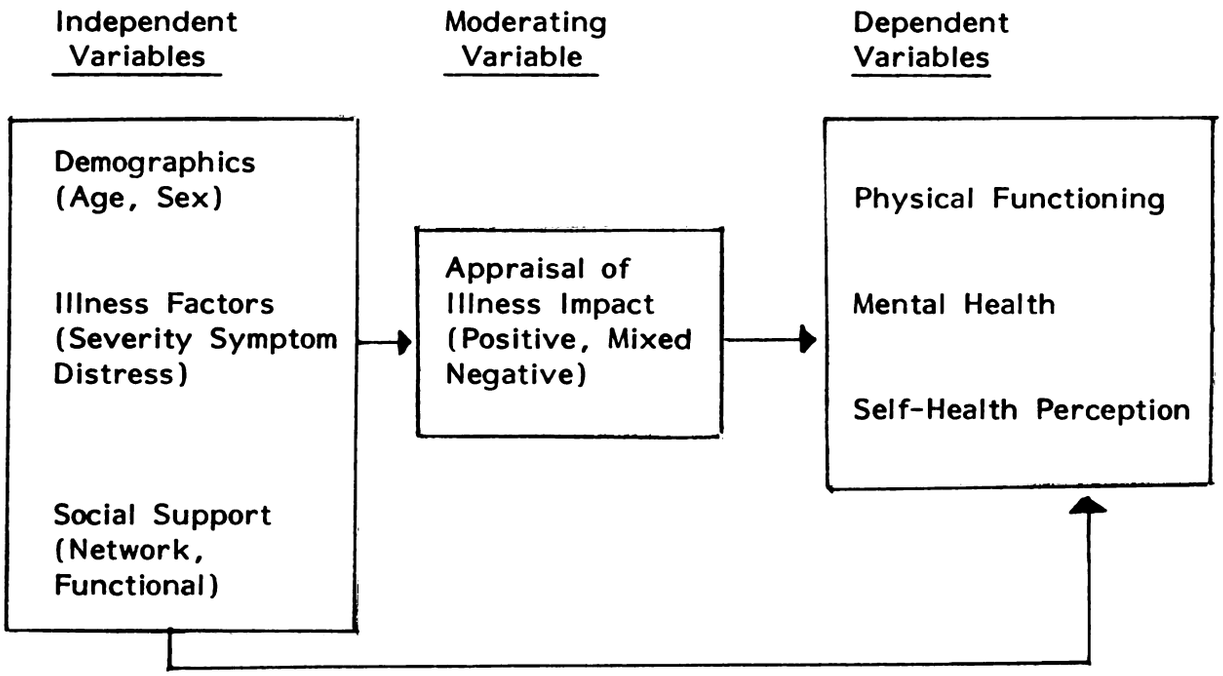
To implement this design strategy, three data collection approaches were employed: (1) chart reviews were done to confirm the diagnosis of aborted sudden death and to obtain pertinent demographic and cardiac pathological and functional data; (2) interviews lasting approximately 45 minutes were conducted, most often in the participant's home, to obtain data about the individual's cardiac arrest/illness experience and any changes that may have occurred in their lives since the cardiac arrest; and (3) at the time of the interview the participants were given three structured questionnaires to complete. These instruments included the Symptom Distress scale which was administered prior to the interview, the Norbeck Social Support Questionnaire and the Health Status questionnaire which were completed by the participants over the following week and generally returned by mail within two weeks of the interview.

In general, this study aimed to identify which selected medical and psychosocial factors, i.e., personal, illness-related, social support or cognitive appraisal of arrest/illness impact, were more related to differences in survivor reports of their current physical functioning, mental health and self-health perception. Since the emphasis in this study was on the determination of relationships, that is, the extent to which changes in one variable occurred in conjunction with changes in

another variable, all the variables were of necessity considered independent. However, because the focus of the study was to clarify which medical and/or psychosocial factors were related to changes in the survivors' reports of physical and mental health, as well as their self-health perceptions, these latter measures were viewed as the outcome or dependent variables. The personal, illness related, social support and cognitive appraisal of arrest/illness impact factors were perceived as independent variables, since they were known to have some effect on recovery outcomes. The designation of these variables as "independent" and "dependent" in the descriptive design of this study, however, does not infer causality as in an experimental design, but rather addresses the relationship of selected factors of interest to variations in the outcome or dependent measures (Cohen and Cohen, 1975). The schematic of the study design is presented in Figure 4-1.

Figure 4-1

Schematic of the Study Design



Sample

A convenience sample of 61 subjects was recruited from the population of 180 patients who had undergone treatment for aborted sudden death by the Electrophysiological Service, directed by Melvin M. Scheinman, M.D., at Moffitt Hospital of the University of California, San Francisco (UCSF). The sample was selected using the following patient selection criteria:

1. Patients with documented ventricular fibrillation, rapid sustained ventricular tachycardia or bradycardia/asystole necessitating external cardiopulmonary resuscitation, direct current cardioversion or both.

2. Adult patients (age 25 years or greater) of either sex.

3. Patients whose aborted sudden death occurred between March, 1980 and September, 1984; i.e., six months prior to but not more than four years before close of data collection on March 31, 1984.

4. Patients who resided within a 200 mile radius of the Bay Area.

5. Patients who could read and speak English.

Patients were excluded from the study if:

1. Informed consent was not possible,

2. They had uncontrolled congestive heart failure, recent myocardial infarction (< 2 months), unstable angina, debilitating concomitant illness (cancer, severe arthritis) or were currently hospitalized due to a concomitant illness.

Initially 180 patients were identified as having been treated at UCSF for aborted sudden death. At the time of sample selection, 56 were deceased, and 44 were excluded because they did not meet the time, residency or age criteria. The 61 subjects of this study were drawn from the remaining 80 patients. Seventy-three of the 80 patients could be contacted; of those, six patients refused participation, three were hospitalized for concomitant illnesses, and three had difficulties either reading or speaking English (see Figure 4-2).

Figure 4-2

Derivation of the Study Sample

Total Population

All patients who had been treated

for aborted sudden death at UCSF

between January, 1979 and January, 1984

N = 180

Select Sample

(Survivors who met initial time,

residency and age criteria)

n = 80

Self-Selected Sample

(Survivors who met remaining criteria

and agreed to participate)

n = 61

Procedures for Data Collection

The Sample. Several data sources were used in order to identify all the patients who had undergone treatment for aborted sudden cardiac death at UCSF by the Electrophysiology Service. These included admission records, patient files and the records of all patients who had undergone programmed electrophysiological studies (EPS) for ventricular arrhythmias. This procedure, while time consuming, was necessary because of missing data in one or more of the files, i.e., not all aborted sudden death patients underwent EPS and not all were admitted directly to the EPS service. Chart reviews were then done on each patient identified in order to document the occurrence of aborted sudden death. Approximately 8 patients were deleted from the original list because of insufficient or contradictory documentation. The chart reviews, as well as the EPS patient records, also provided preliminary data on the current status of some patients. Following the completion of the chart reviews patients were divided into lists according to the year of their initial cardiac arrest event, i.e., 1978 or before, 1979,

1980, etc. Further, those patients whose initial arrest event occurred between 1980 and 1984 were categorized according to their place of residency and age. Telephone calls were then made to the referring physicians of all patients who were presumed alive and their current status was verified. In some cases where the referring physician had not seen the patient for more than six months, telephone calls were made directly to the patient or family. Initially, 129 patients were identified as having sustained their first sudden death event between March, 1980 and September, 1983. Of these patients, 38 had died and 11 survivors were dropped as potential subjects because of the residency (8) or age (3) criteria, leaving the select sample of 80 patients (see Figure 4-2).

Data Collection. Prospective participants were contacted by telephone and the purpose of the study as well as the study procedures were explained to them. An appointment was made with those patients indicating a willingness to be interviewed and complete the questionnaires. Depending upon when the interview was scheduled, a follow-up letter outlining the study purpose, procedures and copy of the consent form was sent to the patient (See Appendix A). At the time of the scheduled appointment, the purpose and procedures of the study were reexplained. The intent and response format for each questionnaire was described and clarifications were made as indicated. The consent form which reiterated the aims and procedures of the study was then read by the subject. It was emphasized to each individual that his or her participation in the study was voluntary and in no way would refusal to do so jeopardize his or her medical care. A copy of

the consent form was given to each subject along with a copy of the Subjects Bill of Rights (See Appendix B).

Data collection occurred in two parts. Following the signing of the consent form, subjects were asked to complete the Symptom Distress scale. Subjects were then interviewed for approximately 45 minutes regarding the cardiac arrest/illness experience, its impact on their current lives and any changes in behavior which may have occurred since the event. Interviews were taped recorded, although field notes were employed twice because of recorder malfunction. After the completion of the interviews, the subjects were given the Social Support and Health Status questionnaire along with a self-addressed stamped envelope. They were asked to complete these forms at their leisure over the next week and return them to the investigator. All but four of the subjects returned the questionnaires within one month of the interview. The four subjects who had failed to return the questionnaire after a two month period were called on the telephone. Two subjects complied with the investigator's request to return the form and two did not. Subsequent data analyses were done on the 59 completed Health Status questionnaires and 57 Social Support forms; two of the latter were omitted because they were incomplete.

Methods and Instruments

The data collection methods in this study included medical chart reviews, semi-structured interviews and three separate questionnaires. Chart reviews were done not only to confirm the diagnosis of sudden cardiac death, but also to obtain pertinent demographic, physiological and functional data. These latter data were used to develop a measure

for assessing illness severity in the sample, the Severity of Illness Index. The interviews provided descriptive data on the subjects' perceptions and reaction to the arrest/illness experiences, the type of changes that have occurred in their life since their cardiac arrest and their appraisals of the impact the arrest/illness experience has had on their lives. The three questionnaires were the McCorkle Symptoms Distress scale, the Norbeck Social Support scale and the Health Status questionnaire which was composed of three parts: the General Health Index (GHI), the Personal Functioning Index (PFI) and the Mental Health Inventory (MHI).

Instruments

The following discussion is a description of Severity of Illness Index developed from the survival analyses, the interview format and development of the cognitive appraisal categories and the standardized instruments used in this study as well as their reliability and validity.

1. The Severity of Illness Index (Sauve', Scheinman, Modin, unpublished) was developed from the chart review data collected on the 180 patients who had undergone treatment for aborted sudden death at UCSF. Over thirty variables, including such factors as age, coronary artery disease, cardiomyopathy, left ventricular ejection fraction and therapy were assessed for their relationship to the survival time of patients. Cox's (1972) hazard-based regression model was employed in this survival analysis. In this statistical model the risk of failure for any individual at any point in time is viewed as the product of an underlying constant or hazard function ($\lambda_0(t)$) and its multiplier, i.e., the concomitant information or covariates. Cox describes the relation as

$\lambda(t) = \lambda_0(t)\exp(\underline{x}'\underline{B})$ where $\underline{x}$ is the concomitant information and $\underline{B}$ parameterizes the model. Information about the effect of the concomitant data is included in exp $(\underline{x}'\underline{B})$ and since $\lambda(t)/x_0(t) = \exp(\underline{x}'\underline{B})$, this quantity is defined as the relative hazard function. In other words, if the concomitant information has no effect on the hazard function, then the chance of an individual dying is simply the reciprocal of the number at risk, because each individual's risk is equally weighted. This statistical analyses yielded four significant factors ($p < 0.01$ or greater) or covariates related to survival times. These factors were age, history of previous myocardial infarction, cardiomyopathy and New York Heart Association functional Class III or IV for Congestive Heart Failure at hospital discharge. Two separate illness severity classifications were developed from the data analysis (See Figure 4.3).

The first classification consisted of four identifiable risk levels from low risk(I) to highest risk(IV) and the second classification consisted of five such levels(I-VI). The differences in these two models resulted from the underlying survival distributions. The first classification is based on the product of factors affecting survival time for the population as a whole and the second is the product of factors related to survival for those patients who survived six months or more. The second classification was devised because the study sample was limited to those individuals who had survived at least six months and it was assumed that their survival curves would reflect this fact. Analysis of the survival distributions at point zero and six months justified this assumption since 46% (25/56) of the nonsurvivors had died

within six months of their initial cardiac arrest and 64% (16/25) of these were in the highest risk category identified in first classification schemes. Therefore, the second classification scheme was used in the study.

The validity of defining illness severity in terms of the risk for mortality at any point in time was deemed appropriate for this investigation. A major aim of this study was to determine physical functioning in a sample of aborted sudden death patients. The current cardiac rehabilitation literature indicates there is a strong correlation between the individuals underlying cardiac function and exercise capacity and tolerance (Kavanagh, Shepherd, Chisholm, et al, 1979; Miller, and Borer, 1982). So in effect these factors that are related to an individual's mortality risk are also related to any limitations of the individual's capacity to perform those physical activities considered normal for people in good health. However, the applicability of these classifications to future samples of aborted sudden death patients as well as to those patients with sustained ventricular tachycardia without sudden cardiac death is undetermined. These survival analyses are in progress and may validate the present classifications or yield more precise descriptions of those patients at lowest and highest risk for recurrence of arrhythmia and/or sudden cardiac death.

Figure 4-3

Illness Severity Indexes

Illness Severity Total Population

n = 180

I. Age < 65, no cardiomyopathy, no CHF, III, IV

II. Age > 65, no previous Myocardial Infarction

III. Age < 65, cardiomyopathy or CHF III, IV

IV. Age < 65, cardiomyopathy and CHF III, IV, or
Age > 65, previous myocardial Infarction

Illness Severity Six Month Survivors

n= 61

I. Age < 65, no cardiomyopathy, no CHF III, IV

II. Age > 65, no previous Myocardial Infarction

III. Age > 65, previous myocardial Infarction

IV. Age < 65, cardiomyopathy, no CHF III, IV

V. Age < 65, cardiomyopathy and CHF III, IV

2. Interview: Cognitive Appraisal of Illness Impact

An interview schedule derived from the conceptual framework of this study was used to obtain data on the subjects' perceptions and attitudes toward their illness experience. Questions addressed to the subjects' perception of the events immediately preceding and during the cardiac arrest, who told them an arrest had occurred, their initial thoughts and feelings about having had an arrest, their reactions after discharge from the hospital and their assessment of the impact the arrest/illness experience has had on their current lives. Another series of questions addressed their perception of the effect their illness experience has had on their relationships with spouse, family or friends, changes in their work status, role status, activity levels, memory, the financial implications of their illness, the effects of medical and/or surgical therapies on their bodies and life styles, and their relationships with health care personnel.

The wording and timing of questions during the interviews varied according to the responses of the subject or the discretion of the interviewer. All but five of the patient interviews took place in the subjects' homes, the others were held in the interviewer's office. None of the subjects refused to have the interview tape recorded, although field notes were employed twice because of recorder malfunction. The interview schedule is included in Appendix C.

Tape recordings of the patient interview were transcribed and checked for accuracy by the investigator. Categories describing the subjects' cognitive appraisal of the impact of their arrest/illness

experience were developed, two raters the investigator and Frances Cohen, Ph.D. Associate Professor of Psychology, School of Medicine, the University of California, San Francisco (UCSF), independently scored a sample of six interviews attaining approximately sixty percent interrater agreement. The categories were revised, and three raters Brigid Doyle, R.N. M.S. Cardiovascular Clinical Specialist, Moffitt Hospital, UCSF, Patricia Malone, R.N. M.S., Research Associate, Department of Electrophysiology, Moffitt Hospital, UCSF and the investigator, independently scored twenty interviews. Interrater reliability was .87.

Three cognitive appraisal categories based on the theoretical definitions identified by Lazarus (1978) were developed. These included benign/positive appraisals, negative appraisals and mixed appraisals.

a. Benign/positive appraisals of the impact of the arrest/illness experience were characterized by survivor assessments that indicated that their current well being was as good or better than that prior to illness; a positive emotional tone, i.e., pleased, calm content, and optimism for the future. Those subjects, who were categorized as benign/positive, tended to fall into three distinct categories:

1. Those survivors who did not view the arrest/illness experience as having caused any significant impact on their life styles or attitudes toward life. They did acknowledge the need for continued medical surveillance and the fact that the length of their life may be limited due to their underlying cardiac dysfunction.

2. Those survivors who assessed their current health or health care as better than it was before the arrest/illness, e.g., these patients were likely to have had a non-cardiac cause for their arrest, or to attribute the arrest to inadequate medical diagnosis or treatment.

3. Those survivors who believe the arrest/illness experience assisted them to reassess their values and priorities and to redirect their activities and goals in life. Some of these survivors emphasized altruistic changes, i.e., greater understanding of self, compassion for others, renewed or deepened relationships, while others emphasized more pragmatic changes, i.e., increased time to develop and enjoy other interests and/or decreased occupational involvement.

b. Negative or stressful appraisals of the impact of the cardiac arrest/illness experience were characterized by survivor assessments emphasizing a sense of loss, vulnerability and/or fear of recurrence; a negative emotional tone, i.e., anger, sadness, anxiety; and a concern or pessimism for their future. These subjects emphasized either their sense of loss, a sense of threat, or both. The real and felt losses expressed by these subjects included loss of work status, role status (spouse had taken over some or many of the individual's former tasks), self-esteem, physical or social independence, and memory losses of the days, weeks prior to or subsequent to the event.

The pervasive sense of vulnerability emphasized by some of the subjects was expressed in several ways: significant reduction of their physical and social activities; periodic to frequent sleep

disturbances, including fear of going to sleep and/or disturbing, sometimes violent dreams; discomfort or anxiety if left alone; and/or frequent unbidden thoughts of vulnerability and panic reactions.

c. Mixed appraisals of the impact of the cardiac arrest/illness experience were characterized by survivor statements that contained elements of both positive and negative appraisals; an emotional tone that varied from relief to sadness and concern or was flattened; and a cautious optimism for the future, i.e., "Things are okay now, but they may not remain that way, one day at a time."

These survivors also tended to fall into three distinct categories:

1. Those survivors who viewed the cardiac arrest/illness experience in terms of having been given a second chance while simultaneously expressing a sense of loss (decreased vitality, physical capacity, work involvement) and a sense of vulnerability (symptom awareness, pulse taking).

2. Those survivors who assessed the cardiac arrest/illness experience as having had little or no impact on their current well being but who also relate difficulties with employment, relationships, and concentration/memory since the illness. These patients made occasional to frequent references to their behavioral changes (decreased physical capacity/endurance, memory difficulties, mood swings) while at the same time minimizing the arrest experience and any relationship it may have to their current problems.

3. Those survivors who indicated that their current well being was not as good or probably not as good as it was prior to

the arrest, but assess it as more or less acceptable. The arrest/illness experience has made these individuals more aware of and sensitive to their own mortality and may have resulted in real or felt losses, but has not significantly changed their life styles, their attitudes toward life or future plans.

The interview data also were coded for work status at time of arrest, initial work return, current work status, resumption of sexual function, and the occurrence of memory and/or concentration deficits since the cardiac arrest. Occupational status was scored as (1) unemployed, (2) retired, (3) disabled, (4) homemaker, (5) part time work (30 hrs./wk.), and (6) full time work (30 hrs./wk.). Sexual functioning categories were the same as used in the Dobson et al. (1971) study, i.e., none before the arrest, none since the arrest, decreased frequency, the same frequency and increased frequency. Memory and/or concentration deficits noted by the subjects were categorized as mild, moderate, and moderately severe.

3. The Symptom Distress Scale (McCorkle, 1982; McCorkle, Quint-Benoliel, Young, 1983) was administered prior to the interview to determine the degree of discomfort patients experience as the result of their illness or from its treatment. This scale is composed of thirteen symptoms which are individually presented to the subject. Each symptom is accompanied by five descriptions which have been operationalized on a Likert-like format with one indicating little or no distress and five severe distress. The Symptom Distress Scale was developed from 26 interviews with patients undergoing cancer therapy. Eight physical symptoms were identified from the interview data and

found consistent with those reported in the literature. Following two additional studies involving 60 subjects with advanced cancer and 52 subjects with either lung cancer or myocardial infarction, the tool was refined and expanded to thirteen symptoms. The reliability coefficient alpha for the total scale is 0.84. Test-retest coefficients are being determined. The Symptom Distress scale is included in Appendix D.

4. The Norbeck Social Support Questionnaire (NSSQ) (Norbeck, Lindsey and Carrieri, 1981; 1983) This questionnaire was used to measure the subjects' social support, a variable reported to affect a variety of health and illness situations. This instrument measures three main variables associated with the concept of social support as defined by Kahn (1979). Two of these variables, total network (number in network, duration of relationship and frequency of contact) and total functional (affect, affirmation and aid) were assessed in this study. The third variable, Total Loss, was not used in the analysis. One week test-retest reliability for these variables ranged from .85 to .91. Test-retest reliability scores after seven months ranged from .58 to .78 indicating moderately high stability for the scale over time and sensitivity to changes in the social environment. Internal consistency for each of the functional properties was estimated at .89 or above and correlations among the network properties ranged from .88 to .96. Moderate levels of concurrent validity (range .31 to .56) were established between the NSSQ and the Lazarus and Coyne social support measure (Schaefer, Coyne, Lazarus, 1982). Evidence for construct validity has also been demonstrated with selected factors from the FIRO-B. The Norbeck Social Support Questionnaire is included in Appendix E.

5. The General Health Index (GHI) (Davies and Ware, 1981) developed and extensively tested in the Rand Health Insurance Experiment (HIE) was used to determine the general health perceptions of the subjects. Such general health measures have been found to provide a comprehensive definition of health status, reflecting both the objective information patients have about their health and their subjective evaluation of that information, thus, providing information beyond that contained in specific physical or mental health measures.

Reliability and validity analyses were determined on the responses of 1,200 adults ranging from age 14 through 62. The test-retest reliability estimate for the General Health Index was 0.89 and the stability estimate after one year was 0.75. Construct validity was established based on an analyses of hypothesized correlations between the general health measures in the index and 30 other self-reported and independently measured variables of physical health, mental health, social circumstances, patient role propensity, use of medical services, age and life stress. Correlations between the GHI and physical health, mental health and life stress variables were highly significant ($p. < 0.001$), less significant for social circumstances ($p. < 0.01$) and no relationship was found between the GHI and patients' role propensity, age and use of service. These relationships with the exception of the age variable, which was expected to be negatively associated with the GHI, were all in the hypothesized directions.

The General Health Index appears as Section I of the Health Status Questionnaire (see Appendix F).

6. The Personal Functioning Index (PFI) (Stewart, Ware, and Brook, 1982) is Section II in the Health Status Questionnaire. This

questionnaire addresses the subject's performance or capacity to perform self-care, mobility and other physical activities considered normal for people in good health. It provides data on both the kind and amount of activities individuals' can perform. Also developed and refined in the Health Insurance Experiment, the PFI is composed of two scales: The Physical Capacities scale which consists of seven positively worded levels of personal function, i.e., "If you wanted to, could you run a short distance?" and the Physical Limitations - Any Duration scale which consists of six negatively worded levels of personal functions, i.e., "Do you have to stay indoors most or all of the day because of your health?" Both are Guttman scales yielding unidimensional scores at the ordinal level. Validity of this scoring procedure was established by comparing mean scores for Current Health and the General Health Rating Index for people in each of the PFI categories. It was found that as mean health scores decreased reported limitations increased. Extensive testing of both scales yielded test-retest reliability estimates between 0.92 and 0.99; the coefficient of reproducibility for the functional limitations scale range between 0.92 and 0.98 and internal consistency coefficients for the physical capacity scale range from 0.89 to 0.90. Both content and construct validity have been established.

7. The Mental Health Index (MHI) developed by Ware, Johnston, Davie-Avery and Brook (1979) is Section III in the Health Status Questionnaire. This questionnaire evaluates the affective state of the subject. The MHI contains two major multi-item subscales (psychological distress, psychological well-being) and five construct

specific subscales (anxiety, depression, loss of emotional control, general positive affect, emotional ties). This 38 item scale contains 22 items adopted from the General Well Being Schedule developed by Dupuy (1972) and additional items designed to improve precision of measurement at the positive and negative ends of this bipolar scale. Extensively tested and refined as part of the Rand Health Insurance Experiment, total scale reliability estimates exceed 0.90 and construct specific scales 0.50. Internal consistency estimates are also very high, ranging from 0.91 to 0.94. Construct validity was established by tests of discriminant hypotheses, i.e., specific measures were hypothesized to correlate less or not at all with variables they should not be related to.

Limitations of the Study

The design of this study is not without some limitations. That is, a cross-sectional approach which relied heavily on structured questionnaires was employed to collect data on a convenience sample. First, the cross-sectional method of data collection, while commonly used in survey research because it allows for data collection to be completed in a relatively short time period, is limiting because of its temporal orientation (Treece and Treece, 1977). That is, because data are collected at a single point in time, it cannot be determined whether or not the relationships in this study will persist over time. Hence the results of this study cannot be discussed in terms of trends or patterns of change, but only in terms of the specific time frame of the investigation since a subsequent study of the same sample could generate different data and relationships.

The second limitation of this study design is the use of structured questionnaires to collect data on several study variables. Even though

every effort was made to utilize instruments that had undergone extensive testing for reliability and validity, it is not possible to ascertain to what extent the subjects understood the intent of the questions or chose to answer the questions in an honest and thoughtful manner. In order to minimize this potential for response bias, the subjects were given both verbal and written instructions as to the intent and time frame of each questionnaire and data on several of the variables under study also were collected during face-to-face interviews. Analysis of this latter data revealed a high degree of congruence between the subject's responses to the interview questions and their responses on the questionnaires.

The third limitation of this study is the manner in which the sample was selected. Initially, in order to control some of the variability that could be introduced into the study results because of the time period since the cardiac arrest experience, only those subjects who had survived for at least six months but not more than four years were contacted. In addition, due to the time and the financial constraints inherent in the interview process, subjects also were only contacted if they resided within a 200 mile radius of the Bay Area. Lastly, of those individuals contacted the choice to participate in this study was voluntary. Thus, a systematic bias based on the differences between the entire population and that of the sample was introduced. To counter this limitation, chart reviews were done on the entire population of patients who had been treated for sudden cardiac death at UCSF and comparisons were made on several demographic and illness related variables. This process allowed for a more complete sample

description and established that with the exception of the occurrence rates of hypertension, mitral valve prolapse and valvular defects, no significant differences existed between the sample and the larger population on these variables. However, this technique did not reduce another source of bias in the study, i.e., the difference between the sample and the remaining survivors on the other variables under study. For example, one does not know whether all other remaining survivors had more or less symptomatology, social support, physical capacity, psychological stability or assessed themselves as healthier or sicker than the study sample. This lack of knowledge about non-respondents limits the generalizability of the study results to the larger population of aborted sudden death patients.

While the necessity of discussing all study results in terms of the sample is acknowledged, additional information about the nature of the sample was made possible through a comparison of sample norms and other known populations. In this study, sample data on physical functioning, mental health and self-health perceptions were compared with normative data obtained from a national survey. In addition, sample norms on the symptom distress and social support scales were compared to reported norms on these measures. These comparisons provided the opportunity to assess the representativeness of the study sample and to determine to what extent, if any, the aborted sudden death survivors in the sample differed from the general population on which these measures were devised. Thus, both the strengths and limitations of the study design have been acknowledged so that generalizations from the study sample to the larger population of

aborted sudden death patients do not exceed the limitations of this investigation.

Data Analysis. Descriptive, correlational and inferential statistics were used to analyze the data. In general, the approach to the analysis of data was conducted in two phases: 1) descriptive data were generated and simple relationships assessed through frequency distributions, cross tabulations, and cross-breaks, and 2) complex relationships were assessed by way of discriminant and multiple correlation and regression (MCR) techniques.

In this study, frequency distributions and condescriptive statistics were used to describe the biopsychosocial characteristics of the sample as well as their reports of recovery status. The comparisons between the sample and other populations were carried out using both the chi square statistic for nominal data and analysis of variances for interval data. Simple relationships were assessed using Pearsons moment correlations for interval data and the Kendall Tau statistic for ordered data. Orthogonal trend analysis established the linearity of the cognitive appraisal variable and in subsequent analyses the Kendall Tau statistic was employed to assess the relationship of this moderating variable to the independent and dependent variables.

Since the primary emphasis of the data analysis was to produce results that could explain the multiple effects, as well as, the unique variance accounted for by the independent variables and the moderating variable on the outcome measures of physical functioning, mental health and self-health perception, both discriminant and multiple correlation and regression methods were used to determine which linear combination

of variables distinguished and predicted the values of the dependent measure.

The Physical Functioning Index, which is an ordered scale ranging from 0 (poorest function) to 5 (highest function) was collapsed into a dichotomous variable, i.e., poor function (scores of 0 and 1, N = 27) and better function (scores 2 through 5, N = 32), for the discriminant analysis. In like manner, the Severity of Illness Index, which was also highly skewed, was collapsed into two groups: low risk (Category I, N = 38) and greater risk (Categories II through IV, N = 23) for this analysis. In order to maintain statistical power, given the small sample size in each of the physical functioning groups, two single discriminant functions were carried out. The first function consisted of the independent variables, age, severity of illness group and symptom distress; the second discriminant function consisted of the two social support variables and the moderating variable, cognitive appraisal of arrest/illness impact.

Multiple correlation and regression was used to assess the relationships of specific variables to the interval data produced by mental health and health perception measures. A hierarchical approach was used in all the analyses. This approach was chosen for two reasons: 1) some variables were considered causally prior to others (e.g., sex before symptom distress), and 2) because of the expected intercorrelations between independent variables. These intercorrelations, referred to as the problem of multicolinarity, made a hierarchical approach necessary so that the unique contribution of a particular variable to the equation could be examined. Figure 4-4 outlines the data analytic plan used in this investigation.

Figure 4-4

Plan for Data Analysis

Research Question	Data	Analysis
1. a - d	Descriptive Data -- Ten Variables	Frequency Distributions
2. a - d	Descriptive Data -- Ten Variables	Cross Tabulations
3. a - d	Descriptive Data -- Six Variables	Frequency Distributions
4.	Descriptive Data -- Three Variables	Cross Tabulations
5.	Descriptive Data -- Four Variables	Analysis of Variance
6.	Descriptive Data -- Six Variables - Simple Relationships	Simple Correlations
7.	Descriptive Data -- Ten Variables - Linearity - Simple Relationships	Analysis of Variance Simple Correlations
8.	Descriptive Data -- Multivariate -- Complex Relationships	Discriminant Analysis
9.	Descriptive Data - Multivariate -- Complex Relationships	Multiple Correlation Regression
10.	Descriptive Data -- Multivariate -- Complex Relationships	Multiple Correlation Regression

CHAPTER FIVE

RESULTS

The results corresponding to the specific research questions and the study hypotheses are presented in this chapter. The chapter is organized into four sections which reflect both the specific aims of this study and various levels of analysis; e.g., descriptive statistics and simple relationships are shown before more complex relationships.

The first section of the chapter describes the study sample outlining the differences and similarities between the sample and the population of aborted sudden death patients from which they were drawn. In addition sample scores on symptom distress and social support are compared to published norms for these scales. In section one research questions one and two are addressed.

The second section addresses research question three, four and five. Descriptive data about work return, sexual functioning and mental status changes in the sample, the comparability of the study sample to national norms on the outcome measures of physical functioning, mental health and general health perceptions, and the effect of time since the cardiac arrest on these latter measures are included.

The third section of the report addresses question six which aimed to describe the relationship among the independent variables and question seven which describes the differences between survivors appraising the impact of the cardiac arrest/illness experience as positive, mixed or negative and their demographic, illness related, and

social support characteristics, as well as, their reports of physical functioning, mental health and general health perceptions.

The fourth section, questions eight, nine and ten generated descriptive data about the direction and magnitude of the associations among the study variables, as well as, the ability of specific variables, i.e., demographics, illness related, social support and cognitive appraisal of arrest/illness impact, to predict differences in physical functioning, mental health and general health perceptions.

Section I. Characteristics of the Study Sample

Research Questions One and Two

The following findings are related to research question one which asked "What are the biopsychosocial characteristics of the study sample?" and research question two which asked "Are there differences between the study sample and the population of sudden death survivors from which they were drawn?" Question one is answered by describing the demographic, illness related and social support characteristics of the study sample, as well as, the distribution of their cognitive appraisals of the impact of their arrest/illness experience, i.e., positive, mixed, negative. In addition, the results of the comparisons between the scores attained by the study sample and those of the normative samples on the Symptom Distress scale and the Norbeck Social Support Questionnaire are reported. These data are presented under the heading biopsychosocial characteristics of the study sample and the subheadings demographic characteristics, illness-related characteristics, social support characteristics and cognitive appraisal of arrest/illness impact.

The second research question is answered by comparing the study sample to the remaining population of sudden death survivors from which they were drawn on several selected features; i.e., demographics, cardiac arrest characteristics, pathology, electrophysiology study results, and prescribed therapy. Chi square was used to determine if the study sample and the larger population differed on any of the categorical variables and t-tests were used to

assess differences between means. These data are presented under the heading comparison of study sample to survivor population.

Biopsychosocial Characteristics of the Study Sample. The study sample was drawn from a population of patients who had survived sudden cardiac death for at least six months but not more than four years. The range of survival times was 6 to 43 months with a mean and standard deviation of 21 ± 11 months. Sixty-two percent of the subjects lived in the counties comprising the Bay Area and 38% were drawn from an area as far north as Redding, California, as far East as Reno, Nevada and as far south as Fresno, California. See Table 1 for Counties of Residence.

TABLE 1

Frequency Distribution of the Subject's

County of Residence

Bay Area		Non-Bay Area	
County	No. of Subjects	County	No. of Subjects
San Francisco/Marin	8	Shasta/Butte	5
Sonoma/Mendocino	6	Sacramento/San Joaquin	7
Solano/Contra Costa	8	Stanislaus/Fresno	5
Alameda	9	Monterey/Salinas	4
San Mateo	6	Reno/Tahoe	3
	37		24

a) Demographics Characteristics. The demographic characteristics of the study sample were obtained during the patient interview. These characteristics included such variables as current age, sex, race, marital status, education and living situation. The demographic data are presented in Tables 2 through 5. The study sample was comprised of 40 males and 21 females, whose ages ranged from 30 to 79 years with a mean age of 59 and a standard deviation of 11.

TABLE 2

Frequency Distribution of

Age and Sex in the Study Sample

	Number of Subjects			Percent		
Age	M	F	Total	M	F	Total
30-39	2	3	5	3.3	4.9	8.2
40-49	4	1	5	6.6	1.6	8.2
50-59	9	3	12	14.8	4.9	19.7
60-69	20	10	30	32.8	16.3	49.1
70-79	5	4	9	8.2	6.6	14.8
	40	21	61	65.7	34.3	100.0

Age in Years

Mean (S.D.) 59 ± 11 Median 62 Range 30-79

Ninety-five percent of the subjects were Caucasion, 74% were married, 13% were widowed and 13% were either separated or divorced. Of those subjects who were married 33% reported dependent children in residence. Subjects who were either widowed, separated or divorced tended to live alone although 44% reported either living with a significant other (12.5%), with dependent children (12.5%) or with adult children (19%). Ninety-two percent of the study sample lived in private homes, 89% of which were owned by the subjects.

TABLE 3

Frequency Distribution of

Marital Status and Race in the Study Sample

	Number of Subjects	Percent
Married	45	73.8
Widowed	8	13.1
Sep./Divorced	8	13.1
	61	100.0
Caucasian	58	95.1
Noncaucasian	3	4.9
	61	100.0

TABLE 4

Frequency Distribution of the

Living Situation in the Study Sample

	Number of Subjects	Percent
Alone	9	14.7
Spouse/Other	32	52.5
Dependent Children	2	3.3
Spouse/Children	15	24.6
Independent Children	3	4.9
	61	100.0

Educationally, 70.5% of the sample had completed high school, 17% of them had also completed college and 9% had completed graduate or professional studies.

TABLE 5

Frequency Distribution of

Educational Levels in the Study Sample

Educational Level	Number of Subjects	Percent
8th Grade or Less	12	19.7
Some High School	6	9.8
High School	19	31.1
Some College	13	21.3
College	7	11.5
Grad./Prof.	4	6.6
	61	100.0

b. Illness Related Characteristics. A summary of the clinical characteristics of the male and female subjects in the sample is presented in Table 6. Thirty-four (56%) of the subjects sustained out-of-hospital cardiac arrests and 27 had in-hospital cardiac arrests (sudden and unexpected loss of consciousness to a patient, visitor or other individual within the physical plant of the hospital). Among the in-hospital cardiac arrests, nine (33%) occurred in the emergency room, three (11%) in outpatient departments, and one (4%) to a visitor. The remaining fourteen subjects were patients, thirteen of whom had been admitted to the hospital for symptomatic heart disease (angina (3), acute myocardial infarction (5), congestive heart failure (5)) and one

for elective surgery (carotid endarterectomy). Ventricular fibrillation was the initial arrhythmia documented in 48 of the 61 events (79%), ventricular tachycardia in twelve (20%) and asystole in one (1%).

Forty-two (69%) of the 61 subjects were diagnosed as having coronary artery disease and 31% of these (13 of 42 patients) had evidence of an acute transmural myocardial infarction by electrocardiographic and/or enzymatic criteria at the time of the event. In five of these latter subjects, acute myocardial infarction was the initiating factor for the cardiac arrest, but it is not possible to determine in the remaining eight subjects whether acute myocardial infarction preceded the cardiac arrest or was a consequence of the event. Of the remaining survivors thirteen (21%) had cardiomyopathies, sixteen (26%) hypertension, and eight (13%) miscellaneous cardiovascular abnormalities (mitral valve prolapse (2), long QT syndrome (3), coronary artery spasm (2), right ventricular dysplasia (1)). One subject had no identifiable heart disease and none of the subjects in the study sample had valvular heart disease. Conduction system disease, that is, right bundle branch block, left bundle branch block or bifasicular block, was present in ten subjects (16%). The total diagnoses exceed 100% since several subjects had more than one disease process that could have contributed to the cardiac arrest.

Angiographic documentation of the extent of coronary artery disease severity was available for 31 of the 42 subjects with this diagnosis. These studies revealed that ten (32%) of the subjects had 75% or greater narrowing of one coronary vessel, seven (23%) two

TABLE 6

Summary of the Clinical Characteristics of the Male and Female Subjects in the Study Sample

Category	Female N=21		Male N=40		
	No.	Percent	No.	Percent	P Value
Age (Mean ± SD)	58±	14	58±	10	NS
Follow-up Time (Months)	18±	10	22±	12	NS
ASD with AMI	1	(5)	12	(30)	.03
CAD	11	(52)	31	(78)	NS
CAD Severity					
One Vessel	3	(38)	7	(30)	
Two Vessel	3	(38)	4	(18)	NS
Three or More	2	(24)	12	(52)	
Prior AMI	7	(33)	19	(48)	NS
Cardiomyopathy	5	(24)	8	(20)	NS
History of CHF	12	(57)	8	(20)	.05
Ventricular Aneurysm	3	(14)	8	(20)	NS
Bundle Branch Block	5	(24)	5	(13)	NS
Other Heart Disease	9	(43)	16	(40)	NS
Hypertension	4	(44)	12	(75)	
MVP	1	(11)	1	(6)	
RV Dysplasia			1	(6)	NS
Long QT Syndrome	3	(33)			
Coronary Spasm			2	(13)	
Brady/Tachysyndrome	1	(11)			

NOTE: ASD = aborted sudden death; AMI = acute myocardial infarction; CAD = coronary artery disease; CHF = congestive heart failure; MVP = mitral valve prolapse; RV = right ventricular.

coronary vessels, and fourteen (45%) three coronary vessels. Left ventricular function was assessed in forty-eight (79%) of the subjects either during cardiac angiography, echocardiography or radionuclide (gated pool) study. Left ventricular aneurysms were identified in eleven (23%) of these subjects and the mean ejection fraction for this subgroup with ventricular aneurysms was 33± 13% (SD). The mean ejection fraction (EF) for the entire group was 44± 16% (SD), indicating mild to moderate left ventricular dysfunction. Of the 48 subjects whose ejection fraction was determined, twenty-nine (60%) had ejection fractions equal to or greater than 40% and twenty-two (76%) of these had ejection fractions equal to or greater than 50%, the mean ejection fraction for this latter subgroup was 54± 9%. Thus, the majority of survivors of sudden cardiac death in the sample had reasonably well preserved left ventricular function, although there is a sizable minority with moderately severe (EF >30% but <40%, 6 subjects) to severe left ventricular dysfunction (EF <30%, 13 subjects).

Programmed electrophysiological studies (EPS) consisting of both incremental ventricular pacing and the introduction of one to three ventricular extrastimuli during diastole were carried out in 51 survivors in the study sample. Forty-five (88%) subjects had baseline EPS studies, i.e., all antiarrhythmic drugs had been withdrawn for at least 36 hours, and clinical studies were carried out in six (12%), i.e., antiarrhythmic therapy or surgical intervention for arrhythmia was being evaluated. Twelve subjects were noninducible, indicating they have a low risk for recurrence. Two of these twelve subjects had clinical studies, one was being assessed for antiarrhythmic efficacy and

one post coronary bypass grafting (CABG) and aneurysmectomy. The incidence of coronary artery disease (CAD) was lowest in this subgroup (5 of 12 subjects) and left ventricular function was within normal limits (EF 57± 11%). Only one subject of the 5 subjects with CAD had cardiac arrest in association with acute myocardial infarction, and in the remaining subjects the event was associated with hypertension (33%) or miscellaneous cardiac abnormalities (25%).

Nonsustained ventricular tachycardia, i.e., five or more ventricular depolarizations but less than 30 seconds, was induced in seventeen subjects. Fifteen of these studies were baseline studies. The incidence of coronary artery disease in these fifteen subjects increased to 65% (11 of 17 subjects) and 36% of these (4 of 11 subjects) also had hypertensive heart disease. Three subjects whose cardiac arrest was associated with acute myocardial infarction were in this group. The remaining six subjects had hypertensive disease only (2), long QT syndrome (2), coronary artery spasm (1) and no discernable heart disease (1). Left ventricular function was still relatively well preserved in the majority of these subjects (EF range 25% - 75%, mean 51± 15%).

Sustained ventricular tachycardia, i.e., 30 seconds or greater of repetitive ventricular responses or a rapid ventricular response requiring overdrive pacing or cardioversion, was induced during programmed stimulation in seventeen (33%) of the subjects. Fifteen of these studies were baseline and two were done following CABG. With the exception of three subjects whose cardiac diagnosis was cardiomyopathy (2) and right ventricular dysplasia (1) the remaining 14

(82%) subjects had coronary artery disease. Five of these latter subjects (36%) experienced cardiac arrest in association with acute myocardial infarction and 43% (6 of 14 subjects) had left ventricular aneursyms. Left ventricular function was moderately to severely depressed in the subgroup; mean ejection fraction was 40± 13%, median 39%, range 14% - 60%.

Five (10%) subjects developed ventricular fibrillation with programmed electrical stimulation. Three of these subjects had coronary artery disease, two of whom had concurrent congestive cardiomyopathy and the remaining two had idiopathic cardiomyopathy. Left ventricular function in the subgroup was generally severely depressed; mean ejection fraction was 32± 14%, median 21%, range 20 - 50%.

Clinically, the subjects in the study sample demonstrated a wide spectrum of cardiac disease, the most dominant of which was coronary artery disease followed by hypertensive heart disease and cardiomyopathy. Coronary artery disease was the presumed mechanism for cardiac arrest in the majority of sample subjects, yet only 31% of the individuals with coronary artery disease had clinical evidence of acute myocardial infarction, indicating that chronic ischemic processes were more often the mechanism underlying this event. In addition, approximately one half of the study sample were found to have relatively good left ventricular function and 36% had ejection fractions within normal range. Lastly, the reproducibility of the subjects' arrhythmia during programmed electrophysiologic stimulation was related to both the severity of cardiac disease and left ventricular function.

These latter findings indicate that there is no direct relationship between left ventricular function and the occurrence of cardiac arrest, rather both cardiac arrest and left ventricular dysfunction are related to the severity of underlying cardiac disease.

The Severity of Illness Index. The Severity of Illness Index is an ordinal scale that ranks individuals into one of five categories from least risk (I) to highest risk (V) according to the presence or absence of specific clinical characteristics. This index was developed from the clinical and mortality data of the 180 patients who had been treated for aborted sudden death. Life table and regression analysis of this data yielded four prognostically significant factors; age, history of previous MI, cardiomyopathy and NYHA grade III or IV for congestive heart failure at hospital discharge. The frequency distribution of scores on the Severity of Illness Index for the study sample is presented in Table 7. Thirty-eight subjects (62%) were in the lowest risk category, whereas, only three subjects (5%) were in the highest risk category. Given that the rankings devised for this measure were based on survival for at least six months, these scores were not totally unexpected. However, in order to more fully assess the rankings, a comparison was made between the subjects in the sample and the 63 living non-study survivors. Chi square analysis showed there were no significant distribution differences between the two survivor groups.

Since the largest percentage of survivors were in the least risk category and the number of survivors in the other four categories was small, categories II through V were collapsed into one category of higher risk in subsequent analysis.

TABLE 7

Frequency Distribution of the Severity

of Illness Index Scores in the Study and Non-Study Survivors

	Study Survivors		Non-Study Survivors	
Category	No. of Subjects	% Subjects	No. of Subjects	% Subjects
I. Least Risk <65 CHF I, II	36	59	40	63
II. Low Risk >65 No Previous MI	11	18	8	13
III. Moderate Risk >65 Previous MI	2	3	8	13
IV. High Risk <65 CM, CHF I, II	9	15	6	9
V. Highest Risk <65 CM, CHF, III, IV	3	5	1	1
	61	100	63	100

X^2 = 5.907, degrees of freedom 4, N.S.

NOTE. CHF = congestive heart failure; MI = myocardial infarction; CM = cardiomyopathy.

Symptom Distress. Symptom distress scores in the study sample ranged from 13 to 40 with a mean of 21.8 ± 11 (S.D.). The most

frequent symptoms identified in the sample in descending order were fatigue, pain frequency, insomnia, outlook and pain intensity. Utilizing the published norms for this scale (McCorkle and Quint-Benoliel, 1982) a comparison was made between the mean scores of the research sample and the normative samples. As can be seen in Table 8, the means for each sample are significantly different ($p < 0.01$). The study sample reported significantly more distress than the uncomplicated myocardial infarction group, but significantly less distress than the cancer group. Fatigue was the most distressing symptom identified in all three patient groups. Additional troublesome symptoms identified by the cancer patients included pain frequency, cough, lack of appetite and insommia. The patients with myocardial infarction identified insomnia, change in outlook, pain frequency and difficulties in concentration. However, despite the number of symptoms identified in all three patient groups, the mean scores for each symptom indicate that the frequency and/or intensity of each symptom was assessed as infrequent or mild to occasional or somewhat distressing, that is, while symptoms occasionally occur they are not assessed as overly troublesome by the majority of subjects. The different means on each symptom reported by the three patient groups are presented in Table 9 and graphically displayed in Figure 5-1.

TABLE 8

Mean Symptom Distress Scores

Comparisons Between ASD Patients

and Normative Data[a]

Sample	Mean	S.D.	Median	P-value
M.I. (N=65)	21.8	6.2	21.0	0.01
ASD (N=61)	19.8	4.9	18.2	0.01
CA (N=56)	26.1	8.4	25.5	0.01

NOTE. ASD = aborted sudden death; M.I. = myocardial infarction; CA = cancer.

[a]Normative sample consisted of 67 persons with lung cancer and 71 persons with myocardial infarction. Thirty-eight percent of the cancer patients were female, 26% of the heart patients were female. Mean age of subjects was 61.5 (range 32 to 89 years).

TABLE 9

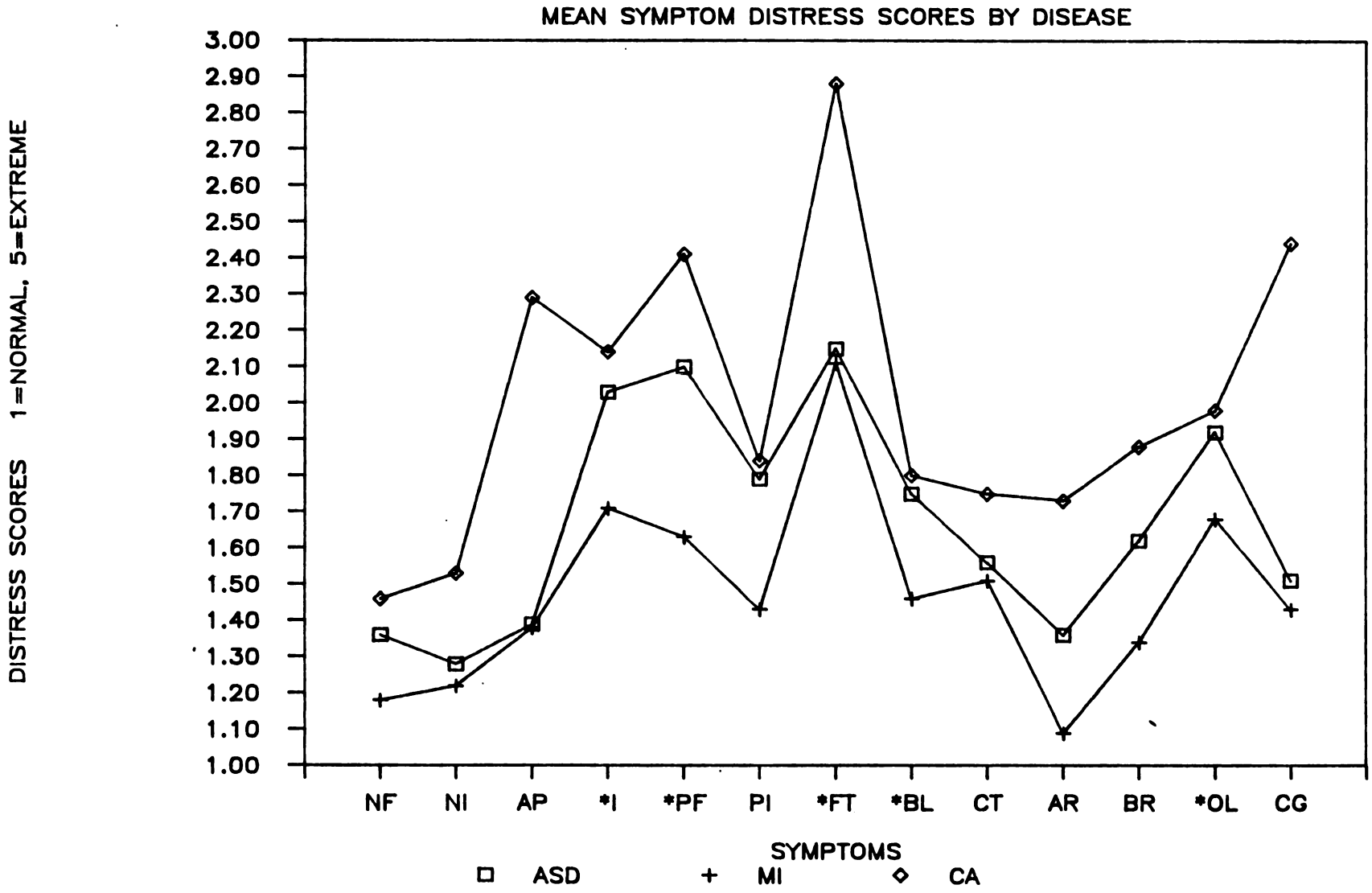
Mean Distress Scores for Each Symptom

on the Symptom Distress Scale by Disease Category

SYMPTOM	ASD	MI	CA
Nausea Frequency	1.36	1.18	1.46
Nausea Intensity	1.28	1.22	1.53
Appetite	1.39	1.38	2.29
Insomnia	2.03	1.71	2.14
Pain Frequency	2.10	1.63	2.41
Pain Intensity	1.79	1.43	1.84
Fatigue	2.15	2.11	2.88
Bowel	1.75	1.46	1.80
Concentration	1.56	1.51	1.75
Appearance	1.36	1.09	1.73
Breathing	1.62	1.34	1.88
Outlook	1.92	1.68	1.98
Cough	1.51	1.43	2.44

NOTE. 1 = normal; 5 = extreme; ASD = aborted sudden death; MI = myocardial infarction; CA = cancer.

FIGURE 5.1


MEAN SYMPTOM DISTRESS SCORES BY DISEASE
DISTRESS SCORES 1=NORMAL, 5=EXTREME
3.00
2.90
2.80
2.70
2.60
2.50
2.40
2.30
2.20
2.10
2.00
1.90
1.80
1.70
1.60
1.50
1.40
1.30
1.20
1.10
1.00
NF
NI
AP
*I
*PF
PI
*FT
*BL
CT
AR
BR
*OL
CG
SYMPTOMS
ASD
MI
CA

c. Social Support Characteristics. The means, standard deviations, and range of scores for the Norbeck Social Support Questionnaire (NSSQ) subscales and composite variables for both the study sample and normative samples are presented in Table 10. Differences in the subscale and composite scores for the two groups were assessed with T-tests. No differences were found between the study sample and normative sample for the total network variable or its subscales (number in network, duration of relationship, frequency of contact), nor for the total functional variable and its subscales (affect, affirmation, aid).

In order to determine the average individual ratings in the study sample for each subscale, the mean score of each subscale was divided by the number in network mean and by the number of questions in each subscale (subscale mean ÷ 12 ÷ 2 = average person ratings). The average ratings per study subject were: affect, 3.35 (moderately); affirmation, 2.95 (a little bit to moderately); aid, 2.90 (a little bit to moderately); duration of relationships, 5.00 (more than 5 years); and frequency of contact, 3.70 (monthly to weekly).

The source of support category reported by the greatest number of study subjects was family or relatives (96.4%), followed by friends (85.7%) and spouse or partner (80.3%) categories. In contrast, professional sources of support such as health care providers, counselors or therapists and the clergy were reported by only 29% of the sample (see Table 11). The frequency distribution for the family or relative and friend categories showed that 41.1% of the subjects listed six or more family or relatives and 30.4% listed six or more

TABLE 10

Comparison of Means, Standard Deviations and Range of Scores for the Study Subjects and Normative Subjects on the NSSQ

	Sample N = 57			Normative Sample N = 136		
NSSQ Subscales And Variables	X	S.D.	Range	X	S.D.	Range
Affect[a]	105.12	47.34	10 - 200	96.50	47.63	14 - 201
Affirmation[a]	95.67	42.16	10 - 174	89.73	43.48	11 - 195
Aid[a]	94.39	42.08	14 - 186	86.18	42.62	18 - 197
Total Functional Variable	295.15	127.30	35 - 528	272.22	128.50	43 - 567
No. in Network	12.42	6.58	2 - 25	12.12	5.67	2 - 23
Duration of Rel.[b]	60.05	32.46	10 - 149	53.26	25.97	10 - 100
Frequency of Contact[c]	44.39	22.81	9 - 99	44.43	21.89	8 - 94
Total Network Variable	116.86	61.34	21 - 272	109.81	52.72	20 - 206

[a]Based on Ratings for each network member on a 5 point scale from 1 = Not at all to 5 = a great deal

[b]Based on ratings for each network member on a 5 point scale from 1 = less than 6 months to 5 = more than 5 years

[c]Based on ratings for each network member on a 5 point scale from 1 = once a year or less to 5 = daily

[d]Normative sample consisted of 47 male and 89 female employed adults at a large university medical center whose mean age was 35.8 (range 22 to 67 years).

friends in their networks. Expressed as a proportion of the total listed in the network, family or relatives accounted for 47.2 percent, and friends 33.7 percent, of the network. The first three categories of sources of support accounted for 87.6 percent of the number in the network.

TABLE 11

Mean and Range for Each Source of Support Category and Percentage of Subjects Listing Each Source Category on Network List on the NSSQ (N=57)

Source of Support Category	X	Range	Percent	Proportion of Total Number Listed
Spouse/Partner	.80	0 - 1	80.3	6.5
Family or Relatives	5.88	0 - 19	96.4	47.2
Friends	4.18	0 - 17	85.7	33.9
Work or School Associates	.10	0 - 3	10.7	1.6
Neighbors	.59	0 - 5	35.7	5.6
Health Care Providers	.39	0 - 4	21.4	3.2
Counselor or Therapist	.07	0 - 1	7.1	0.6
Minister/Rabbi/ Priest	.05	0 - 1	5.4	0.4
Other	.13	0 - 7	1.8	1.0

d. Cognitive Appraisal of Arrest/Illness Impact. The subject's cognitive appraisal of the arrest/illness was defined as the individual's on-going evaluation of the impact of this event on his or her current well being. Three classifications of the subject's cognitive appraisal based on the theoretical definitions identified by Lazarus (1978) were developed from the interview data. These included benign/positive, negative (stressful) and mixed appraisals.

Benign/Positive. Fifteen subjects (25%) had benign/positive appraisals of the impact of the arrest/illness experience. These individuals assessed their current well being as being as good or better than it was prior to the event. They projected an emotional tone that was calm, contented or pleased and they tended to view their future optimistically.

The majority of these subjects (10 of 15) viewed the arrest/illness experience benignly. They did not assess the arrest/illness as having had any significant impact on their life styles or attitude toward life. However, these individuals did acknowledge the need for continued medical surveillence and the fact that their lives may be shortened because of their cardiac dysfunction. Five subjects (33%) assessed the impact of the arrest/illness positively. These individuals stated either that the quality of their medical care and/or their physical stamina had improved since the event (2 of 5 subjects) or that the arrest/illness experience had prompted them to reassess their values and priorities in life (3 of 5 subjects). One of these latter individuals stressed altruistic changes, i.e., greater compassion for others, another primarily pragmatic changes, i.e., decreased work involvement

and more time for pleasure; and the third subject stated a combination, i.e., change in work setting, marital status and a new emotional relationship.

Negative Appraisals. Nineteen (31%) of the subjects had negative appraisals of the impact of the arrest/illness experience on their current well being. These survivors emphasized either a sense of loss (7 subjects), a sense of threat (4 subjects) or both (8 subjects). The emotional tone projected by these subjects ranged from concern and anxiety to frustration, anger and/or a deep sadness. These subjects generally viewed their futures as something to be endured or as a genuine concern.

The real and felt losses expressed by these subjects included loss of work status, role status (spouse had taken over some or many of the individual's former tasks), self-esteem, physical or social independence, and memory losses of the days, weeks prior to or subsequent to the event.

The pervasive sense of vulnerability emphasized by some of the subjects was expressed in several ways. Some of the survivors had significantly reduced their physical and social activities avoiding or limiting even recommended activities such as walking regularly. Others reported periodic to frequent sleep disturbances including fear of going to sleep and/or disturbing, sometimes violent dreams. Still others expressed discomfort or anxiety if left alone for any length of time or frequent unbidden thoughts of vulnerability and panic reactions. Lastly, several of these survivors reported an acute awareness and concern for changes in body sensations, symptoms, and potential side effects of current medications.

Mixed Appraisals. Forty-one percent of the subjects (25 of 61) gave appraisals of the impact of the cardiac arrest/illness experience that had elements of both positive and negative appraisals. The emotional tone projected by these individuals varied from relief and contentment to saddness and concern or it was flattened. These subjects tended to view the future with cautious optimism, i.e., most had plans for future endeavors but with a "one day at a time" approach.

1. Eleven of the subjects (44%) viewed the event positively, i.e., of having been given a second chance or as the impetus that assisted them to make positive changes in their life styles or relationship, while simultaneously expressing a sense of loss (decreased vitality, physical endurance, work involvement) and a sense of vulnerability (symptom awareness, pulse taking, fear of the activity they associate with the arrest).

2. Four subjects (16%) assessed the impact of the event benignly, i.e., it had little or no impact on their current well being, but these subjects also related difficulties with employment, concentration, physical endurance and spousal relationship since the event. These subjects tended to minimize the arrest/illness experience and any relationship it may have to their current problesm.

3. Forty percent of the subjects (10 of 25) viewed the impact of the arrest/illness on their current well being somewhat negatively, i.e., it was not as good or probably not as good as before the event but it (current well being) was more or less acceptable. The arrest/illness experience made these individuals more aware of and sensitive to their own mortality (pulse taking, rare sleep disturbances)

and may have resulted in real or felt losses (decreased exercise tolerance), but had not significantly changed their life styles, their attitudes toward life or future plans.

The frequency distribution of the subjects' cognitive appraisals of the arrest/illness impact are presented in Table 12. Two (3%) of the subjects were not categorized because both stated they had never thought about the impact of the event on their lives and did not feel able to do so at the time of the interview. These individuals were dropped from all subsequent analyses involving the cognitive appraisal variable.

TABLE 12

Frequency Distribution of the Study Subjects'

Cognitive Appraisal of the Impact of the Arrest/Illness Experience

Category	No. of Subjects	% of Subjects
No Appraisal	2	3.3
Positive/Benign	15	24.6
Mixed	25	41.0
Negative (Stressful)	19	31.1
	61	100.0

To summarize the results of question one "What are the biopsychosocial characteristics of the study sample?", the typical survivor of sudden cardiac death in this sample was a white male, high school graduate with some additional college or vocational training, who was approximately 60 years old, married and living with his spouse in

their own home. Despite the underlying causes of his arrhythmia, his cardiac function is within normal limits or only mildly depressed and he is at low risk for recurrence. He has occasional symptoms of fatigue, insomnia and mild to mildly distressing pain. His social network averages twelve individuals and is comprised primarily of his wife, family and friends whom he has known for five years or more and who he sees on a monthly to weekly basis and he perceives these individuals' as supportive of his emotional and tangible needs. His appraisal of the impact of his cardiac arrest/illness experience is mixed, i.e., he views his current well-being as good, acceptable or as having been given a second chance while simultaneously expressing real or felt losses, a sense of vulnerability and a slightly concerned but generally hopeful outlook for the future.

Comparison of Study Sample to Survivor Population. A comparison of the study sample to the population of aborted sudden death patients from which they were drawn showed that there were few significant differences between the groups. The distribution of age and sex were similar, although as expected the sampling procedures for this study significantly affected mean follow-up times. The larger population of sudden death patients had a mean follow-up of 28 ± 25 (SD) while the study sample, which did not include subjects whose initial cardiac arrest had occurred prior to March, 1980, had a mean follow-up of 21 ± 11 ($p < 0.01$).

TABLE 13

Age, Sex and Follow-up Times of the Study Sample, and Population of Survivors of Sudden Death Syndrome Treated at UCSF

Category	Sample N=61	Population N=119	P. Value
Follow-up (Mean ± SD)	21 ± 11	28 ± 25	.01
Age (Mean ± SD)	58 ± 11	56 ± 16	NS
Sex			
Male	40 (66%)	87 (73%)	NS
Female	21 (34%)	32 (27%)	NS

The groups did not differ on specific features of their cardiac arrests, i.e., out-of-hospital, documented arrhythmia and whether or not the arrest occurred in the milieu of acute myocardial infarction (See Tables 14 and 15). However, the severity of coronary artery disease as well as the distribution of hypertensive heart disease, mitral valve prolapse and valvular defects did distinguish the sample from the larger population. For this study, severity of coronary artery disease was defined as 75% or greater narrowing of a coronary vessel. Angiographic documentation of the extent and severity of coronary artery disease was available for 31 (74%) of the sample subjects and 47 (57%) of the larger population. Analysis of this data showed that the study sample had significantly ($p<0.02$) more one vessel disease compared to two vessel disease than did the larger population.

However, this finding lost its significance when those patients with three or more vessel disease were added to the X^2 analysis. So while these data suggest a trend for the study subjects to have more single vessel disease than the larger population, the overall distribution of coronary artery disease severity is similar.

TABLE 14

Cardiac Arrest Site, Rhythm, and MI Occurrence Rate of the Study Sample and Survivors of Sudden Death Syndrome at UCSF

Category	Sample N=61	Population N=119	P. Value 0.05
Out of Hospital ASD	34 (56%)	81 (68%)	NS
ASD With MI	27 (23%)	13 (21%)	NS
ASD Rhythm			
Ventricular Tachycardia	12 (20%)	21 (18%)	NS
Ventricular Fibrillation	48 (79%)	95 (80%)	NS
Brady/Asystole	1 (2%)	3 (2%)	NS

NOTE: ASD = aborted sudden death; MI = myocardial infarction

TABLE 15

Frequency Distribution of Known Cardiac Pathology in the Study Sample and in the Population of Sudden Death Survivors at UCSF

Category	Sample N=61	Population N=119	P. Value 0.05
	No. (%)	No. (%)	
Coronary Artery Disease	42 (69)	82 (69)	NS
(≥ 75% Narrowing)			
One Vessel	10 (32)	7 (15)	
Two Vessel	7 (23)	21 (45)	.02
Three or More	14 (45)	19 (40)	NS
Cardiomyopathy	13 (21)	32 (27)	NS
Ventricular Aneurysm	11 (18)	22 (19)	NS
Bundle Branch Block	10 (16)	28 (24)	NS
Previous MI	26 (43)	53 (45)	NS
History CHF	22 (36)	55 (46)	NS
Other Cardiac Disease	25 (41)	54 (45)	NS
Hypertension	16 (64)	(22 (41)	
Mitral Valve Prolapse	2 (8)	11 (20)	
Valvular HD		9 (17)	.05
Long QT	3 (12)	2 (4)	
Other	4 (16)	10 (18)	
No Known Disease	1 (2)	3 (3)	NS

The occurrence of other forms of cardiac disease was similar in the two groups, but analysis of the specific types of pathology revealed significant difference between the study subjects and the larger population of sudden death patients. The study subjects were more

likely to have or have been treated for hypertension at the time of their cardiac arrest than the larger sample and the patients in the larger population were more likely to have mitral valve prolapse and other valvular heart defects than the study subjects. These differences were significant at the 0.05 level. The occurrence of long QT syndrome, coronary artery spasm and congenital heart disease in the two groups was not significantly different.

The electrophysiological stimulation study (EPS) results showed that there was no difference in the number of patients in each group who did not have an EPS study and those who had baseline studies (i.e., off all drugs for at least 36 hours). However, significantly more of the individuals in the larger population ($p < 0.003$) had had clinical EPS studies, i.e., studies done subsequent to drug loading or after coronary artery bypass grafting (CABG). This finding was not unexpected. Prior to 1980, EPS studies at UCSF were largly restricted to testing for efficacy of drug therapy rather than the current protocol which assesses inducibility first and drug efficacy second. This difference between groups then, is largely a function of sample selection. Interestingly, despite the significant differences in the number of clinical studies performed in the two groups, there were no significant differences in the number of negative and positive EPS studies in the two groups. This finding indicates that even though some individuals were receiving antiarrhythmic therapy, these drugs were not effective in suppressing the arrhythmia.

TABLE 16

Frequency Distribution of Electrophysiological Study Results in the Study Sample and in the Population of Sudden Death Survivors at UCSF

Category	Sample N=61	Population N=119	P. Value 0.05
	No. (%)	No. (%)	
Baseline EPS[a]	45 (74)	62 (53)	NS
Baseline Vs. Clinical[b]	6 (10)	41 (35)	0.003
EPS Study Results			
Negative	12 (24)	40 (39)	
Positive	39 (76)	63 (61)	NS
Nonsustained VT	17 (33)	23 (22)	
Sustained VT	17 (33)	32 (31)	NS
VF	5 (10)	4 (4)	
Other		4 (4)	

NOTE. EPS = programmed electrophysiologic study; VT = ventricular tachycardia; VF = ventricular fibrillation.

[a]Baseline EPS - patient off antiarrhythmic therapy for at least 36 hours.

[b]Clinical EPS - Antiarrhythmic therapy or surgical treatment of arrhythmia is being evaluated.

No differences in medical and surgical therapies were found between the two groups of patients. While there was a trend for more of the larger population of patients to have been treated with standard antiarrhythmic drugs and for more of the study subjects to have

received amiodarone, an experimental antiarrhythmic drug, this trend was nonsignificant. Thus, with the exception of the occurrence rates of hypertension, mitral valve prolapse and valvular defects, the significant differences which were found between the study sample and the larger population of sudden death survivors from which they were drawn were largely due to sampling artifact. Tables 11 - 17 summarizes the data that have been discussed in this section.

TABLE 17

Frequency Distribution of Prescribed Therapy in the Study Sample and Population of Sudden Death Survivors at UCSF

Category	Sample N=61	Population N=119	P. Value 0.05
	No. (%)	No. (%)	
Medical Therapy[a]	57	108	
Antiarrhymics			
No Drugs	4 (7)	10 (9)	NS
Standard A/A	21 (34)	51 (43)	NS
Amiodarone	35 (57)	48 (41)	NS
Other Experimental	1 (2)	9 (7)	NS
Digoxin	28 (46)	67 (52)	NS
Diuretics	32 (52)	64 (54)	NS
Nitrates	13 (21)	32 (27)	NS
Surgical Therapies[b]	17 (28)	23 (19)	NS
No Drug Post OR	3 (18)	5 (22)	NS
Coronary Bypass	7 (41)	11 (48)	NS
Sympathectony	3 (18)		
Pacemaker	4 (23)	5 (22)	NS
Other	3 (18)	7 (30)	NS

NOTE. A/A = antiarrhythmics; OR = surgery;

[a]Medical therapy consists of using drugs only to control cardiac rhythm and function.

[b]Surgical therapies consist of interventions such as coronary bypass grafting in order to control malignant arrhythmia. Patients treated surgically may or may not need concomitant antiarrhythmic drugs.

Section II. Recovery Pattern in the Study Sample

Research Questions Three, Four and Five

In this section, the physical, psychological, intellectual and social recovery status of the survivors in the study sample, which were determined from an analysis of the interview data and from the subjects' responses to the Health Status Questionnaire, are addressed. In addition to describing the rate of work return, resumption of sexual activity, and the extent of perceived memory and/or concentration deficits in the sample, the subject's reports of current physical health, mental health and self health perceptions are presented. These findings are related to research question three which asked "What are the survivors' self-reports of recovery status?" Frequency distributions and descriptive statistics (ranges, medians, means and standard deviations) were used to obtain this descriptive data.

Further, the scores attained by the subjects on the Health Status measures, i.e., General Health Index (GHI), Physical Functioning Index (PFI), Mental Health Index (MHI) and the two subscales of the MHI, physiological well being and psychological distress, are compared to the norms established in a national survey. These findings are related to research question four which asked, "How do the health status scores obtained from the study sample compare with the normative data reported by other researchers?" Chi square and analysis of variance were employed to determine what differences, if any, existed between the study sample and normative population.

Lastly, the effect of time since the cardiac arrest, i.e., six to twelve months, thirteen to twenty-four months etc., on the subjects' reports of physical functioning, mental health and health perceptions is presented. These findings are related to research question five which asked "Does the length of time since the cardiac arrest affect survivor reports of physical health, mental health and health perceptions?" Analysis of variance was used to make these determinations.

The descriptive data generated by these research questions are presented under the following headings: work return in the sample; sexual functioning in the study sample; mental status changes in the study sample; and current functional health status in the study sample.

Work Return in the Study Sample. The occupational status by age and sex of the study subjects at the time of cardiac arrest is shown in Table 18. Forty-one (67%) of the subjects were employed either full time (28 subjects), part time (8 subjects) or were homemakers (5 subjects). Twenty-three percent (14 subjects) were retired and 10% (6 subjects) described themselves as previously disabled. Reasons for disability included one or more previous myocardial infarctions (4 subjects), ideopathic cardiomyopathy (1 subject) and degenerative joint disease (1 subject). Homemakers and retired subjects had the highest mean ages, 68 ± 6 and 67 ± 4 years respectively, while those subjects working full time had the lowest mean age, 52 ± 11 years, range 28 - 63 years.

Initial work return following the cardiac arrest/illness event was 73% (30 of 41 subjects). Twenty-one subjects (75%) who had been

TABLE 18

Work Status of Study Sample at Time of Cardiac Arrest by Sex and Age

Work Status	Men		Women		Mean Age ± SD
	No.	(%)	No.	(%)	
Unemployed					
Retired	11	(28)	3	(14)	67.1 ± 4.0
Disabled	2	(5)	4	(19)	61.0 ± 3.3
Homemaker			5	(24)	68.6 ± 5.9
Part Time (<30 hr/wk)	4	(10)	4	(19)	58.1 ± 12.1
Full Time (>30 hr/wk)	23	(57)	5	(24)	51.6 ± 11.4
	40	(100)	21	(100)	

employed full time prior to their illness returned to work for at least 30 hours per week within six months, and two returned to work on a part time basis (<30 hrs/wk). Three subjects (38%) who had been working part time returned to their previous work schedules and four (80%) homemakers resumed the majority of their household tasks within six months. Nine subjects, four of whom had been employed full time, four part time and one homemaker were sufficiently disabled by their illness that they were unable to return to their previous work and/or household activities. Reasons for disability included decreased exercise tolerance due to poor left ventricular function in five (mean ejection fraction 28 ± 6%), concurrent illness in two (emphysema (1),

degenerative patellar disease (1)) and intellectual deficits resulting from prolonged out-of-hospital resuscitations in two. However, of these subjects none were so limited as to be unable to carry out self-care activities or light household tasks, such as cooking or dusting. Two subjects (5%), one of whom had sustained his myocardial infarction and cardiac arrest on the day he was due to retire and one who had been semi-retired, retired following their illness.

Currently, eleven of the twenty-one subjects (52%) who returned to work full time after their cardiac arrests continue in full time employment, two (10%) are unemployed and one (5%) became a homemaker following the adoption of an infant. Five subjects continue to work on a part time basis and three subjects continue as full time homemakers.

The two subjects, who are currently unemployed, had difficulties maintaining employment since the arrest/illness. One subject on returning to work was demoted twice before finally quitting his original employer. He had subsequently quit another position just prior to the interview. While this subject felt his initial employer had treated him unfairly after his years of service, he also stated he was aware that his intellectual functions were not what they had been, i.e., "I can't visualize things the same way. I don't think anybody outside would notice it, but I do. I have trouble with complex things, mathematics. I'm trying right now to relearn some things..that I know I knew." The other subject had recently moved to the Bay Area and was in a new position for less than two weeks prior to his myocardial infarction and subsequent cardiac arrest. Against physician advice, this subject

returned to work within three months, lasting approximately two weeks on the job. The subject stated "I guess I wasn't quite with it, that I could really concentrate on the job. As a result it didn't work out. . .we finally agreed mutually that it was time to leave." Since that time he has held two subsequent positions with periods of six months or more of unemployment in between. While this subject stated he didn't believe he was as "sharp" as he had been prior to his illness, he attributed his work difficulties to other factors, i.e., age, poor job market, not the right job for him.

In the interim period, i.e., the time of initial work return and the interview, three additional subjects had retired, only one of whom retired early. This latter individual had planned for early retirement, but retired a year earlier than expected because his employer would no longer allow him to travel extensively, an aspect of his work which he greatly enjoyed. Five subjects, four of whom had initially returned to work full time and one homemaker, had subsequently been disabled due to recurrent aborted sudden death (2), worsening cardiomyopathy (1), or both (2). In addition, one of the recurrent sudden death subjects was further disabled by a cerebral vascular accident although at the time of the interview was managing to live by herself with the assistance of a part time housekeeper.

In Table 19 the current work status of the study sample by sex and age is shown. Fifty percent of the women who were employed full time, part time or were homemakers at the time of the cardiac arrest are currently disabled and 52% of the males who were employed full or part time are currently unemployed (7%), retired (19%) or have been disabled (26%). While a greater percentage of the women subjects in

TABLE 19

Current Work Patterns in the Study Sample by Sex and Age

Work Status	Men	Women	Mean Age ± SD
	No. (%)	No. (%)	
Unemployed	2 (05)		51.0 ± 10
Retired	16 (40)	3 (14)	68.2 ± 5
Disabled	9 (23)	11 (52)	57.9 ± 9
Homemaker		4 (19)	61.0 ± 21
Part Time (<30 hr/wk)	3 (7)	2 (10)	66.6 ± 3
Full Time (>30 hr/wk)	10 (25)	1 (5)	48.1 ± 11
	40 (100)	21 (100)	

the study have become disabled following one or more episodes of cardiac arrest, there was no significant differences in the incidence of disability between the male and female subjects (Chi square, 1.9110, df = 1, p = NS).

Over a mean follow-up time of 21 ± 8 months, 67% of the subjects who were gainfully employed or who were homemakers at the time of cardiac arrest continue to work and/or maintain their homes. In this sample, of the five subjects who retired, only one retired before age 60. The subjects who became disabled by their disease tended to be in their fifties (mean 55 ± 9 years) and over 60% of them had underlying cardiomyopathy (congestive, ideopathic). However none of the subjects

who were disabled were unable to carry out self-care activities and/or light housework.

Sexual Functioning in the Study Sample. Data on the resumption of sexual activity in the sample were gathered during the interview. Coital frequency was not ascertained, since the aim had been to determine whether or not sexual patterns had changed subsequent to the cardiac arrest. Older subjects were somewhat more reluctant to respond to the question about sexual activity than were the younger subjects. All the subjects provided at least basic data, i.e., sexual activity had ceased before the cardiac arrest, had ceased since the cardiac arrest, was decreased in frequency, etc. and most subjects willingly provided additional information.

Only 37 of the 61 subjects interviewed described themselves as sexually active prior to the cardiac arrest/illness period. Of the remaining 24, thirteen (54%) were widowed (6 women, 3 men) or unmarried (3 women, 1 man) and had no sexual partner, five (one woman) related their abstinence to loss of interest (2) or poor marital relations (3), and three were not active because of spousal impotency. Three subjects provided no reason for their abstinence.

Eight subjects, with a mean follow-up period of 24 ± 13 months (range 11 - 42 months) who had been sexually active prior to the cardiac arrest illness event had not resumed coitus. Four subjects stated that they were impotent and three of these related their difficulty to their antiarrhythmic medication (procainamide 2, amiodarone 1) and one to age. Of the remaining four subjects, one (a woman)

cited a loss of interest, one marital difficulties, one physical discomfort and loss of interest and one provided no additional information.

Twenty-nine of the 37 subjects who had been sexually active prior to their illness continued to have sexual relations although twelve (41%) stated they were significantly less active, four (14%) somewhat less active, and only thirteen (45%) claimed to be similarly active. None of the subjects indicated that they had become more active since the arrest/illness event. A summary of these findings is presented in Table 20. Both age and sex appeared to be factors affecting sexual activity prior to and subsequent to the cardiac arrest, the majority of women (14 of 21) included in the study were sexually inactive before the cardiac arrest. The inactive subjects prior to arrest were also the oldest and those subjects who remained similarly active or only somewhat less active were the youngest.

The principal reason for the decrease in coital frequency in those subjects less active after cardiac arrest was organic symptoms. Of the five subjects citing organic symptoms as the principal cause of reduction in sexual activity, two complained of angina, two complained of discomfort and fatigue and one attributed the reduction to his medication. Four subjects (one women) cited loss of interest and in an additional four subjects decreased activity was attributed to spousal anxiety (two women). Three subjects did not cite any reason for decreased frequency of coital activity.

In this sample of aborted sudden death survivors 25% of the men and 67% of the women subjects were inactive sexually before the cardiac arrest/illness episode. Following the illness episode an additional

TABLE 20

Changes in Status of Sexual Activity Following Cardiac Arrest in the Study Sample

Sexual Activity	Men	Women	Mean Age ± SD
Not Previously Active	24	14	68.7 ± 4.9
No Resumption	8	1	60.5 ± 5.5
Less Active			
Somewhat Less	4	3	48.8 ± 12.5
Significantly Less	12	1	56.5 ± 7.2
Similarly Active	13	2	50.5 ± 14.0
More Active	0	—	
	61	21	

20% of the men and 5% of the women subjects became inactive. However, 35% of the men and 29% of women subjects who had been sexually active noted no decrease in sexual activity since the arrest/illness episode and 11% of the men and 43% of the women reported being only somewhat less active.

Mental Status Changes in the Study Sample. Twenty-seven subjects (44%), nine female and eighteen male, described themselves as having memory, concentration and/or comprehension difficulties since the cardiac arrest/illness event. Two of these subjects (one male,

one female) however, were not included in this analysis because of a history of cerebral vascular accidents. While most of the deficits described by the subjects were mild, i.e., increased absentmindedness or short term memory lapses, others described more profound deficits, i.e., loss of previously acquired manual skills, decreased comprehension of new material and loss of specific cognitive skills such as the ability to do mathematical calculations.

Since no standardized tests were done to assess for deficiencies in cerebral function, three classifications were devised by the investigator to catagorize subject responses to the interview question, "Have you noticed any changes in your memory or concentration since your illness?" These categories are: (1) mild - those subjects who described primarily short term memory lapses or decreases in their ability to concentrate; (2) moderate - those subjects who described both short and long term memory lapses or those individuals who described impairments of intellectual functions; i.e., learning, comprehension, calculations, problem solving; and (3) moderate to severe - those individuals who described memory and/or intellectual deficits and expressed an awareness of significant changes in their personalities, i.e., they were not the same person they had been prior to the cardiac arrest. In addition, this category includes those subjects who during the interview either demonstrated an impaired thought process, i.e., spontaneous, unthinking response to questions, or were unable to respond to questions requiring evaluation.

1. Mild Mental Status Changes. Eleven subjects (2 female, 9 male) complained of short term memory lapses or decreases in their

ability to concentrate. Most of these subjects described a kind of absentmindedness, i.e., "I forget a little easier than I did before. I'm not that bad but I don't remember like I did before. . .Like my wife will talk to me and I'll walk away and then I'll go, oh yeah, what did you say again?" One subject who had described himself as a reader stated, "Concentration, my mind wanders. I read books and my mind won't stick with it that much." Occasionally, the subject's spouse would interject comments such as "There are times when she will say something, and I'll give an answer and about five minutes later, she'll ask me exactly the same question."

The majority of subjects with these difficulties had devised memory jogs to keep track of physician appointments and medication times, i.e., detail activity lists, calendars, peg boards, daily medication trays, digital watches with alarms, strict routines, or made a point of doing things right away lest they forget. Two subjects who took medication only in the morning stated they let their wives keep track of all other appointments.

Of the six subjects in this category who had been working full time at the time of their cardiac arrests, two continue to work full time (1 female), three are disabled and one retired. The one individual who was working part time continues to do so. Three of the subjects were retired (1 female) and one was disabled due to heart disease, at the time of their cardiac arrests.

2. Moderate Mental Status Changes. Ten subjects (4 female, 6 male) described impairments in intellectual functions or long term memory. Four subjects (2 female, 2 male) described specific disabilities

either with doing mathematical calculations or remembering series of numbers. For example, "I seem to be lacking concentration. It's hard, and memory is really. . .I could do math problems, I just went through a series of tests at school. . .I knew (used to know) things. Heck went through the thing (test), and I couldn't remember." Or "Lost quite a bit of memory, it's starting to come back, but I've definitely lost something in my head. . .it's not like it used to be. I used to remember everybody's phone number and so on. . .maybe it was because of my work (telephone line man), but I can't remember, I forget a lot of things now."

Four additional subjects (1 female, 3 male) described themselves as having difficulties concentrating. One subject who had been a mechanic was no longer able to disassemble and assemble carburetors and other car parts, he stated "A lot of people have told me, boy. . .you've changed. I don't feel like I forgot but my head won't let me do it. It just won't let me concentrate on what I'm doing." Two other subjects described difficulties with concentration in terms of decision making and setting priorities, i.e., "It's just I don't have the concentration like I used to. Things come up and I really have to stop and think about it. Probably doing paper work. . .I just can't get rolling. . .If I get too many things going then I have a hard time concentrating on one thing." One subject, a women, who had returned to graduate school after her last arrest noticed difficulty in learning and comprehending new information, "It was the reading, the studying. . .I would read the same paragraph over and over and over. I don't know whether, I'm not, just not interested in it as I might be or whether it's the result of having my heart stop." This subject also

noted another change following her last arrest event, "I started having a problem in writing, in that I reverse letters. That's something that never happened before."

Lastly, two subjects described memory lapses in which they had failed to recognize old and close friends. However, each stated that once the individuals introduced themselves they were able to remember who they were. Both had found these experiences painful and embarrassing.

Four subjects in the moderate group were working full time at the time of cardiac arrest, of these one has continued working full time, one is a homemaker and two are unemployed. One subject who was working part time is now disabled due to degenerative patellar disease. Two subjects were retired and two were disabled by congestive cardiomyopathy at the time of their cardiac arrests. All of these subjects have remained socially active with family and friends.

TABLE 21

Mental Status Changes in the Study Sample

Changes in Status	No.	%	Women	Mean Age ± SD
Mild	11	(44)	2	58.4 ± 10.2
Moderate	10	(40)	4	53.2 ± 13.8
Moderate to Severe	4	(16)	2	51.8 ± 7.9
	25	(100)	8	

Moderate to Severe Changes in Mental Status. Four subjects (2 male, 2 female) were categorized as having moderate to severe mental status changes. Three of these subjects have significant periods of amnesia for the cardiac arrest event and both women have retrograde amnesia of approximately one to three months. The two women subjects cited significant cognitive defects since the arrest; one was no longer able to read and understand directions and was not allowed by her family to travel alone because she became easily lost; the other had attempted to return to work but despite a supportive work atmosphere was unable to do her job, i.e., "I had problems typing. Sometimes I could remember where the keys were and sometimes I couldn't. . .During this whole period I was totally exhausted." Both these subjects had been told by their families that they were not the same people they had been before the arrests.

The two men were not as open about citing cognitive difficulties. Both avoided responding to the question as to whether there had been memory or concentration changes. One subject however, frequently responded to questions in a disorganized manner. For example, Q: "How did your wife respond to your illness?" A: "S..., how did she respond to the first kid. . .everything happened to me, had to be my own way. In the Marine Corps, we was with a medical outfit. . .so they went according to what I said and went ahead and this is the way I feel the first time." The second male subject presented himself with an affable affect but was unable to answer any questions which required evaluation or analysis, such as, "What has been your wife's reaction?" or "What kind of impact do you think your illness has had on

your life? This subject described himself as having become very lazy and his major complaint was that his dreams had become so different. "I used to dream the usual fantastic goings on. . .flying used to be one of my favorites. Swing my arms and fly, sailing. I don't dream like that any more, I dream more mundane things."

Of these four subjects, one has returned to work full time and the other three are on disability or in the process of applying for disability.

Functional Health Status in the Study Sample. The functional health status of the survivors in the study sample were determined from the subject's responses on the Health Status Questionnaire which was composed of the Personal Functioning Index (PFI), the General Health Index (GHI) and the Mental Health Index (MHI). Further, the scores attained by the subjects in these health status measures were compared to the norms established in a national survey involving approximately 5,000 individuals ranging in age from 14 to 67 years. The frequency distribution of scores on the Personal Functioning Index is presented in Table 22. In addition, the comparison of the percentage of study subjects in each rank of the PFI, i.e., from poorest function to best function, to the percentage of subjects in each rank from the national sample is shown.

TABLE 22

Frequency Distribution of Personal Functioning Index Scores

Comparison of Study Subjects and National Subjects

INDEX SCORE (RANK)	STUDY SAMPLE		NATIONAL SAMPLE	
	No.	Percent	No.	Percent
0: Poorest Functioning	19	32.2	65	1.5
1:	8	13.6	126	2.7
2:	13	22.0	220	4.8
3:	7	11.8	192	4.2
4:	6	10.2	403	8.8
5: Best Functioning	6	10.2	3570	78.0
	59	100.0	4576	100.0

X^2 = 480.2, df = 5, p 0.001

[a]Personal Functioning Index comprised of physical limitations and physical capacity subscales.

NOTE: 0 = Level four or greater on either or both scales; 1 = level three on either or both scales; 2 = level two on either or both scales; 3 = level one on both scales; 4 = level one on one or the other scales but not both; 5 = not limited on either scale.

Ninety percent of the study subjects were limited on one or more levels of the physical limitations and/or physical capacity scales which comprise the PFI, while 78% of the normative sample had no limitations

on either scale (X^2 = 480.2, df = 5, $p < 0.001$). While none of the subjects were limited in self care activities, approximately 20% had difficulties with mobility, i.e., needed assistance to travel, stayed indoors most of the day because of health, or had diminished exercise tolerance. However, the majority of the study subjects (45 - 52%) had difficulties only with more vigorous activities, such as heavy housework, active sports, running short distances and climbing uphill or upstairs. Summaries of the physical limitations and physical capacities subscales and the distribution of scores in the study sample on these scales are presented in Tables 23 and 24. The main causes for limitations in the study sample were shortness of breath, enlarged heart or heart failure, chest pain, and joint problems. The most common reasons for limitations reported by the normative sample were back problems, joint problems, overweight, and shortness of breath, enlarged heart, or heart failure. The reasons for limitations in the study sample are summarized in Table 25.

The means, standard deviations, medians, and range of scores attained by the sample subjects and the normative population on the General Health Index and Mental Health Index and its two subscales, psychological well being and psychological distress, are presented in Table 26. The subjects' scores on the General Health Index, which is a reflection of both the objective information individuals have about their health and their subjective evaluation of that information, were significantly lower than those reported by the normative sample ($t = 10.3$, $p \leq 0.001$). This finding is not unexpected, since it has been shown that mean health scores as measured by the GHI become

TABLE 23
Summary of Personal Limitations Scales and Distribution of Scores in Study Sample

Scale Score	Limited in Self-Care	Limited in Mobility	Trouble Walking One Block or Climbing One Flight of Stairs	Trouble Walking Several Blocks or Climbing a Few Flights of Stairs	Limited in Vigorous Activities or in Bending, Lifting or Stooping	No. and Percent of Study Sample
5	Yes	Yes	Yes	Yes	Yes	0 (0)
4	No	Yes	Yes	Yes	Yes	10 (17)
3	No	No	Yes	Yes	Yes	8 (14)
2	No	No	No	Yes	Yes	13 (22)
1	No	No	No	No	Yes	18 (30)
0	No	No	No	No	No	10 (17)
						59 (100)

TABLE 24
Summary of Physical Capacities Scale and Distribution of Scores in the Study Sample

Scale Score	Limited in Self-Care	Limited in Walking Around Inside House	Limited in Light Housework	Limited in Moderate House-Work or Walking a Block or More	Limited in Running a Short Distaance or Walking Uphill or Upstairs	Limited in Hard Activities at Home or in Active Sports	No. Percent Subjects
6	Yes	Yes	Yes	Yes	Yes	Yes	0 (0)
5	No	Yes	Yes	Yes	Yes	Yes	13 (22)
4	No	No	Yes	Yes	Yes	Yes	5 (9)
3	No	No	No	Yes	Yes	Yes	6 (10)
2	No	No	No	No	Yes	Yes	15 (25)
1	No	No	No	No	No	Yes	11 (19)
0	No	No	No	No	No	No	9 (15)
							59 (100)

TABLE 25

Summary of Main Causes for Physical Incapacities

For Men and Women in the Study Sample

N = 59

Reason	Men			Women		
	Total Number Limited	% Limited Total	% of Total N = 40	Total Number Limited	% Limited Total	% of Total N = 19
All Reasons	32	100.0	80.0	18	100.0	94.7
Chronic Bronchitis, Emphysema, Phlegm	1	3.1	2.5	1	5.6	5.3
Chest Pain, Heart Attack or Angina	11	34.4	27.5	5	27.8	26.3
High Blood Pressure (Hypertension)	1	3.1	2.5			
Shortness of Breath, Enlarged Heart or Heart Failure	17	53.1	42.5	13	72.2	68.4
Joint Problems (Arthritis, Gout, Rheumatism)	2	6.3	5.0	2	15.4	10.5
Hernia, Rupture	1	3.1	2.5			
Other						
Leg Cramps	1	3.1	2.5			
Back Trouble				1	5.6	5.3
Age	2	6.3	5.0			
Below Knee Amputation	1	3.1	2.5			
Weakness, Fatigue Poor Condition	2	6.3	5.0	2	15.4	10.5
Osteoporosis				1	5.6	5.3

NOTE. Some subjects attributed different causes to various limitations

TABLE 26

General Health Index and Mental Health Index:
Comparison of the Means, Standard Deviations, Medians and Range of Scores for the Study Subjects and National Subjects

INDEX	STUDY SAMPLE			NATIONAL SAMPLE			
	Mean ± SD	Median	Range	Mean ± SD	Median	Range	t - Value
		N = 59			N = 4707		
General Health Index (GHI)	65.66 ± 16.8	65	38-100	83.64 ± 13.2	82	27-100	10.3*
		N = 56			N = 5089		
Mental Health Index (MHI)	176.33 ± 32.2	183	62-223	177.56 ± 25.5	183	62-226	.4
Psychological Well Being (PWB)	60.93 ± 13.2	63	16- 83	59.16 ± 12.2	NA	NA	1.0
Psychological Distress (PD)	60.36 ± 16.2	57	40-106	47.54 ± 15.4	NA	NA	6.2*

*$p < 0.001$

NOTE. NA = data not available.

increasingly lower as physical limitations increase (Stewart, Ware and Brook 1982).

Unexpected however, was the finding that there was no difference between the mean score of the study sample and the national sample on the Mental Health Index. This finding indicates that the study subjects, despite significant physical limitations and unfavorable estimates of their health in general, have favorable mental or psychological health. An analysis of the subjects' scores for psychological well being one of the two constructs underlying the MHI, provided additional support for viewing the subjects as generally psychologically healthy. The mean scores for both the study sample and the normative sample on the psychological well being subscale were approximately the same; the study subjects having a slightly higher mean score. However, the mean scores for the psychological distress subscale, the other construct underlying the MHI, were significantly different ($t = 6.2$, $p < 0.001$). The study subjects reported significantly more psychological distress than did the subjects in the normative sample. This finding indicates that while the overall mental health of the study subjects is favorable, those subjects who are distressed have a significant level of upset.

In order to elucidate more fully the patterns of functional health status in the study sample, two additional analyses were carried out. The first was run to determine the relationships among the health status measures and the second determined the effect of time since the cardiac arrest on the subjects' reports of physical functioning, mental health and general health perceptions.

Relationships Among the Health Status Measures. Correlations between the General Health Index scores, Mental Health Index scores and Physical Functioning Index scores in the study sample appear in Table 27. There were significant positive associations between both the Mental Health and Physical Health Index scores and the subjects' reports of general health perceptions. As expected, since the mental health and physical functioning scales are measuring different constructs of health, the association between these scales was weak and nonsignificant. However, these associations while weak were in the expected directions, i.e., Mental Health Index and psychological well being scores were positively associated with the Physical Functioning Index scores whereas psychological distress scores were negatively associated with physical health scores. Psychological distress scores were also negatively and significantly associated with the Mental Health and General Health Index scores.

Thus, those subjects with higher Mental Health Index scores or higher Physical Functioning Index scores are more likely to report higher General Health Index scores. Whereas, those subjects reporting high psychological distress or poor physical functioning are more likely to assess their general health less favorably.

Effect of Time on Patterns of Health Status. The effect of time since the cardiac arrest on the subjects' reports of physical functioning, mental health and general health perceptions was assessed by analysis of variance. Subjects' scores were categorized by the length of time since the initial cardiac arrest, i.e., group I, 6 to 12 months; group II, 13 to 24 months; group III, 25 to 36 months; and group IV, 37 to 48 months. While there was a consistent trend for

TABLE 27

Correlations Among General Health Perceptions,[a]

Mental Health and Physical Functioning[b]

Scores in the Study Sample

N = 56[c]

Variable	Variable				
	MHI	PWB	PD	GHI	PFI
MHI					
PWB	.94*				
PD	-.96*	-.85*			
GHI	.48*	.38*	-.50*		
PFI	.13	-.08	-.18	.43*	

*Significance at 0.005 two-tailed test

[a]Correlation based on Pearson Product Moment

[b]Correlation derived from Kendall Tau

[c]Three Respondents had missing data on one measure

Note. MHI = Mental Health Index; PWB = Psychological Well Being; PD = Psychological Distress; GHI = General Health Index; PFI = Physical Functioning Index.

subjects in group II (13 to 24 months) to report lower physical functioning, mental health and general health perceptions, there were

no significant differences between the mean health status scores in each group. However, since this trend was evident a brief analysis of this group of survivors was done. Five of the subjects had had recurrent aborted sudden death and three of the subjects were significantly disabled due to congestive (2) or ischemic (1) cardiomyopaties. Time since the initial cardiac arrest was not found to be a significant factor in the subject's reports of current health status, but rather the occurrence of symptomatic heart disease appeared to be the main factors affecting subject reports of current health status.

Section III. Relationships: Influencing Factors and Cognitive Appraisal of Illness Impact

Research Questions Six and Seven

The findings related to research question six "Is there a relationship among selected demographic (age, gender), illness related (severity, symptom distress) and social support characteristics of the survivors?" and research question seven "Do survivors who appraise the impact of arrest/illness as positive, mixed or negative differ as to age, gender, illness severity, symptom distress, social support and functional health status?" are presented in this section. These research questions address two of the assumptions underlying the Crisis of Physical Illness Model which guided the development of the conceptual framework for this study: (1) the individual's appraisal of the life crisis is influenced by three sets of determinants: background characteristics, illness related factors and features of his sociocultural background; and (2) all these factors together determine the outcomes or level of wellness achieved by the individual. In the Crisis of Illness Model it is postualted that the three sets of determining factors are related, these associations are addressed first in the analysis.

The findings related to the subjects' cognitive appraisal of cardiac arrest/illness impact are presented next. Analysis of variance was used to determine if there were any differences among subjects appraising the impact of the cardiac arrest/illness experience as positive, mixed or negative and current age, symptom distress, social support characteristics and health status scores. Tests for linearity were

also done to determine whether cognitive appraisal was an ordered or nonordered variable. Chi square was employed to assess for differences between the subject's appraisals of arrest/illness impact, sex and the severity of Illness Index.

Relationships Among Determining Factors. The correlations among the demographic, illness related and social support characteristics are presented in Table 28. In addition to the social support variables which were highly interrelated, only sex showed any significant relationship with the other study variables. These small to moderate negative correlation indicate that female subjects tended to report higher symptom distress, as well as, higher total function and total network social support scores than did the male subjects. However, the generally weak to zero order correlations among these variables argues strongly for viewing the three sets of determining factors as unrelated or independent factors rather than covariates as suggested by the Crisis of Physical Illness Model.

TABLE 28

Pearson Moment Correlations Among the Demographic, Illness Related and Social Support Variables in the Study Sample

N=56

	Variable					
Variable	CurrAge	Sex	SI	SymDis	TIFunct	TINtwrk
CurrAge	-					
Sex	.04	-				
SI	.02	-.16	-			
SymDis	-.23	-.29*	.14	-		
TIFunct	-.03	-.34**	.06	.15	-	
TINtwrk	-.04	-.31**	-.04	.11	.94***	-

*p < 0.05; **p < 0.01; ***p < 0.001 Two Tailed Tests

Note. CurrAge = Age at time of interview; SI = severity of illness; SymDis = symptom distress score; TIFunct = total functional; TINtwrk = total network

Cognitive Appraisal of Arrest/Illness Impact. The analysis of variance and orthogonal trend analysis of group means for the subject's cognitive appraisals of arrest/illness impact are presented in Table 29. Differences in group mean scores for positive, mixed and negative appraisals were highly significant for current age ($p < 0.001$); symptom distress ($p < 0.001$); mental health ($p < 0.0001$); psychological well being ($p < 0.0001$); psychological distress ($p < 0.0001$); and general

health perceptions ($p < 0.015$). In addition, the orthogonal trend analysis determined that the differences between the mean scores for the categories of cognitive appraisal were linear. That is, those subjects who appraised the impact of the cardiac arrest/illness experience as positive had significantly higher or lower mean scores for a specific variable than did those subjects who appraised the impact of the arrest/illness experience negatively. While the linearity of mean scores for the cognitive appraisal categories is apparent across all the study variables, only those associated with current age, symptom distress, mental health, psychological well being, psychological distress, and general health perceptions were highly significant (range $p < 0.01$ to $P < 0.0001$). The large variances associated with the mean scores for the social support scales and Physical Functioning Index precluded any significant differences between group means and therefore linearity for these variables. The distribution of sex and Severity of Illness scores among the cognitive appraisal categories was also nonsignificant ($X^2 = 2.63$, df=2, $p < 0.27$ and $X^2 = 14.6$, df=8, $p < 0.07$ respectively).

Given the strong statistical support for linearity among the cognitive appraisal categories, in all subsequent analyses these categories were treated as ordered data. However, the more conservative Kendall Tau rank-ordered coefficient was used in order to avoid attributing greater strength to a relationship than was warranted by the data. In table 30 the Kendall Tau coefficients for cognitive appraisal, its determant variables and the subjects' health status scores are presented.

TABLE 29

Summary of Data, Analysis of Variance and Orthogonal Trend Analysis

Cognitive Appraisal of Cardiac Arrest/Illness Impact

Variable	Cognitive Appraisals Positive	Mixed	Negative	Source	df	Sum of Squares	Mean Squares	F	Sig.
Age (Years)									
N	15	25	18	Between groups	2	1985.70	992.85	9.32	.0003
Mean	68.47	59.84	52.89	Linearity	1	1975.75	1975.75	18.55	.0001
SD	7.17	8.56	14.10	Dev. From Linearity	1	9.95	9.95	.09	NS
				Within groups	56	5856.87	106.49		
Symptom Distress									
N	15	25	19	Between groups	2	599.80	299.90	9.83	.0002
Mean	19.67	19.64	26.47	Linearity	1	431.29	431.29	14.14	.0004
SD	3.39	5.05	7.21	Dev. from Linearity	1	168.51	168.51	5.53	.02
Total Functional (Social Support)									
N	14	25	16	Between Groups	2	34563.62	17281.81	1.09	NS
Mean	259.07	229.72	191.62	Linearity	1	34303.53	34303.53	2.16	NS
SD	138.18	145.54	67.03	Dev. from Linearity	1	260.10	260.10	.02	NS
				Within Groups	52	823963.71	1584.46		
Total Network (Social Support)									
N	14	25	16	Between Groups	2	5927.42	2963.71	.80	NS
Mean	136.36	117.28	108.81	Linearity	1	5544.45	5544.45	1.50	NS
SD	68.34	67.68	37.46	Dev. from Linearity	1	382.97	382.97	.11	NS
				Within Groups	52	191682.69			
Mental Health Index									
N	15	25	17	Between Groups	2	20646.10	10323.05	14.00	.0001
Mean	196.54	184.49	148.80	Linearity	1	18687.75	18687.75	25.34	.0001
SD	17.67	24.03	36.73	Dev. from Linearity	1	1958.35	1958.35	2.66	NS
				Within Groups	54	39824.60			

TABLE 29 (Continued)

Variable	Cognitive Appraisals Positive	Mixed	Negative	Source	df	Sum of Squares	Mean Squares	F	Sig.
Psych. Well Being									
N	14	24	16	Between Groups	2	3361.27	1680.64	14.28	.0001
Mean	68.14	65.17	49.19	Linearity	1	2798.80	2798.80	23.78	.0001
SD	8.01	10.25	13.55	Dev. from Linearity	1	562.48	562.48	4.78	.03
				Within Groups	51	6003.49			
Psych. Distress									
N	14	25	16	Between Groups	2	5538.13	2769.06	16.08	.0001
Mean	49.00	57.24	75.13	Linearity	1	5221.63	5221.63	30.33	.0001
SD	9.62	12.42	16.42	Dev. from Linearity	1	316.49	316.49	1.83	NS
				Within Groups	52	8952.31			
Health Perceptions									
N	15	25	17	Between Groups	2	2330.43	1165.21	4.51	.02
Mean	71.00	68.64	55.71	Linearity	1	1938.78	1938.78	7.50	.008
SD	12.12	17.69	16.60	Dev. from Linearity	1	391.65	391.65	1.52	NS
				Within Groups	54	13957.30			
Physical Functioning									
N	15	25	17	Between Groups	2	1.49	.74	.26	NS
Mean	2.00	1.88	1.59	Linearity	1	1.38	1.38	.49	NS
SD	1.46	1.81	1.66	Dev. from Linearity	1	.10	.10	.04	NS
				Within Groups	54	152.76			

TABLE 30

Kendall Tau Coefficients for Cognitive Appraisal,[a]

Its Determining Factors and Health Status Scores

	Determinants of Cognitive Appraisal Variable					
Variable	Age	Sex	SymDis	SevIll	TIFunct	TINtwrk
CAI	-.41** (N=58)	-.12 (N=59)	.30* (N=59)	.10 (N=59)	-.11 (N=55)	-.10 (N=55)

	Health Status Scores Variable				
Variable	MHI	PWB	PsyDis	GHI	PFI
CAI	-.46** (N=57)	-.46** (N=54)	.53** (N=55)	-.28* (N=57)	-.09 (N=57)

* $p < 0.005$

** $p < 0.0001$

[a]Cognitive appraisal scored: 1 = positive, 2 = mixed, 3 = negative.

Moderate to moderately strong negative correlations were found between cognitive appraisal and age, mental health and psychological well being. Moderate to moderately strong positive correlations were found between cognitive appraisal and symptom distress and psychological distress. These associations were all significant at $p < 0.005$ or greater. A small but significant negative association was

also found between cognitive appraisal and general health perceptions; the remaining variables were only weakly associated with cognitive appraisal.

These findings indicate that negative appraisals of the impact of the arrest/illness are associated with younger age, higher symptom distress, psychological distress and poorer perceptions of general health. Further, it can be extrapolated that positive appraisals of arrest/illness impact are related to older age, low symptom distress, favorable mental health and higher perceptions of general health.

Section IV. Relationships Among Medical and Psychosocial Factors and Survivor Reports of Physical Functioning Mental Health and Health Perceptions

Research question eight asked, "What are the relationships and interrelations among demographics, illness related, social support, and cognitive appraisal characteristics of the survivors and their self-reports of physical functioning?" The study hypothesis related to question eight was, "age, illness severity and symptom distress will significantly differentiate between survivor reports of physical functioning." Discriminant analysis was the data analytic system chosen to answer this research question. As noted in the Methods chapter, the Physical Functioning Index categories were collapsed into a dichotomous variable, minimal function and moderate function. The results of the discriminant analysis are presented under this heading, medical and psychosocial factors related to physical functioning in the sample.

Research question nine asked, "What are the relationships and interrelationships among demographic, illness related, social support and cognitive appraisal characteristics of the survivors and their self-reports of mental health?" The study hypothesis related to question nine was, "demographics (age and sex), symptom distress, social support (total functional, total network) and cognitive appraisal of arrest/illness impact will be significantly related to survivor reports of mental health." Hierarchical multiple regression analysis was employed to examine the relationship of the study variables to the

Mental Health Index scores in the sample. These results are presented under the heading, Relationship of Medical and Psychosocial Factors to Mental Health in the Sample.

Question ten asked, "What are the relationships and interrelations among demographic, illness related, social support and cognitive appraisal characteristics of the survivors and their reports of general health perceptions?" The study hypothesis related to question ten stated, "severity of illness, sex, symptom distress, and cognitive appraisal of arrest/illness impact will be significantly related to survivor reports of self-health perceptions." Hierarchical multiple regression analyses again was employed to examine the hypothesized relationships of the study variables to the General Health Index scores reported by the study sample. The results of these analyses are presented under the heading, Relationship of Medical and Psychosocial Factors to Health Perceptions in the Sample.

Relationship of Medical and Psychosocial Factors to Physical Functioning. In order to maintain statistical power given the sample sizes in the two physical functioning groups (minimal, N=27; moderate, N=32), two separate discriminant analyses were performed. The variables assessed in the first discriminant analysis were age, symptom distress and severity of illness group (note: this variable was formed when the Severity of Illness Index was collapsed into two categories, i.e., least risk, greater risk). This discriminant function yielded a Wilkes lamba of .6622 (X^2 = 22.88, df = 3, $p < .0001$) indicating that it significantly discriminated between membership in the two physical functioning categories. The canonical correlation for this single

discriminant function was .5812 indicating a moderately strong association between the function and the physical functioning groups.

The squared canonical correlation indicated that 34% of the expected variance in physical functioning was accounted for by this discriminant function. The structure matrix, which is the within pooled correlations between the canonical discriminant functions and the original discriminating variables, indicated that severity of illness group contributed the most to the discriminant function (.7821), followed by symptom distress (.5372) and age which contributed the least (.1153).

The second discriminant analysis, whose single function consisted of the two social support variables (total function and total network), and the subject's cognitive appraisal of arrest/illness impact yielded a Wilkes lambda of .9500 which was nonsignificant. The canonical correlation for this function was .234 indicating a small association between the variables in this function and physical functioning. In addition, the squared canonical function indicated that this function explained only 5% of the expected variance in physical functioning. A summary of these findings are precented in Table 31.

Thus, the major hypothesis, "age, illness severity and symptom distress will significantly differentiate between survivor reports of physical functioning" was accepted.

Relationship of Medical and Psychosocial Factors to Mental Health. The hierarchical multiple regression model employed to examine the relationships of the study variables to survivor Mental Health Index (MHI) scores consisted of five steps. For this analysis, the demographic variables, age and sex, were entered into the equation on

TABLE 31

Results of Discriminant Analysis for Physical Functioning

Discriminant Function	Eigen Value	Canonical Correlation	Wilks' Lamba	X^2	D.F	P Value	Structure Matrix
1-A	.5102	.5812	.6622	22.88	3	0.0000	
SI Group							.7821
Sym. Dis.							.5371
Age							.1153
1-B	.0526	.2236	.9500	2.64	3	0.45	
TI Funct.							.8400
TI Network							.6889
CAI							.2358

the first step, followed by severity of illness group, symptom distress score, social support scores (total functional, total network) and lastly cognitive appraisal of arrest/illness impact. It was hypothesized that each of these variables or variable sets (demographics, social support) with the exception of severity of illness group would be significantly related to MHI scores. The significance level for the regression equation was set at 0.05 and at 0.01 for each step of the equation.

Demographics. Demographics (age and sex) were entered first into the regression equation and yielded an R of .3581 with mental health scores. The R^2, which indicates the amount of variance in mental health accounted for by this set of variables was .1282, a nonsignificant finding ($F = 3.677$, $df = 2$, $p < 0.032$). Most of the

variance in mental health accounted for by this set of variables was due to the influence of age. The direction of the relationship indicated that older subjects had higher mental health scores. The amount of change in mental health scores as a function of a one unit change in age was 1.022; that is, for every unit increase in mental health scores, age increased one year.

Thus, the hypothesis that a set of demographic variables would significantly contribute to differences in mental health scores was rejected.

Severity of Illness. At the second step of the regression, severity of illness group was added to the equation. With the addition of this variable, the R^2 rose from .1282 to .1309, indicating that severity of illness group accounted for only .3% of the variance in mental health, a nonsignificant finding.

Thus, the study hypothesis that severity of illness would not contribute significantly to differences in mental health scores was supported.

Symptom Distress. At the third step of the regression, symptom distress scores were entered into the equation. At this point, the Multiple R rose to .7334 and the R^2 rose to .5378, a .41 increase in the R^2. This increase was highly significant ($F = 42.261$, $df = 4$, $p < 0.0001$) and indicates that symptomatology accounted for a large proportion of the variance in mental health. The direction of this relationship was negative, indicating that survivors with high symptom distress scores had significantly lower mental health scores. The amount of change in mental health scores as a function of a one unit change in symptom distress scores was -3.70.

Thus, the study hypothesis that symptom distress would contribute significantly to differences in mental health scores was accepted.

Social Support. At the fourth step of the regression, total functional and total network social support scores were entered into the equation. With the addition of this variable set, the multiple R rose to .7686, yielding an R^2 of .54, indicating that the social support variables accounted for only 5% of the expected variance in mental health; a nonsignificant finding.

Thus, the study hypothesis that social support would contribute significantly to differences in mental health scores was rejected.

Cognitive Appraisal. On the last step of the regression, the cognitive appraisal of arrest/illness impact categories were entered into the equation. The R^2 rose to .6257, an increase of .035. This increase which indicates that cognitive appraisal uniquely accounted for only 3.5% of expected variance in mental health was nonsignificant.

Thus, the study hypothesis that cognitive appraisal of arrest/illness impact would significantly contribute to differences in mental health scores was rejected.

In summary, with demographics, illness severity, symptom distress, social support and cognitive appraisal of arrest/illness impact in the regression equation, the multiple correlation was 0.79, which is considered a large effect size (Cohen and Cohen, 1977). In addition, these variables explained 63% of the variance in survivor mental health scores which was a significant finding ($F = 10.74$, df 7, $p<0.001$). However, only one variable, symptom distress, was significantly related to MHI scores as well as accounting for a substantial portion of the

variances in this measure. Thus, the major hypothesis that demographics, social support scores and cognitive appraisal of arrest/illness impact as well as symptom distress would be significantly related to survivor reports of mental health was rejected.

Since the MHI is a global measure of mental health status, two additional analyses were done to examine the relationships among the study variables and the underlying constructs of the MHI, psychological well being and psychological distress. The regression model employed for these analyses was the same as for the MHI. The results indicated that as with the MHI, only symptom distress was significantly related to psychological well being scores, accounting for 32% of the expected variance ($F = 27.05$, $df = 4$, $p<0.0001$). The direction of this relationship was also negative, indicating that survivors with high psychological well being scores have low symptom distress scores.

The pattern of relationships for the psychological distress scores was somewhat different. Demographics as well as symptom distress were significantly related to psychological distress scores, accounting for 17% and 36% of the expected variance ($F = 4.50$, $df = 2$, $p<0.01$; $F = 37.86$, $df = 4$, $p<0.0001$). As with the MHI, most of the variance in psychological distress accounted for by the set of demographic variables was due to the influence of age. The direction of the relationship indicated younger age was related to psychological distress. The amount of change in psychological distress scores as a function of a one unit change in age was -.57, that is, for every unit increase in psychological distress scores, age decreased .57 years. As would be expected, symptom distress scores were positively related to psychological distress ($r = .69$).

Thus, symptomatology is the best indicator of mental health status for a group of sudden cardiac death survivors. In addition, among those survivors having symptoms, younger patients are more likely to experience significant psychological distress. A summary of the regression analyses are presented in Table 32.

Relationship of Medical and Psychosocial Factors to Health Perceptions in the Study Sample. A hierarchical multiple regression model consisting of five steps was utilized to examine the relationships of the study variables to survivor General Health Index scores. This measure reflects both the objective information individuals have about their health and their subjective evaluation of that information. Therefore, it was hypothesized that severity of illness, symptom distress and cognitive appraisal of arrest/illness impact would significantly relate to GHI scores, but that the demographic (age and sex) and social support variables (total network and total functional) would not. The significance level for the regression equation was set at 0.05 and at 0.01 for each step in the equation.

Demographics. Demographics (age and sex) were entered first into the regression equation and yielded an R of .1552 and an R^2 of 0.241, indicating that age and sex accounted for only 2% of the variance in GHI scores. This was a nonsignificant finding. The direction of the association among these variables was positive, but the correlations were very small (.05 for age, .15 for sex).

Thus, the study hypothesis that the demographic variables of age and sex would not contribute significantly to differences in GHI scores was accepted.

TABLE 32

Summary of Results of Multiple Regression Analysis for Mental Health, Psychological Well Being and Psychological Distress (N=53)

Step/Variables	Multiple R	R^2	Adjusted R^2	R^2 Change	F Change	Significance	Correlation
Mental Health Index							
1. Demographics[a]	.358	.128	.093	.128	3.68	.032	.358/.002
2. Severity of Illness Group	.362	.131	.078	.003	.15	.700	.007
3. Symptom Distress Total	.733	.538	.499	.407	42.26	.000	-.681
4. Social Support[b]	.769	.591	.537	.053	2.97	.061	.214/.189
5. Cognitive Appraisal	.790	.626	.567	.035	4.20	.046	-.590
Psychological Well Being							
1. Demographics[a]	.346	.120	.085	.120	3.40	.041	.345/-.03
2. Severity of Illness Group	.347	.120	.066	.001	.03	.874	.082
3. Symptom Distress Total	.661	.437	.390	.317	27.05	.000	-.590
4. Social Support[b]	.713	.508	.444	.071	3.31	.045	.257/.25
5. Cognitive Appraisal	.728	.530	.457	.022	2.06	.158	-.537
Psychological Distress							
1. Demographics[a]	.408	.167	.133	.167	4.50	.010	-.408/-.009
2. Severity of Illness Group	.420	.177	.126	.010	.60	.443	.033
3. Symptom Distress Total	.735	.540	.501	.363	37.86	.000	.668
4. Social Support[b]	.759	.570	.521	.036	1.97	.151	-.170/-.133
5. Cognitive Appraisal	.790	.623	.565	.047	5.64	.022	.620

[a]Demographics, Current Age, Sex

[b]Social Support = Total Network, Total Functional

Severity of Illness. The severity of illness group ranks were entered into the regression equation at the second step. The multiple R rank to .288, yielding an R^2 of .0829. The change in R^2 was .06, indicating that severity of illness accounted for 6% of the expected variance in GHI scores. This finding was nonsignificant. As expected, the relationship between severity of illness and GHI scores was negative ($r = -.26$). However, this finding indicates that the objective information individuals' have about their health has only a small effect on their perceptions of their health in general.

Thus, the study hypothesis that severity of illness would significantly relate to survivor reports of health perceptions is rejected.

Symptom Distress. At the third step of the regression, total symptom distress scores were entered into the equation. At this time the multiple R rose to .7048 yielding an R^2 of .4967, and R^2 increase of .41. This increase was highly significant ($F = 39.46$, $df = 4$, $p<0.0001$) and indicates that a substantial portion of the expected variance in GHI scores is due to occurrence of symptoms. The direction of this association was negative ($r = -.68$) indicating that perceptions of health decrease as symptom distress increases. The amount of change in health perception scores as a function of a one unit change in symptom distress scores was -1.9.

Thus, those survivors who are experiencing symptoms, regardless of the extent of their underlying cardiac disease, are far more likely to have lower health perceptions than those survivors who do not report symptoms.

The study hypothesis that symptom distress would significantly relate to differences in GHI scores was therefore accepted.

Social Support. At the fourth step, the social support variables, total network and total functional, were added to the equation. These variables had a negligible effect on the R (.7087) and R^2 (.5023) accounting for less than 1% of the variance in GHI scores.

Thus, the study hypothesis that social support scores would not contribute significantly to differences in GHI scores was accepted.

Cognitive Appraisal. At the last step of the equation, the moderating variable cognitive appraisal of arrest/illness impact was entered into the equation. The unique proportion of variance accounted for by this variable was .3%, a nonsignificant finding. The association between cognitive appraisal of arrest/illness impact and GHI scores was negative ($r = -.30$), indicating that survivors who had negative appraisal had lower perceptions of their health.

Thus, the study hypothesis that cognitive appraisal of arrest/illness impact would significantly contribute to differences in GHI scores was rejected.

In summary, with demographics, illness severity, symptom distress, social support and cognitive appraisal of arrest/illness impact in the regression equation, the multiple correlation was .71, a large effect size. In addition, these variables explained 51% of the expected variance in survivor General Health Index scores ($F = 6.57$, $df = 7$, $p < 0.0001$). However, as with the MHI scores, the only variable which was significantly related to GHI scores and which contributed significantly to differences in this measure was symptom distress.

Thus, the major hypothesis that severity of illness, symptom distress and cognitive appraisal of arrest/illness impact would significantly relate to survivor reports of general health perceptions was rejected.

TABLE 33
Results of Multiple Regression Analysis for General Health Perceptions
N = 53

Step/Variables	Multiple R	R^2	Adjusted R^2	R^2 Change	F Change	Significance	Correlation
1. Current Age							.046
Sex	.155	.024	-.015	.024	.62	.543	.149
2. Severity of Illness Group	.288	.083	.027	.059	3.14	.082	-.256
3. Symptom Distress Total	.705	.497	.454	.414	39.46	.000	-.678
4. Total Network Score							.009
Total Functional Score	.709	.502	.437	.006	.26	.773	-.031
5. Cognitive Appraisal	.711	.505	.428	.003	.28	.599	-.300

CHAPTER SIX

DISCUSSION

This study was undertaken to describe the long term recovery status in a sample of patients who had survived one or more sudden cardiac deaths. The major research question answered was, "What are the relationships among selected medical and psychosocial factors and the functional health status of patients who have survived sudden cardiac death?" For this study, functional health status was viewed as a multidimensional concept consisting of both physical and psychological dimensions as well as the survivor's perception of his or her health in general. The major research question posited a relationship between the biopsychosocial characteristics of the survivors and their recovery health status. This supposition was based on a conceptualization of the recovery process following serious illness proposed by Moos and Tsu (1977). These authors postulated that serious physical illness should be understood as a life crisis. The person's cognitive appraisal of this crisis sets forth the tasks of recovery to which various coping strategies can be applied. Further, the individual's cognitive appraisal is influenced by three sets of factors: background and personal characteristics, illness-related factors, and features of their sociocultural environment. All of these factors together determine the outcome of the crisis or physical illness. This conceptualization of the recovery process provided a framework for describing the direction and magnitude of the relationships among the study variables and for determining which of the biopsychosocial characteristics of the survivors

best predict their reports of current physical health, mental health and self-health perception.

In addition, this study described the demographic, clinical, and social support characteristics of the survivors in the sample, as well as their current work status, sexual functioning, reports of mental status changes, and the comparability of their reports of physical functioning, mental health and health perceptions to norms established in a national survey.

The discussion chapter is divided into three sections. The first section addresses the descriptive data on the biopsychosocial characteristics of the survivors and the second, their general recovery status. The third section addresses the major research question and the findings corresponding to the three study hypotheses.

Section I. Biopsychosocial Characteristics of the Survivor

The development of effective in-hospital and community based emergency resuscitation programs has resulted in an increased number of survivors of sudden cardiac death. Previous research indicated that sudden death survivors are most often middle aged men with extensive coronary artery disease. Left ventricular dysfunction is also a common concomitant condition (Josephson et al., 1980; Myerburg et al., 1980; Morody et al., 1983; Trech et al., 1981; Weaver et al., 1976). In addition, preliminary studies of psychosocial adaptation following successful in-hospital resuscitations have shown that survivors have varied outcomes in terms of psychological status, work return, resumption of sexual activity and mental status changes (Dobson et al.,

1971; Druss and Kornfeld, 1967; Dupont et al., 1969; Longstreth, Inui, Cobb and Caposa, 1983; Minuck and Perkins, 1970; Tresh et al., 1981). This study corroborates many of the findings by other investigators and provides additional data for comparison with other survivors of sudden cardiac death.

Personal Characteristics. The demographic findings in this study are generally consistent with previous investigations of sudden death survivors. The mean age (58 ± 11 years) and range of ages (30-79 years) in the sample compare favorably with those reported by Dobson (1971), Tresh (1981), Weaver and colleagues (1976) who reported mean ages between 55 ± 8 years and 58 ± 8 years and ranges of 31-72 years. In contrast, 34% of the study sample were female compared to the 23% reported by Josephson et al. (1980), 19% by Lilberthson et al., (1974), and 5% reported by Dobson (1971). The higher percentage of females in the sample is not significantly different from the percentage of women (29.5%) in the total population of sudden death survivors treated by the Electrophysiology Service at the University of California, San Francisco (UCSF). This finding may simply represent sampling artifact and/or a slightly higher incidence of sudden cardiac death among Bay Area women.

Seventy-four percent of the survivors were married, which is less than the 85% reported by Dobson et al. (1971). However, 34% of the survivors in this study were women, 43% of whom were either widowed or divorced, versus the one female subject in the Dobson study. Thus, the differences in marital status are probably reflective of sample selection.

Educational levels of sudden death survivors have not been previously reported. In the study sample, 70.5% of the subjects had high school, college or graduate education, reflecting a well educated patient group. Lower educational levels did not appear to be a factor in the long term adjustment of this survivor group. Those individuals having less than a high school education while significantly older than the remaining survivors, did not report levels of physical functioning, mental health or self health perceptions different from those survivors with high school, college or graduate training. Nor did lower education levels impact negatively on the overall financial stability evident in this group of survivors. Only two subjects, both women, were financially dependent upon their adult children and only one of these since the occurrence of cardiac arrest.

Ninety-five percent of the survivors in the sample were Caucasian which is consistent with other reports of the high incidence of sudden cardiac death among white middle aged males (Kuller, Lilenfeld, Fisher, 1966; Liberthson, Nagel, Hershman et al., 1974). Thus, the sudden cardiac arrest survivors in this sample are primarily white, male, middle aged, and middle class, a finding consistent with other reports in the literature. The significance of the higher percentage of women in the sample and in the population of patients treated for aborted sudden death at UCSF is undetermined and warrants further investigation.

Illness Related Factors. The clinical findings of survivors in this study closely approximate those reported by other investigators of sudden death survivors. Ventricular fibrillation was the initial documented arrhythmia in 75% of the survivors. This percentage falls between

those reported by Myerburg (1980), Tresh (1981) and their coworkers, who reported ventricular fibrillations as the initial arrhythmia in 62% and 97% of such patients, respectively. Further, while the survivors described in this study demonstrated a wide spectrum of cardiac disease, the predominant diagnosis was coronary artery disease, followed by hypertensive heart disease and cardiomyopathy, a finding consistent with previous research reports (Kuller, Lilenfeld, Fisher et al, 1966; Myerburg, 1980). In addition, the 33% incidence of triple vessel disease ($\geq$ 70% narrowing of the vessel) was the same as that reported by Weaver (1976) and coworkers. However, it was considerably less than the 55% (27 of 49 patients) reported by Tresh (1981).

The extent of left ventricular dysfunction among survivors in this study also paralled previous research findings. Mean ejection fraction (EF) in this study was 44 $\pm$ 16% which compares favorably with those published by Weaver, Myerburg and their coworkers, who reported mean ejection fractions of 39 $\pm$ 18% and 48 $\pm$ .03%, respectively. These latter investigators, as well as Tresh and colleagues (1981) also reported that 30 to 62% of the cardiac death survivors in their samples had good left ventricular function, i.e., EF equal to or greater than 50%. In this study, 36% of the 48 survivors in whom left ventricular function was assessed had ejection fractions equal to or greater than 50%.

Lastly, the finding that 76% of the 51 survivors of cardiac arrest in the sample had inducible ventricular tachycardia during programmed electrical stimulations is similar to the findings reported by Josephson

(1980), Ruskin (1980) and their colleagues, who reported inducible ventricular tachycardias in 60 and 75% of their patient groups respectively. Thus, the clinical findings of the sudden death survivors in this sample mirrors the findings of previous investigators suggesting that the study survivors are not only a representative sample of the UCSF population of sudden death survivors, but also of the total population of sudden death in the United States.

Severity of Illness Index. The Severity of Illness Index, which was developed from the clinical and mortality data of the 180 patients who had been treated at UCSF for aborted sudden death, yielded four factors which were prognostically significant. These factors were age, history of previous myocardial infarction, cardiomyopathy, and the American Heart Association grade III or IV for Congestive Heart Failure at hospital discharge. The factors in this study with the exception of cardiomyopathy had been identified as prognostic in an earlier investigation in which Goldstein, Landis, Leighton, and colleagues (1981) proposed a risk stratification for survivors of out-of-hospital cardiac arrest. The high risk group identified by their classification was characterized as having used digitalis before arrest, experiencing blood urea nitrogen elevation and pulmonary congestion during hospitalization, and having a cardiac arrest classification of primary arrhythmic event. One and two year survival rates for the high risk group was 71% and 55%. The individuals classified as primary arrhythmic event in this schemata had a mean age of 68.5 years and a 71% incidence of previous myocardial infarction. In contrast, those individuals in the low risk group had a mean age of 60.5 years and a

36% incidence of previous myocardial infarction. Thus, both age and previous MI which were identified as significant prognostic indicators in the Severity of Illness Index were subsumed in the classification of primary arrhythmic event.

While the prognostic value of the Severity of Illness Index for identifying cardiac arrest survivors at greatest risk for mortality is still being evaluated, the Index as currently constructed was highly related to the levels of physical functioning reported by the sudden death survivors in the sample (X^2=12.08, df=1, $p < 0.005$). In addition, along with symptom distress and age, this variable accounted for 34% of the variance in physical functioning scores. Therefore, knowledge of the survivor's Severity of Illness rank may provide a valid estimate of long term physical functioning following aborted sudden death.

Symptom Distress. The findings in this study indicate that survivors of sudden cardiac death have significantly more symptom distress, as measured by the McCorkle Symptom Distress Scale, than recovering myocardial infarction patients, but significantly less than lung cancer patients. The more obvious interpretation of this result is that aborted sudden death survivors have more illness severity than do uncomplicated myocardial infarction patients, but less than cancer patients. Indeed, Croog and Levine (1977) in their study of 300 men with first myocardial infarction found that those men who at one year had one or more rehospitalizations reported proportionally more symptoms than did the nonrehospitalized men. However, half of the nonrehospitalized men were also classified as high symptom reporters. The authors concluded that while the absence of rehospitalization might

indicate a more favorable health history for these men, their reports of symptoms implied that they were still involved with the sequelae of the disease.

In contrast, Pennebaker (1982) views symptom reporting as a stable personality disposition as well as a response to situational changes. He describes the high symptom reporter as an anxious, socially insecure female with a generally unhealthy lifestyle who is constantly seeking to please. In this study, there was a significant small to moderate correlation between female sex and symptom distress scores (.29, $p < 0.05$), indicating that the women in the sample were indeed reporting more symptom distress than the male subjects. However, the dispositional aspects of symptom reporting are not necessarily confined to the female sex. Croog and Levine (1977) also reported in their study of 300 men with first myocardial infarction, that there was a significant correlation between the personality self ratings of the men at three months after infarction and their reports of symptomatology at one year. Those men who had described themselves as generally moody, nervous, always being in a hurry or easily depressed reported a greater proportion of symptoms at one year. Thus, the greater symptom reporting in these men may simply be a reflection of their underlying emotional disposition.

Therefore, while it is tempting to interpret the symptom distress scores in this study in terms of illness severity, it is far more likely that the survivor's reports of symptom distress are related to dispositional factors. The findings lend support to this conclusion. First, the correlation between illness severity scores and symptom

distress scores, while positive, is very small (.14). Second, the most frequently reported symptoms in the study in descending order are fatigue, pain frequency, insomnia and change in outlook. These symptoms with the possible exception of pain frequency are often more indicative of psychological strain than physiological changes.

Social and Cultural Factors. The social support total network and total functional scores of the survivors on the Norbeck Social Support Questionnaire (NSSQ) were not significantly different from the scores reported by the normative subjects. These scores indicate that the survivors in this study not only have comparable social networks to the normative subjects, but also perceived the individuals in their networks as providing similar degrees of love, trust and material aid. While it was anticipated that survivor reports of social support might be lower than the normative subjects because of their older mean age (59 ± 11 years versus 35 ± 8 years) and their history of serious illness, the finding that these factors did not significantly effect either the overall extent of the survivors' social networks or perceived support was encouraging.

Reasonable explanations for these findings include the fact that the majority of survivors had lived in their neighborhoods or communities for most of their adult lives and had friends and relatives nearby. Among the survivors the average duration of relationships with members of their social network was five years or more and the average contact with members of the network was monthly to weekly, indicating a stable and moderately active social environment. Donald and Ware (1982) in their study of social well being among 4,500 adults also found moderate

social contact (two to three times a month to weekly) positively associated with emotional ties, defined as feelings of being loved, having a full and complete love life, and only occasional loneliness. The emotional ties variable defined by these authors is not dissimilar from the subscales, affect, affirmation and aid, composing the functional support variable of the NSSQ in that both are reflections of the individual's subjective evaluation of the adequacy of his or her interpersonal relationships.

A second factor which may be contributing to the survivors social support scores is the general physical and socioeconomic independence characterizing this group of patients. Less than 18% (10 of 61 subjects) reported that they had to rely on others for transportation to social or church activities, shopping and/or medical appointments. In addition, of these only four found this dependency on others a major source of stress or frustration in their lives. Overall, the survivors in this study were active and involved. While family events dominated the social activities of those with children or grown children in the area, other activities outside of home and work included church related social and volunteer activities, social clubs organized around specific interests such as card playing, cooking, restoration of old cars, and/or travel. Lastly, only five of the survivors contacted by the investigator refused to participate in the study. The majority of individuals contacted were not only willing but eager to participate. Typically, the subjects stated that if by sharing their experience, others might be helped, then participating was something they wanted to do. This find would seem to indicate that the majority of survivors had a low level of fear about

discussing their own brush with death and an attitude of involvement and concern for others.

The social stability and social activity reported by the survivors in this study are similar to those reported by Brodie (1977) in a study of 75 retirees, 50 years of age or greater. Like the survivors, these subjects had also lived in an area in which the research was conducted for a number of years and had relatives and friends nearby. In addition, their social activities revolved around family events or specific areas of interest and most (75 of 88 contacted) were eager to participate in the investigation. As one gentleman stated, "Here's my chance; its not often somebody asks for your opinion when you get to be my age." (p. 116). An auxillary finding of this study was that perception of health was a predictor of social activity among the retirees, i.e., the better the retiree's perception of health the more social activity and the worse the retiree's perception of health the less social activity ($r = .48$, $p<0.001$).

In contrast, Donald and Ware (1982) found only small though significant correlations between social activity and perceived health status ($r = .15$, $p < 0.05$). While differences in measurement strategies may be responsible for these findings, the authors suggest that some individuals may increase their social activities as a coping mechanism to relieve feelings of being unloved and/or of loneliness. In this study, psychological distress was highly associated with decreases in perceived health status ($r = -.47$, $p < 0.001$) and insignificantly associated with reports of decreased social network and perceived support, $r = -.17$ and $-.13$, respectively. Given the overall social activity levels reported

by the survivors, these findings would seem to indicate that it is quite possible that some survivors were attempting to relieve uncomfortable feelings through social outlets; however, it would also appear these endeavers were not necessarily successful. Further investigation of these relationships is warranted, but are beyond the scope of this study. It is suggested that future research focus on the possible impact of perceived support in terms of affect, affirmation and aid on psychological distress and perceived health status.

Another interesting finding associated with the social support variables in this study were the gender differences in reports of both total network and total functional support scores. While Norbeck, Lindsey and Carrieri (1983) did not find significant gender differences in their normative sample, male sex in this study was significantly associated with lower network ($r = -.31$, $p < 0.01$) and total functional support scores ($r = -.34$, $p < 0.01$). Thus, the male survivors reported not only smaller social networks than women survivors, but perceived the individuals in their networks as providing less love, trust and material aid.

Reasonable explanations for this finding include the fact that male subjects in the normative study did in fact report lower total network and functional support scores than the female subjects. However, the normative sample was only one-third male while the study sample is two-thirds male. It is quite possible the nonsignificant trend for males to report lower scores in the normative study was a function of sample size while it is equally possible that the difference in gender reports of social support in this study are exaggerated by the preponderance of

male subjects in the sample. However, these findings may also indicate a true gender difference in both size of social network and perceived support.

Another explanation for these differences may be associated with the interaction effect of age and employment status. While there is no definitive evidence at this time that older age is associated with lower network and functional support scores, Schaefer, Coyne and Lazarus (1982) have reported that in a cohort of individuals aged 45 - 64, older subjects reported lower emotional support scores than younger subjects. However, the authors attributed this finding to decreases in co-worker support among men who had retired and to decreases in support from friends among older women. In this study, 40% (16 of 40 subjects) of the men were retired and an additional 23% (9 of 40 subjects) had been disabled by their illness and were no longer working at the time of the study. Thus, it is very likely that male survivors may have lost a significant portion of their social networks and their perceived functional support when they retired or had to stop working. To what extent the gender difference in social support scores in this study are related to employment status, older age, sampling artifact or are in fact true gender differences is undetermined, but these potential relationships warrant further study.

Cognitive Appraisal. According to the Crisis of Illness model, the primary psychological mediator of recovery outcomes following serious illness or injury is the individual's cognitive appraisal of the event. This model implicitly hypothesizes that both positive and adverse reactions following serious illness are mediated by the individual's

subjective evaluation of the illness event. It would therefore be expected that the current behavioral responses of the sudden cardiac death survivors in this study would be significantly related to their appraisals of the impact of the cardiac arrest/illness event. In this study, three categories of cognitive appraisal of the impact of the arrest/illness event were developed from the interview data: benign/positive, negative and mixed. Fifteen survivors were categorized as having benign/positive appraisals, i.e., those individuals who assessed the impact of the cardiac arrest/illness experiences as having little if any effect or as having a positive effect on their current well being. Nineteen survivors had negative appraisals of impact of this event, i.e., they assessed the impact of the event in terms of real or perceived losses and/or as an ongoing threat to their well being. Twenty-five subjects had mixed appraisals, i.e., their assessments of the impact of the cardiac arrest/illness event had elements of both positive and negative appraisals.

The findings of this study support the hypothesis implied in the Crisis of Illness model, i.e., cognitive processes mediate both positive and adverse reactions following serious illness. Moderately strong and highly significant correlations were found between the subjects, cognitive appraisals of the impact of the cardiac arrest/illness experience and their reports of mental health, psychological well being and psychological distress. These associations were also in the expected directions. Negative appraisals were related to significantly lower Mental Health Index scores and positively associated with higher psychological distress scores, while positive appraisals were positively

associated with higher Mental Health Index scores and higher psychological well being scores. Mixed appraisals were associated with scores falling between the two extremes. In addition, moderate and significant correlations were found between cognitive appraisal and survivor reports of self-health perceptions and these associations were in the expected directions. These findings support the linkages between cognitive appraisal and perceived psychological health and general health states hypothesized in the Crisis of Illness model. These findings are not merely theoretical, rather these findings provide a direction for developing preventive and/or restorative intervention strategies. If mixed and more importantly, negative cognitive appraisals of illness can be modified or changed, the subsequent changes in health status might be great, yielding both individual and social benefits.

The weak nonsignificant associations between cognitive appraisal of arrest/illness impact and survivor reports of physical functioning was not totally unexpected. In this study, severity of illness was significantly related to survivor reports of physical functioning ($r=-.34$) but was only narrowly associated with general health perceptions ($r=-.25$) and it was not associated with any of the mental health measures. These findings are similar to those of Garrity and Klein (1975) who found that measures of behavior and severity of illness during the acute phase of the myocardial infarction were unrelated, yet each contributed independently to six month mortality. However, the results differ from the findings of Cassem and Hackett (1977) and Stern et al. (1977) who found early low level exercise programs highly

associated with improved psychological status during recovery from myocardial infarction. In contrast, a more recent report by Stern and Cleary (1982) indicates that a long term prescribed program of exercise did not provide additional long term psychological benefits.

There are two alternative explanations for the lack of association between the survivors' cognitive appraisals of arrest/illness impact and their reports of current physical functioning. First, it is quite possible as suggested by the studies of Cassem and Hackett and Stern and colleagues that the relationship between these two variables is greatest during early recovery (less than six months) when the effects of physical deconditioning are most apparent. Since the survivors of cardiac arrest in this study were only contacted if it had been six months or more since their illness event, the deconditioning factor was probably not apparent. Secondly, there may be no direct association between cognitive appraisal of arrest/illness and subsequent levels of physical functioning. Rather the relationship may be an indirect one. Both survivor appraisals of arrest/illness impact and reports of current physical functioning in this study are moderately and significantly associated with their reports of symptom distress, $r = .43$, ($p < 0.001$) and $r = -.34$, ($p < 0.001$), respectively. This finding indicates that higher levels of symptom distress are associated with negative appraisals of arrest/illness impact and poorer physical functioning. Mechanic (1977) has postulated that stressful life changes, such as the occurrence of life threatening illness, can cause individuals to become bored and discontented enough to attribute their psychological malaise to illness symptoms. These symptoms, defined by the individuals as

illness, trigger illness behavior, such as seeking medical advice, taking of medication or in the case of the cardiac patient, precipitate cardiac invalidism, i.e., dependency, helplessness and restriction of activity often to an extent not justified by the underlying medical disability (Krantz, 1980).

Thus, some survivors with few if any limitations in physical functioning may assess the impact of their arrest/illness experience negatively because of perceived symptomatology related to the strain inherent in a significant life change, while others who report poor physical functioning in association with symptom distress may be responding to both psychological and physical factors as suggested by Dobson and coworkers (1971).

Section II. Recovery Status in the Study Sample

Work Return. Wenger (1981) in a recent review of factors affecting vocational rehabilitation following myocardial infarction and/or coronary bypass surgery noted that recent work status and type of occupation were the most influential factors in the decision whether to return to work. Other factors which may negatively influence the decision to return to work were older age, anxiety and depression, symptoms particularly with effort such as pain or dyspnea and the potential financial, social and compensation benefits associated with retirement or disability policies provided by unions, business and/or government agencies.

In this study, work return following initial cardiac arrest was 73% (30 of 41 subjects), a figure which includes full time homemakers. If

full time homemakers are removed from the computation, work return decreases to 61%. This latter return rate is substantially less than the current 80-85% predicted rate for individuals with uncomplicated myocardial infarction (Wenger, 1981), and the 78% (14 of 18 subjects) return rate reported by Dobson and colleagues (1971) for individuals having myocardial infarction complicated by cardiac arrest. The decision whether to return to work following initial aborted sudden death in this study was largely influenced by symptoms with exercise presumably related to decreased left ventricular function, recurring sudden death, worsening of their cardiomyopathy or both. Other factors negatively influencing initial work return were impairment of intellectual function subsequent to resuscitation, other chronic diseases with or without concomitant psychological distress and proximity to normal retirement age. Type of occupation while not specifically addressed in this study was a factor contributing to disability retirement in three of these subjects.

After a mean follow-up time of 21 ± 8 months, 62% (16 of 26 subjects) of those subjects who returned to work either full time or part time following aborted sudden death are still actively employed. This finding is similar to that of Tresh and coworkers (1981) who reported after a mean follow-up of 36 months, 59% of their patients treated for sudden cardiac death were actively employed. As in the Tresh study, the majority of survivors in this study who are no longer working following an initial work return have experienced recurrent aborted sudden death, a decrease in functional class, or both. Overall, symptomatology and decreased exercise tolerance due to poor

cardiac function were the primary factors affecting initial work return and subsequent employment status in 34% (14 of 41 subjects) of the survivors who had been gainfully employed or were full time homemakers at the time of the initial cardiac arrest event.

These factors differ somewhat from those reviewed by Wenger (1981), but are consistent with the medical data on survivors of sudden cardiac death which indicate that there is a high incidence of left ventricular dysfunction in this patient population. In addition, patients with significant left ventricular dysfunction (EF < 40) as well as those with nonsignificant coronary artery disease (70% narrowing of a coronary vessel) are also less likely to receive surgical therapy for ischemic arrhythmic events (Tresh et al., 1981). Thus, the descriptive data in this study suggest that vocational adjustment following aborted sudden cardiac death is more influenced by the severity of the individual's underlying cardiac disease than older age, psychological factors or the financial, social, and compensation benefits associated with retirement or disability practices. However, it is also likely that these latter factors may have also contributed to the decision whether or not to return to work in some patients. In future research, the contribution of these factors to vocational adjustment, as well as, the factors influencing work return among women survivors, 50% of whom were disabled in this study, need to be assessed and clarified.

Resumption of Sexual Activity. Significant reductions in sexual activity following myocardial infarction, despite the development of sexual counseling within the framework of cardiac rehabilitation programs, have been reported by several investigators (Block, Maeder, Haissly, 1975;

Greene, 1975; Mann, Yates, and Raftery, 1981). Cessation and/or reduction in sexual activity is most often attributed to decreased libido, impotence, symptoms such as fatigue or angina, depression, spousal anxiety, and fear of relapse or sudden death. These reasons for stopping or decreasing sexual activity are apparently also significant in this study of survivors of sudden cardiac death. Of the 37 survivors who indicated they were sexually active at the time of their cardiac arrest, only 29 continue to have sexual relations and 16 of these reported sexual activity was somewhat to significantly decreased. As noted by others, the most common reasons for decreases in sexual activity or for cessation of activity were symptoms, loss of libido, impotency, spousal anxiety, or a combination of these.

In this study, older subjects were more likely to cease sexual activity following their sudden death event. To what extent these individuals were sexually active prior to their illness was not always clear. However, a common myth exists which implies as people age, they become less sexual. While it was not common, several subjects referred to their age when asked about changes in sexual patterns. The inference projected was that such behavior was improper or at least a moot point at their age.

Another finding in this study was the relatively large (39%) group of subjects who were sexually inactive prior to their cardiac arrest. While this may reflect the presence of cardiac symptoms in some, Mann and colleagues (1981) also suggest that coronary events may occur more commonly in those less sexually active. Stern and coworkers (1977) have reported an increase in sudden cardiac death following myocardial

infarction in sexually inactive women. In this study, a high proportion of the women survivors were sexually inactive prior to the cardiac arrest event (14 of 21) although only one additional woman became inactive following the event. Green (1975) points out that more female coronary patients are in an age group where sexual activity is supposedly less, although he acknowledged this point is current in dispute.

The relationship of antiarrhythmic drug therapy to the occurrence of impotency is somewhat difficult to disentangle since the majority of these subjects were also receiving diuretics and vasodilator therapy. Currently, there is no documentation in the literature that either procainamide or amiodarone have negative effects on sexual potency.

The cause of sexual dysfunction in individuals with cardiac disease remains poorly understood. While there are data suggesting a strong relationship between lack of adequate information, fear of relapse, depression, symptomatology and the development of sexual dysfunctions in both men and women with cardiac disease, it remains unclear why many patients significantly reduce or cease sexual activity despite assurances and rehabilitation programs that stress sex is not only permissable but favorably influences psychosocial recovery.

Mental Status Changes. Successful resuscitation of individuals sustaining in-hospital or out-of-hospital cardiac arrest is increasingly common. However, while claims of excellent neurological function in survivors is fairly common, more recent investigations indicate that few of the long-term survivors of cardiac arrest are without some deficits on careful neurological examination (Earnest, Yarnell, Merrill, Knapp,

1980). In a retrospective analysis of 459 consecutive patients resuscitated and admitted to a teaching hospital, Longstreth, Inui, Cobb and Copass (1983) related the occurrence of neurological deficits to the time of awakening, defined as the patient following commands or having comprehensible speech. In their study, only 91 of the 279 patients who survived were identified as having persistent neurologic deficits from the data in medical and nursing progress notes. Yet, Earnest and colleagues (1980) who employed neuropsychological tests, in a three year follow-up study of 20 living sudden death survivors, found that only 2 of 17 patients who were able to complete the tests scored within normal ranges on at least three of the four tests. A more recent study by Nielsen, Gram, Rasmussen and coworkers, (1983), of 13 cardiac survivors one to three years after the incident reported seven patients had symptoms of mild to moderate and moderate to severe dementia as measured by standardized neuropsychological tests.

In the present study, 25 subjects reported minor to substantial changes in cognitive function since the occurrence of one or more cardiac arrest events. While this finding is based on self-reports during interview and therefore subject to bias, the fact that 41% of the subjects expressed an awareness of changes in memory or cognition is noteworthy. Nielsen and coworkers (1983) found in their study that there was a general tendency of the cardiac arrest survivors during the psychological interview to deny symptoms of mental status changes. However, since no standardized neuropsychological tests were employed in this study, nor were any attempts made to control for current cardiac status, the results of this study should be viewed

speculatively. That is, while the more profound cognitive deficits identified by the survivors, i.e., letter reversal, loss of previously learned manual or cognitive skills, personality changes, may represent somewhat more objective findings, the reports of absentmindedness and difficulties in concentration may be related to other factors such as generalized cerebral atherosclerotic changes or depression.

Reich, Registein, Murawski and coworkers (1983) have recently reported on the difficulty of differentiating between the symptoms of mild organic brain dysfunction and reactive depression in survivors of cardiac arrest. These authors presented a series of six case studies which elucidate this diagnostic problem. Each of the subjects in this study had been diagnosed as depressed following one or more cardiac arrests although the symptoms were chronic, unresponsive to treatment, and independent of the survivor's cardiac status. As noted by the authors, reactive depression following serious illness tends to be episodic and to lift as the patient's physical condition improves. Four of these subjects eventually underwent neuropsychological testing which showed that they were functioning below their premorbid intellectual capacities. However, the results of these tests indicated that the patients despite substantive cognitive losses still scored within the normal IQ ranges. Thus, the cognitive losses sustained by these individuals would probably go unnoticed by persons who had not known the patients before cardiac arrest.

Since most medical and nursing personnel are unfamiliar with the premorbid states of most patients, it is not surprising that subtle changes in personality or cognition are either missed or attributed to

depression. In approximately one third of the interviews in this study, the spouse and/or family member was present. It was not uncommon for these individuals either to substantiate the responses of the survivors regarding memory or concentration changes or on occasion give specific examples of behavior they found personally frustrating. Thus, family members are probably the best source of information if mental status changes are suspected.

Despite the mild to more substantive cognitive losses reported by the subjects in this study, it should be noted that of the 15 subjects who were working full or part time at the time of cardiac arrest, five (33%) are still working and one is a homemaker and part time graduate school student. Two, however, have experienced significant employment difficulties and are currently unemployed. In addition, all but two subjects have resumed independent social activities. Hence, while there is evidence of previously unreported cognitive deficits in this sample of cardiac arrest survivors, these losses are not overly problematic for the majority of the survivors or their families.

Yet, the findings of this study also indicate the need for more complete neuropsychological evaluations of cardiac arrest survivors. With an ever increasing number of successful sudden death resuscitations, the potential for gross and subtle neurologic sequelae increases, as does the potential for attendant family and work related problems. To what extent the survivor and his or her family are able to cope and adjust to the mental status changes may be dependent upon their understanding of the underlying problem.

Functional Health Status. The findings in this study indicate that survivors of sudden cardiac death are significantly more limited in their capacity to perform moderate to vigorous activities as measured by the Personal Functioning Index (PFI) than are individuals in the general population. Given the known incidence of left ventricular dysfunction (54%) in the survivor group, this finding is not unexpected. Indeed, 51% of the survivors (30 of 59 subjects) reported that the main cause for decreases in their capacity to perform moderate and/or vigorous activities was due to shortness of breath, enlarged heart or heart failure. A second factor which may be contributing to lower physical functioning levels in the survivor group is age. Only 12% of the normative sample was 50 years of age or older while 84% of the survivors were 50 years old or older and of these 18% (9 of 51 subjects) were between 70 and 79 years of age. Lastly, while several of the retired subjects reported that they walked two to three miles a day, the majority of the survivors had no regular programs of exercise or exercised only sporatically. In addition, only two subjects reported having attended a formal cardiac rehabilitation program. This finding is somewhat surprising given the emphasis in the cardiac rehabilitation literature on the beneficial effects of even low level exercise on subsequent recovery outcomes. There is a high incidence of left ventricular dysfunction in the survivors in this study, however, Kavanagh, Shepherd, Chrisholm and their coworkers (1979) have shown that patients with aneurysm or cardiac enlargement did not have any greater risk for complications while participating in an individually prescribed activity program than those patients who were treated more conservatively.

Survivor perceptions of their health were also significantly less favorable than those reported by the normative population. Less favorable rating of health, as measured by the General Health Index, have been associated with reports of either poor physical or mental health (Davies and Ware, 1981). In this study, less favorable perceptions of health were significantly associated with psychological distress scores and lower physical functioning scores. While it was not directly assessed in this study, it is very likely that those survivors reporting poor physical functioning and high psychological distress had the least favorable perceptions of their health. Thus, the data in this study replicate the findings of others that perceived health is significantly related to aspects of both physical and mental health.

The finding that survivors of sudden cardiac death in this study reported mental health and psychological well being scores consistent with those reported by individuals in the general population was unexpected. While it is possible that the Mental Health Index is not sensitive enough to pick up affective states in a patient versus general population sample, this explanation is very unlikely given the extensive validity and reliability testing this instrument has undergone. Rather, it would appear that as a group, the survivors in this study have achieved a level of psychological adjustment similar to that of the population at large. Adams and Lindeman (1974) and Strauss and Glaser (1975) both suggest that psychological adjustment among chronically ill and/or disabled individuals is dependent upon the individual's and his or her family's ability to come to terms with permanent and/or progressively lower levels of normalcy. That is,

living as normal a life as possible despite symptoms and other manifestations of the disease process. Strauss and Glaser further state that normalizing depends upon the intrusiveness of the medical regimens and the knowledge others have about the disease and of its fatal potential. For sudden cardiac death survivors and their families this may mean adapting to changes in physical capacity, cognition, and work status, living with the fear of recurrence and potential for premature death, and accepting various degrees of dependency.

The results of this study indicate that the ability to normalize and attain a positive level of psychological adjustment is related to the survivors' age. Older subjects who comprised 64% of the study sample tended to report high levels of psychological well being while younger subjects tended to report significant levels of psychological distress. This finding is consistent with those of Rosen and Bibring (1966) and Rhodda, Miller and Bruhn (1971) who found that psychological reactions among older men having myocardial infarction was less than that of men in younger age groups. Mages and Mendelsohn (1979) have reported similar age group differences among cancer patients. Historically, viewing psychosocial processes within the context of developmental stage has been largely limited to the study of children. Only recently has life stage been recognized as a significant factor affecting adult responses following life-threatening illness (Murray and Zentner, 1975).

According to developmental theory, the developmental task of mature years is ego integrity versus dispair (Erickson, 1963). That is, the individual accepts his or her life and the life-style he or she has created and would wish for none other versus believing that life has

not been worth the struggle and/or wanting another chance to redo life. As the individual ages several adaptations must take place in order for the person to establish ego integrity. These include seeing oneself as a worthwhile person because of who one is rather than occupational or social status; accepting changes in body image due to decreases in physical strength and capacity to function; and accepting the inevitability of death (Murray and Zentner, 1975).

Larson (1978) has noticed that among Americans over sixty, psychological well being defined as the individual's day to day effective state, is strongly influenced by their health, followed by socioeconomic factors and the degree of their social interaction. While there was no difference in illness severity between older and younger survivors in this study, older survivors reported significantly less symptom distress than younger survivors. Several factors may be associated with this finding. Older survivors may in fact be less aware of physical symptoms because of neurological changes associated with aging, i.e., (decreased pain perception) or they may be attributing the source of symptoms to other causes (old age) and therefore not perceive symptoms as distressing or out of the ordinary. Another factor that may be affecting symptom reporting is that older survivors while remaining physically active, i.e., walking two to three miles per day, have learned to pace themselves so that symptoms are less likely to occur. This latter possibility is congruent with the hypotheses proposed by Strauss and Glaser (1975) that symptom control is a learned process. That is, the individual can minimize the occurrence of symptoms by recognizing when they occur, how long they last, and

whether he or she can prevent or minimize the occurrence and intensity of symptoms by certain actions or the avoidance of particular actions.

In addition, the majority of older subjects in this study while retired and living on fixed incomes were homeowners. The cardiac arrest/illness experience had not been a significant financial stress for these individuals either because of Medicare supplements or because of individually owned or retirement health benefits. Although a few subjects found the cost of medication and physician visits a strain on their limited financial resources, most reported that these costs were manageable and took the attitude that health care costs were a priority.

Lastly, older individuals in this study tended to report higher total network and total functional support scores than younger subjects. In addition, most had been long time residents in their communities and had relatives and friends nearby whom they saw on a fairly regular basis. Retired subjects were also more likely to report membership in social clubs and/or church related activities. Thus, the mental health and psychological well being scores reported by the older survivors in this study would indicate that overall they had made many of the adjustments required to establish ego integrity and these adjustments had been facilitated by a relatively stable health status, comfortable economic means and the presence of an ample and supportive social network.

The developmental crisis of middle age is generativity versus self-absorption and stagnation (Erickson, 1963). Generativity is a concern about providing for others while self-absorption is characterized by both physical and psycological self-doubt. Middle age

is a period when introspection or taking stock of one's accomplishments, failures and the limitations of one's future prospects begins. Careers, family, and position in life are usually firmly established.

In contrast to older survivors of sudden cardiac death, middle aged adults showed the greatest variation in response to the event. Some tended to take this event in stride while others were emotionally devastated by their illness. This finding is also consistent with that of Rosen and Bibring (1966) and Mages and Mendelsoln (1979) who both observed the greatest variation of response in this age group to the occurrence of myocardial infarction and cancer respectively. Concerns in this age group of survivors centered around maintaining economic stability and around family needs, i.e., being there for growing children or preparing spouses to take over financial management if necessary. Even among those survivors who returned to work and resumed many or all of their former social activities there was an underlying resentment about the potential implications of having heart disease for future well being.

Young adults in this study (5 of 61 subjects) had the greatest degree of upset. These individuals had just begun the process of establishing careers and families and the occurrence of cardiac arrest significantly effected their self-concept as physically strong and capable individuals. All of these subjects were married; three survivors stated they had become closer to their spouses as the result of the cardiac arrest but two couples were experiencing significant difficulties. In these latter two cases, the husbands of the survivors had become overly protective and both women were reacting with anger and

frustration to the restrictions placed on their activities. However, despite the significant level of upset among these survivors, three of them also expressed the view that the arrest/illness experience had led them to appreciate what was important in life, i.e., home, family and had enabled them to focus more on what they wanted to achieve for themselves and/or their families.

Thus, because of the various developmental tasks of particular age groups, it apparently takes younger persons longer to integrate and accept the seriousness of their illness and to adopt normalcy, then older persons who have resolved many of their conflicts over body image changes associated with aging and who, by virtue of their age, have faced their own mortality.

Section III. Relationship Among the Variables

In accordance with the conceptual framework of this study, it was hypothesized that survivor reports of physical functioning would be significantly related to their age, severity of illness group and symptom distress scores. Further, it was hypothesized that age, sex, symptom distress, social support (network and functional) and cognitive appraisal of arrest/illness impact would be significantly related to survivor reports of mental health status. Lastly, it was hypothesized that severity of illness, symptom distress and cognitive appraisal of arrest/illness impact would be significantly related to survivor reports of self-health perceptions. These expectations were not totally borne out by the data analysis. While age, severity of illness group and symptom distress scores significantly predicted poor or better physical functioning, only symptom distress proved to be a significant predictor of mental health status and general health perceptions.

The finding that symptoms had an effect on both psychological status and perceived health is not without precedent. Croog and Levine (1977) found in 300 men with first myocardial infarction that symptomatology was highly associated with reports of anxiety and depression one year after the event. Dobson and collegues (1971) also found that cardiac arrest survivors reporting symptoms associated with heart failure, angina or other concurrent chronic diseases had significantly higher anxiety scores as measured by the Taylor Manifest Anxiety Scale than those not reporting symptoms. Further, Garrity, Somes and Marx (1978) found significant correlations between perceived health and psychophysiological symptoms as measured by the Langer Index, and recent life changes. However, most of the variance in perceived health was accounted for by the Langer index followed by recent life change. Thus, if symptoms occur they are likely to be defined as illness by the individual even though as noted by Pennebaker (1982) the perception of physiologic changes is error prone and highly related to the dispositional characteristics of the symptom reporter.

There are two alternative explanations for these findings. The first possible explanations for the relationship of symptom distress to reports of mental health and general health perceptions is that they are all manifestations of coping with a life event with ambigious overtones, i.e., the cardiac arrest/illness event was outside the survivor's control and prevention of a second event may not be totally within their control. Coping as noted by Lazarus (1966, 1978) is a process which may challenge the individual's ability to adapt, thus causing both

emotional and physiological strain. Cassidy, (1977) in a study of 40 adult females, has shown that reports of physical symptoms are more likely to occur on days of greater than average adjustment as measured by the Daily Events Checklist. The physiologic responses to emotional strain are similar to those associated with decreases in cardiac function, e.g., both are mediated by the sympathetic nervous system. Thus, if individuals associate the physiologic changes attendant with emotional strain to deleterious changes in their cardiac function then they are more likely to become anxious or discouraged and perceive their health less favorably.

The second plausible explanation is proposed by Mechanic (1977). In this author's view, individuals undergoing stressful life changes including serious illness tend to become unhappy and discontented enough to attribute their symptoms of psychological malaise to illness symptoms. That is, the fatigue associated with boredom or the insomnia that occurs after a three hour nap is associated with the underlying physical problem and triggers illness behaviors, i.e., seeking medical assurances that all is well, avoiding some or many ordinary responsibilities. In this scheme, the psychological distress precedes symptom reporting which in turn decreases perceptions of health.

The directions of the correlations found in this study would support either one of these explanations. A prospective study in which acute and frequent follow-up evaluations of symptom distress, mental health and perceived health might help to clarify these relationships. The results of this study seem to raise more questions about the relationships of specific variables to recovery outcomes following sudden

death then they seem to answer. It is highly likely these questions result from the fact that some of the relationships implied in the Crisis of Physical Illness model used to develop the conceptual framework of this study, as well as, some of its underlying assumptions were not supported by the study results. The initial assumption of this conceptual model states that serious illness or injury represents a life crisis. The findings of this study clearly indicate that the occurrence of cardiac arrest for the majority of the survivors was indeed an emotionally hazardous period which was characterized by real and perceived changes in themselves, their relationship with others, and/or their roles in life. However, approximately 25% of the survivors did not view the cardiac arrest as a significant life event. While this finding is similar to that reported by Gruen (1971) in his psychological study of 70 myocardial infarction patients, it does raise the question of the generalizability of this assumption. Clearly the results of this study would indicate that older individuals who have experienced a number of life crises and who have come to grips with their own mortality are a subset of survivors whose needs for interventions during recovery might be quite different from those of younger survivors. That is, more appropriate interventions for these survivors may be directed toward reestablishing physical independence through low level exercise programs and/or assessing adequacy of their social support systems in order to prevent unnecessary social isolation.

In addition, while the relationships among the determining factors (personal, illness-related, social cultural environmental), cognitive appraisals of arrest/illness impact and functional health status outcomes

generally support the assumption that cognitive appraisal is the primary psychological mediator of recovery outcomes, it should be noted that this variable was only significantly related to psychological status and perceived health status. The relationship of appraisal of arrest/illness impact to physical health as measured in this study was very small and nonsignificant. While it is quite possible that some subjects are less physically active because of symptoms which leads them to evaluate the impact of the arrest/illness in negative terms, this indirect relationship is not hypothesized by the model. Rather there appears to be a direct relationship between illness related factors (severity of illness, symptom distress) and physical health with illness severity being the strongest predictor of this health outcome.

Another relationship that needs to be reassessed is between social support and mental health status. While it is highly unlikely that this variable is related to either physical health or significantly associated with perceived health (Donald and Ware, 1982), the lack of a significant relationship with the mental health status in this study brings into question whether the measures used to assess this relationship were adequate. Norbeck, Lindsey and Carrieri (1983) found that the subscale measures for both the total functional and total network social support variables significantly accounted for more of the variance in negative mood state as measured by the Profile of Moods State than did the variables themselves. It is therefore likely that any direct or buffering effects of social support on the survivors reports of mental health were diluted by using the summed variables instead of the subscale measures.

Lastly, the relationship of symptom distress to health status outcomes following aborted sudden death needs to be clarified. In future studies a measure of current stress such as the Daily Events Checklist (Cassidy, 1977) or the Daily Hassels Scale developed by the Lazarus group might be helpful in disentangling the factors underlying the occurrence of symptoms. If in fact symptoms are being perceived because of adaptational stresses, interventions can be devised which will aid the individual in identifying when and under what circumstances symptoms occur and actions can be used to relieve both the symptom and the adaptational stress.

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Appendix A

Letter to Patients

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

BERKELEY • DAVIS • IRVINE • LOS ANGELES • RIVERSIDE • SAN DIEGO • SAN FRANCISCO SANTA BARBARA • SANTA CRUZ

SCHOOL OF MEDICINE
DEPARTMENT OF MEDICINE

SAN FRANCISCO, CALIFORNIA 94143

Dear

Thank you for consenting to participate in the long-term recovery study of patients who have been resuscitated because of heart rhythm disorders. As I mentioned to you in our phone conversation, the study consists of an interview, during which I will ask you questions about your illness and any changes that may have occurred in your life as a result of it, and the completion of three questionnaires. Two of the questionnaires deal with aspects of your current health, i.e. symptoms if any, your physical activities and any limitations you may have, your mood for the past month and how you currently view your health status. The third questionnaire asks about the kind of support you have received from others in your life.

I have enclosed two copies of the consent form for participation in this study and ask that you read them carefully. I will be happy to answer any questions you may have during our appointment. If you wish to contact me sooner than that, please call me at 415-666-1035. The date and time of our appointment is listed below.

Again, thank you for your assistance in helping us to determine ways in which we can be of greater service to patients.

Sincerely,

Mary Jane Sauve, R.N., M.S.
Clinical Research Associate

MJS:lw

Appendix B

Consent Form

University of California, San Francisco

Consent To Be A Research Subject

Mary Jane Sauve, R.N., M.S. and Melvin Scheinman, M.D., are conducting a study to learn about both the positive and stressful things that may have happened to patients like me who have experienced a serious heart rhythm disorder, requiring resuscitation. In general, they would like to know about my present health and any limitations I might have, how I feel about my illness and its consequences on my life. They have invited me to participate in this study.

Participation in research is completely voluntary. I am free to participate, or to withdraw from the study at any time without jeopardy to my medical or nursing care.

If I agree to be in this study, the following will occur.

1. I will be interviewed for about one hour at a time convenient to me. I will be asked questions relative to my illness experience, such as, what I thought about and/or felt when I first learned I had had a serious heart rhythm disorder, how my life has or has not changed since my illness.

2. During the interview, I will complete two questionnaires. One questionnaire concerns the kind of symptoms I may be experiencing and how much they bother me. The second questionnaire concerns the kind of support I have received from others in my life.

3. During the week following the interview, I will complete an additional questionnaire and mail it in a self-addressed, stamped envelope to the investigator. This questionnaire asks about my physical activities and any limitations I might have, my mood for the past month and my perceptions fo my current health status. It will take me approximately 30 to 45 minutes to complete this questionnaire.

The interview will be tape recorded only if I give my consent to do so. If any of the interview questions are uncomfortable for me to answer, I don't have to answer them. In addition, if I feel troubled or upset after discussing these events or believe it would be helpful for me to discuss them further, I have the options of talking about them at the completion of the interview, joining a group of other patients who have had a serious heart disorder like mine to discuss these feelings or I can request individual counseling.

My name as well as all the information I give during the interview or on the questionnaire will be given a code number. The list of matching names and code numbers will be kept separately in a locked file box so that my confidentiality will be protected as much as possible under the law. To further protect my confidentiality, the following precautions will also be taken:

1. If the interview is tape recorded, the tapes will be kept in a locked file prior to transcription and then will be destroyed.

2. All the information I give will be kept in a locked file cabinet under the code number assigned my name.

3. No information that discloses my identity in any way will be given to any person unless I request its release in writing.

This information was explained by Mary Jane Sauve, R.N., M.S. If at any time I have any questions about the study, I may call her at 666-5272 or 666-1035.

I have been given a copy of the consent form and Experimental Bill of Rights.

Date_____ Name (Signature)_____

UNIVERSITY OF CALIFORNIA, SAN FRANCISCO

EXPERIMENTAL SUBJECT'S BILL OF RIGHTS

The rights below are the rights of every person who is asked to be in a research study. As an experimental subject I have the following rights:

1) **To be told what the study is trying to find out,**

2) **To be told what will happen to me and whether any of the procedures, drugs, or devices is different from what would be used in standard practice,**

3) **To be told about the frequent and/or important risks, side effects or discomforts of the things that will happen to me for research purposes,**

4) **To be told if I can expect any benefit from participating and, if so, what the benefit might be,**

5) **To be told the other choices I have and how they may be better or worse than being in the study,**

6) **To be allowed to ask any questions concerning the study both before agreeing to be involved and during the course of the study,**

7) **To be told what sort of medical treatment is available if any complications arise,**

8) **To refuse to participate at all or to change my mind about participation after the study is started. This decision will not affect my right to receive the care I would receive if I were not in the study.**

9) **To receive a copy of the signed and dated consent form,**

10) **To be free of pressure when considering whether I wish to agree to be in the study.**

If I have other questions I should ask the researcher or the research assistant. In addition, I may contact the Committee on Human Research, which is concerned with protection of volunteers in research projects. I may reach the committee office by calling: (415) 666-1814 from 8:00 AM to 5:00 PM, Monday to Friday, or by writing to the Committee on Human Research, University of California, San Francisco, CA 94143.

Call X1814 for information on translations.

Appendix C

Interview Schedule

IDENTIFICATION NUMBER: _____

INTERVIEW SITE: ___Home ___Office ___Other:_____

BASELINE DATA:

1. DATE OF BIRTH: _____ _____ _____ Age in Years: _____
   Month Day Year

2. SEX: _____

3. MARITAL STATUS: 1 = Single, 2 = Married, 3 = Widowed,
   4 = Separated/Divorced

4. RACE: 1 = White, 2 = Black, 3 = Oriental, 4 = Other _____

5. EDUCATION:

   1 = 8th Grade or Less

   2 = Some High School

   3 = High School Graduate

   4 = Some College/Vocational Training

   5 = College Graduate

   6 = Post Graduate/Professional

6. LIVING SITUATION:

   1 = Alone

   2 = With Spouse/Partner

   3 = With Spouse/Children

   4 = Family Members: _____

   5 = Other: _____

7. TYPE RESIDENCE:

1 = Private Home

2 = Apartment

3 = Hotel

4 = Retirement Residence

5 = Other: _____

Recovery Interview

We are interested in knowing about both the positive and stressful things that happen to people who have experienced a serious heart rhythm disorder requiring resuscitation. In general, we would like to know what you think and feel about your illness experience, whether it has changed any of your activities or your relationships with others and how you have handled some of the stressful situations that may have occurred.

The following questions are meant to guide the interview. They may or may not be presented in the order below. It is also possible, that some questions may not be appropriate in a given situation.

A. Reactions to diagnosis:

1. Tell me generally, what happened on the day your heart (first) fibrillated? (A complete story of the event will be sought).

2. When were you first aware of the fact that your heart had fibrillated? Who informed you of it?

3. How did it make you feel?

4. What happened, if anything, to change how you feel about the situation?

5. Is there anything else I should know about that my questions haven't covered.

B. Relationships with spouse/partner, family, friends, work associates:

1. Has your relationship with your spouse/partner changed in any way since your illness?

a. Spend as much time together?

b. Things you can no longer do around house? Who does them now?

c. Able to share things with each other?

d. Sleep in same room?

e. Any changes in sexual patterns?

2. Has your relationship with other family members changed in any way since your illness?

a. Spend as much time together?

b. Able to share things with each other?

c. Children's response to your illness?

3. Has your relationships with your friends changed in any way since your illness?

a. See the same friends?

b. Spend as much time together? How often?

c. Are there friends you'd like to see but haven't for awhile?

d. How do you keep in touch with friends? How often do you visit?

e. In general, how well are you getting along with other people these days? Better, about the same, not as well?

f. Do you belong to any groups or organizations such as church groups, clubs or lodges? How active?

g. Do you attend any religious services on a regular basis? Has this changed since the onset of your illness?

4. Has the kind of work you do changed since the onset of your illness?

a. Working more, less, the same?

b. As important to you as ever?

c. See the people from work? More, less, the same?

C. FINANCIAL IMPLICATIONS:

5. Has your illness created any financial hardships for you (family)?

a. Have you had to make any major changes in where you live? Roles? Budget priorities?

b. Has spouse returned to work?

D. FUTURE IMPLICATIONS:

6. In general, how would you say your illness has affected the plans you had for the future?

E. EFFECTS OF ILLNESS AND THERAPY ON BODY, LIFE STYLE:

7. Generally, how have you been feeling since the onset of your illness?

a. Have you had to limit your physical activities in any way?

b. Do you need any assistance with getting around or carrying out daily activities?

c. Have you noticed any changes in your concentration or memory?

d. How do you keep tract of appointments, medication times?

e. Do you drive or take a bus the same, less or more often than before?

f. Have your eating patterns changed? Smoking?

F. RELATIONSHIPS WITH HEALTH CARE PERSONNEL?

8. Since your illness, you have had contact with several different doctors, nurses and other health care personnel. What has been the most helpful aspect of these encounters? The most stressful?

a. Do you believe you have adequate knowledge of your condition? Diet? Medications? Activity?

b. Are there things you have learned that you wish you had known about earlier?

c. Do you feel comfortable asking questions of doctors, nurses? What would help you feel more comfortable?

d. How often do you see your personnel physician? Do you think you should see him more often, less often, the same?

Appendix D

Symptom Distress Scale

Symptoms	Degrees of Distress				
	1	2	3	4	5
Nausea (1)	I seldom feel any nausea at all.	I am nauseous once in a while.	I am often nauseous.	I am usually nauseous.	I suffer from nausea almost continually.
Nausea (2)	When I do have nausea it is very mild.	When I do have nausea it is mildly distressing.	When I have nausea, I feel pretty sick.	When I have nausea, I feel very sick.	When I have nausea, I am as sick as I could possibly be.
Appetite	I have my normal appetite.	My appetite is usually, but not always, pretty good.	I don't really enjoy my food like I used to.	I have to force myself to eat my food.	I cannot stand the thought of food.
Insomnia	I sleep as well as I always have.	I have occasional spells of sleeplessness.	I frequently have trouble getting to sleep and staying asleep.	I have difficulty sleeping almost every night.	It is almost impossible for me to get a decent night's sleep.
Pain (1)	I almost never have pain.	I have pain once in a while.	I frequently have pain-several times a week.	I am usually in some degree of pain.	I am in some degree of pain almost constantly.
Pain (2)	When I do have pain, it is very mild.	When I do have pain, it is mildly distressing.	The pain I do have is usually fairly intense.	The pain I have is usually very intense.	I am in some degree of pain almost constantly.
Fatigue	I am usually not tired at all.	I am occasionally rather tired.	There are frequently periods when I am quite tired.	I am usually very tired.	Most of the time, I feel exhausted.

Symptoms	Degrees of Distress				
	1	2	3	4	5
Bowel	I have my normal bowel pattern.	My bowel pattern occasionally causes me some concern and discomfort.	I frequently have discomfort from my present bowel pattern.	I am usually in discomfort because of my present bowel pattern.	My present bowel pattern has changed drastically from what was normal for me.
Concentration	I have my normal ability to concentrate.	I occasionally have trouble concentrating.	I often have trouble concentrating.	I usually have at least some difficulty concentrating.	I just can't seem to concentrate at all.
Appearance	My appearance has basically not changed.	My appearance has got a little worse.	My appearance is definitely worse than it used to be, but I am not greatly concerned about it.	My appearance is definitely worse than it used to be, and I am concerned about it.	My appearance has changed drastically from what it was.
Breathing	I usually breathe normally.	I occasionally have trouble breathing.	I often have trouble breathing.	I can hardly ever breathe as easily as I want.	I almost always have severe trouble with my breathing.
Outlook	I am not fearful or worried.	I am a little worried about things.	I am quite worried, but unafraid.	I am worried and a little frightened about things.	I am worried and scared about things.
Cough	I seldom cough.	I have an occasional cough.	I often cough.	I often cough, and occasionally have severe coughing spells.	I often have persistent and severe coughing spells.

Appendix E

Social Support Questionnaire

PLEASE READ ALL DIRECTIONS
ON THIS PAGE BEFORE STARTING.

Please list each significant person in your life on the right. Consider all the persons who provide personal support for you or who are important to you.

Use only first names or initials, and then indicate the relationship, as in the following example:

Example:
etc.

Use the following list to help you think of the people important to you, and list as many people as apply in your case.

-spouse or partner
-family members or relatives
-friends
-work or school associates
-neighbors
-health care providers
-counselor or therapist
-minister/priest/rabbi
-other

You do not have to use all 24 spaces. Use as many spaces as you have important persons in your life.

WHEN YOU HAVE FINISHED YOUR LIST, PLEASE TURN TO PAGE 2.

c 1980 by Jane S. Norbeck, D.N.Sc.
University of California, San Francisco
Revised 1982

Number_____
Date_____

PERSONAL NETWORK

	First Name or Initials	Relationship	
1.	_____	_____	[32]
2.	_____	_____	[33]
3.	_____	_____	[34]
4.	_____	_____	[35]
5.	_____	_____	[36]
6.	_____	_____	[37]
7.	_____	_____	[38]
8.	_____	_____	[39]
9.	_____	_____	[40]
10.	_____	_____	[41]
11.	_____	_____	[42]
12.	_____	_____	[43]
13.	_____	_____	[44]
14.	_____	_____	[45]
15.	_____	_____	[46]
16.	_____	_____	[47]
17.	_____	_____	[48]
18.	_____	_____	[49]
19.	_____	_____	[50]
20.	_____	_____	[51]
21.	_____	_____	[52]
22.	_____	_____	[53]
23.	_____	_____	[54]
24.	_____	_____	[55]

For each person you listed, please answer the following questions by writing in the number that applies.

1 = not al all
2 = a little
3 = moderately
4 = quite a bit
5 = a great deal

Question 1:

How much does this person make you feel liked or loved?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

Question 2:

How much does this person make you feel respected or admired?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

GO ON TO NEXT PAGE

1 = not al all
2 = a little
3 = moderately
4 = quite a bit
5 = a great deal

Question 3:

How much can you confide in this person?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

Question 4:

How much does this person agree with or support your actions or thoughts?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

GO ON TO NEXT PAGE

1 = not al all
2 = a little
3 = moderately
4 = quite a bit
5 = a great deal

Question 5:

If you needed to borrow $10, a ride to the doctor, or some other immediate help, how much could this person usually help?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

Question 6:

If you were confined to bed for several weeks, how much could this person help you?

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

GO ON TO NEXT PAGE

1 = not al all
2 = a little
3 = moderately
4 = quite a bit
5 = a great deal

Question 7:

How long have you known this person?

1 = less than 6 months
2 = 6 to 12 months
3 = 1 to 2 years
4 = 2 to 5 years
5 = more than 5 years

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

Question 8:

How frequently do you usually have contact with this person? (Phone calls, visits, or letters)

5 = daily
4 = weekly
3 = monthly
2 = a few times a year
1 = once a year or less

1. _____
2. _____
3. _____
4. _____
5. _____
6. _____
7. _____
8. _____
9. _____
10. _____
11. _____
12. _____
13. _____
14. _____
15. _____
16. _____
17. _____
18. _____
19. _____
20. _____
21. _____
22. _____
23. _____
24. _____

PLEASE BE SURE YOU HAVE RATED EACH PERSON ON EVERY QUESTION. GO ON TO THE LAST PAGE.

9. During the past year, have you lost any important relationships due to moving, a job change, divorce or separation, death, or some other reason?

_____ 0. No
_____ 1. Yes

IF YES

9a. Please indicate the number of persons from each category who are no longer available to you.

_____	spouse or partner	[58]
_____	family members or relatives	[59-60]
_____	friends	[61-62]
_____	work or school associates	[63-64]
_____	neighbors	[65-66]
_____	health care providers	[67]
_____	counselor or therapist	[68]
_____	minister/priest/rabbi	[69]
_____	other (specify)_____	[70]

9b. Overall, how much of your support was provided by these people who are no longer available to you?

_____ 0. none at all
_____ 1. a little
_____ 2. a moderate amount
_____ 3. quite a bit
_____ 4. a great deal

Appendix F
Questionnaire for Study on Recovery Health Status

THIS QUESTIONNAIRE CONTAINS A VARIETY OF ITEMS WHICH PERTAIN TO YOUR CURRENT HEALTH STATUS. EACH QUESTION IS IMPORTANT TO CONDUCTING THIS STUDY ON THE COURSE OF REHABILITATION IN PATIENTS WHO HAVE HAD SERIOUS HEART RHYTHM DISTURBANCES. PLEASE READ EACH QUESTION OR STATEMENT CAREFULLY AND ANSWER AS ACCURATELY AS POSSIBLE. PLEASE DO NOT LEAVE ANY QUESTIONS UNANSWERED. THIS QUESTIONNAIRE SERVES SCIENTIFIC AIMS ONLY. THERE ARE NO RIGHT OR WRONG ANSWERS. IT IS YOUR OPINION ABOUT YOUR CURRENT HEALTH STATUS THAT IS WANTED.

PART I: HEALTH PERCEPTIONS

1. PLEASE READ EACH OF THE FOLLOWING STATEMENTS, AND THEN CIRCLE ONE OF THE NUMBERS ON EACH LINE TO INDICATE WHETHER THE STATEMENT IS TRUE OR FALSE FOR YOU.

   If a statement is definitely true for you, Circle 5.

   If it is mostly true for you, Circle 4.

   If you don't know whether it is true or false, Circle 3.

   If it is mostly false for you, Circle 2

   If it is definitely false for you, Circle 1.

   SOME OF THE STATEMENTS MAY LOOK OR SEEM LIKE OTHERS. BUT EACH STATEMENT IS DIFFERENT, AND SHOULD BE RATED BY ITSELF.

	Definitely True	Mostly True	Don't Know	Mostly False	Definitely False
A. According to the doctors I've seen, my health is now excellent	5	4	3	2	1
B. I try to avoid letting illness interfere with my life.	5	4	3	2	1
C. I seem to get sick a little easier than other people	5	4	3	2	1
D. I feel better now than I ever have before	5	4	3	2	1
E. I will probably be sick a lot in the future	5	4	3	2	1
F. I never worry about my health	5	4	3	2	1

	Definitely True	Mostly True	Don't Know	Mostly False	Definitely False
G. Most people get sick a little easier than I do	5	4	3	2	1
H. I don't like to go to the doctor	5	4	3	2	1
I. I am somewhat ill	5	4	3	2	1
J. In the future, I expect to have better health than other people I know	5	4	3	2	1
K. I was so sick once I thought I might die	5	4	3	2	1
L. I'm not as healthy now as I used to be	5	4	3	2	1
M. I worry about my health more than other people worry about their health	5	4	3	2	1
N. When I'm sick, I try to just keep going as usual	5	4	3	2	1
O. My body seems to resist illness very well	5	4	3	2	1
P. Getting sick once in a while is a part of my life	5	4	3	2	1
Q. I'm as healthy as anybody I know	5	4	3	2	1
R. I think my health will be worse in the future than it is now	5	4	3	2	1
S. I've never had an illness that lasted a long period of time	5	4	3	2	1
T. Others seem more converned about their health than I am about mine	5	4	3	2	1
U. When I'm sick, I try to keep it to myself	5	4	3	2	1
V. My health is excellent	5	4	3	2	1

	Definitely True	Mostly True	Don't Know	Mostly False	Definitely False
W. I expect to have a very healthy life	5	4	3	2	1
X. My health is a concern in my life	5	4	3	2	1
Y. I accept that sometimes I'm just going to be sick	5	4	3	2	1
Z. I have been feeling bad lately	5	4	3	2	1
AA. It doesn't bother me to go to a doctor	5	4	3	2	1
BB. I have never been seriously ill	5	4	3	2	1
CC. When there is something going around, I usually catch it	5	4	3	2	1
DD. Doctors say that I am now in poor health	5	4	3	2	1
EE. When I think I am getting sick, I fight it	5	4	3	2	1
FF. I feel about as good now as I ever have	5	4	3	2	1

PART II: PHYSICAL ACTIVITIES

2. ARE YOU ABLE TO DRIVE A CARE?

	(Circle One)	
No, because of my health	1	-Answer 2-A
No, for some other reason	2	-Go to 3
Yes, able to drive car	3	

2A. HOW LONG HAVE YOU BEEN UNABLE TO DRIVE A CAR BECAUSE OF YOUR HEALTH?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

3. WHEN YOU TRAVEL AROUND YOUR COMMUNITY, DOES SOMEONE HAVE TO ASSIST YOU BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 3-A
No	2	-Go to 4

3A. HOW LONG HAVE YOU NEEDED SOMEONE TO ASSIST YOU IN TRAVELING AROUND YOUR COMMUNITY?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

4. DO YOU HAVE TO STAY INDOORS MOST OR ALL OF THE DAY, BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 4-A
No	2	-Go to 5

4A. HOW LONG HAVE YOU HAD TO STAY INDOORS MOST OR ALL OF THE DAY, BECAUSE OF YOUR HEALTH?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

5. ARE YOU IN BED OR A CHAIR FOR MOST OR ALL OF THE DAY BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 5-A
No	2	-Go to 6

5A. HOW LONG HAVE YOU BEEN IN BED OR A CHAIR FOR MOST OR ALL OF THE DAY BECAUSE OF YOUR HEALTH?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

6. DOES YOUR HEALTH LIMIT THE KIND OF VIGOROUS ACTIVITIES YOU CAN DO, SUCH AS RUNNING, LIFTING HEAVY OBJECTS, OR PARTICIPATING IN STRENUOUS SPORTS?

Yes	1	-Answer 6-A
No	2	-Go to 7

6A. HOW LONG HAS YOUR HEALTH LIMITED THE KIND OF VIGOROUS ACTIVITIES YOU CAN DO?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

7. DO YOU HAVE ANY TROUBLE EITHER WALKING SEVERAL BLOCKS OR CLIMBING A FEW FLIGHTS OF STAIRS, BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 7-A
No	2	-Go to 8

7A. HOW LONG HAVE YOU HAD TROUBLE WALKING SEVERAL BLOCKS OR CLIMBING A FEW FLIGHTS OF STAIRS BECAUSE OF YOUR HEALTH?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

8. DO YOU HAVE TROUBLE BENDING, LIFTING, OR STOOPING BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 8-A
No	2	-Go to 9

8A. HOW LONG HAVE YOU HAD TROUBLE BENDING, LIFTING, OR STOOPING BECAUSE OF YOUR HEALTH?

	(Circle One)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

9. DO YOU HAVE ANY TROUBLE EITHER WALKING ONE BLOCK OR CLIMBING ONE FLIGHT OF STAIRS BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 9-A
No	2	-Go to 10

9-A. HOW LONG HAVE YOU HAD TROUBLE WALKING ONE BLOCK OR CLIMBING ONE FLIGHT OF STAIRS BECAUSE OF YOUR HEALTH?

	(Circle one)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

10. ARE YOU UNABLE TO WALK UNLESS YOU ARE ASSISTED BY ANOTHER PERSON OR BY A CANE, CRUTCHES, ARTIFICIAL LIMBS, OR BRACES?

Yes	1	-Answer 10-A
No	2	-Go to 11

10A. HOW LONG HAVE YOU BEEN UNABLE TO WALK WITHOUT ASSISTANCE?

	(Circle one)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

11. ARE YOU UNABLE TO DO CERTAIN KINDS OR AMOUNTS OF WORK, HOUSEWORK, OR SCHOOLWORK BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 11-A
No	2	-Go to 12

11A. HOW LONG HAVE YOU BEEN UNABLE TO DO CERTAIN KINDS OR AMOUNTS OF WORK, HOUSEWORK, OR SCHOOLWORK BECAUSE OF YOUR HEALTH?

	(Circle one)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

12. DOES YOUR HEALTH KEEP YOU FROM WORKING AT A JOB, DOING WORK AROUND THE HOUSE, OR GOING TO SCHOOL?

Yes	1	-Answer 12-A
No	2	-Go to 13

12A. HOW LONG HAS YOUR HEALTH KEPT YOU FROM WORKING AT A JOB, DOING WORK AROUND THE HOUSE, OR GOING TO SCHOOL?

	(Circle one)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

13. DO YOU NEED HELP WITH EATING, DRESSING, BATHING, OR USING THE TOILET BECAUSE OF YOUR HEALTH?

Yes	1	-Answer 13-A
No	2	-Go to 14

13A. HOW LONG HAVE YOU NEEDED HELP WITH EATING, DRESSING, BATHING, OR USING THE TOILET, BECAUSE OF YOUR HEALTH?

	(Circle one)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

---

14. DOES YOUR HEALTH LIMIT YOU IN ANY WAY FROM DOING ANYTHING YOU WANT TO DO?

Yes	1	-Answer 14-A
No	2	-Go to 15

14A. HOW LONG HAS YOUR HEALTH LIMITED YOU IN DOING THINGS YOU WANT TO DO?

	(Circle one)
Less than 1 month	1
1 - 3 months	2
More than 3 months	3

THESE NEXT QUESTIONS ARE ABOUT ANY PHYSICAL LIMITATIONS YOU MIGHT HAVE AND WHAT CAUSES THEM. FOR THESE ACTIVITIES, PLEASE CIRCLE A NUMBER FOR THE STATEMENT WHICH BEST DESCRIBES YOU. IF YOU CAN'T DO THE ACTIVITY, OR IF YOU CAN ONLY DO IT SLOWLY, CIRCLE THE NUMBER FOR THE ONE HEALTH PROBLEM YOU THINK IS THE MAIN CAUSE.

15. CAN YOU DO HARD ACTIVITIES AT HOME, HEAVY WORK LIKE SCRUBBING FLOORS, OR LIFTING OR MOVING HEAVY FURNITURE?

Yes	1	-Go to 16
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 16)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

16. IF YOU WANTED TO, COULD YOU PARTICIPATE IN ACTIVE SPORTS SUCH AS SWIMMING, TENNIS, BASKETBALL, VOLLEYBALL, OR ROWING A BOAT?

Yes	1	-Go to 17
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 17)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

17. COULD YOU DO MODERATE WORK AT HOME LIKE MOVING A CHAIR OR TABLE, OR PUSHING A VACUUM CLEANER?

Yes	1	-Go to 18
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 18)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

18. CAN YOU DO LIGHT WORK AROUND THE HOUSE LIKE DUSTING OR WASHING DISHES?

Yes	1	-Go to 19
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 19)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

19. IF YOU WANTED TO, COULD YOU RUN A SHORT DISTANCE?

Yes	1	-Go to 20
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 20)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

20. CAN YOU WALK UPHILL OR UP STAIRS?

Yes	1	-Go to 21
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 21)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

21. CAN YOU WALK AROUND INSIDE THE HOUSE?

Yes	1	-Go to 22
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 22)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

22. CAN YOU WALK A BLOCK OR MORE?

Yes	1	-Go to 23
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 23)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

23. CAN YOU WALK TO A TABLE FOR MEALS?

Yes	1	-Go to 24
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 24)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

24. CAN YOU DRESS YOURSELF?

Yes	1	-Go to 25
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 25)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

25. CAN YOU EAT WITHOUT HELP?

Yes	1	-Go to 26
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 26)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

26. CAN YOU USE THE BATHROOM WITHOUT HELP?

Yes	1	-Go to 27
Yes, but only slowly	2	WHY?
No, I can't do this	3	

(Circle number for one main cause; then answer 27)

Chronic bronchitis, emphysema or phlegm	01
Chest pain, heart attack, or angina	02
Overweight	03
High blood pressure (hypertension)	04
Anemia (low blood)	05
Shortness of breath, enlarged heart, or heart failure	06
Severe stomach pain or stomach ache (ulcer)	07
Kidney, bladder, or urine infection	08
Joint problems (arthritis, gout, rheumatism)	09
Cancer	10
Hernia, rupture, herniated navel	11
Varicose veins	12
Hemorrhoids	13
Goiter or thyroid trouble	14
Hay fever or other allergies to plants and grasses	15
Eyesight problems	16
Hearing problems	17
Diabetes or pre-diabetes (sugar in blood or sugar disease)	18
Cholesterol (high blood cholesterol)	19
Tuberculosis	20
Trouble with drinking	21
Some other problem (What?_____)	22

PART III: GENERAL WELL-BEING

THESE NEXT QUESTIONS ARE ABOUT HOW YOU FEEL, AND HOW THINGS HAVE BEEN WITH YOU MOSTLY WITHIN THE PAST MONTH.

FOR EACH QUESTION, PLEASE CIRCLE A NUMBER FOR THE ONE ANSWER THAT COMES CLOSEST TO THE WAY YOU HAVE BEEN FEELING.

27. HOW HAPPY, SATISFIED, OR PLEASED HAVE YOU BEEN WITH YOUR PERSONAL LIFE DURING THE PAST MONTH?

(Circle one)

Extremely happy, could not have been more satisfied or pleased	1
Very happy most of the time	2
Generally satisfied, pleased	3
Sometimes fairly satisfied, sometimes fairly unhappy	4
Generally dissatisfied, unhappy	5
Very dissatisfied, unhappy most of the time	6

---

28. HOW MUCH OF THE TIME HAVE YOU FELT LONELY DURING THE PAST MONTH?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

29. HOW OFTEN DID YOU BECOME NERVOUS OR JUMPY WHEN FACED WITH EXCITEMENT OR UNEXPECTED SITUATIONS DURING THE PAST MONTH?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

30. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU FELT THAT THE FUTURE LOOKS HOPEFUL AND PROMISING?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

31. HOW OFTEN DO YOU EAT TOO MUCH?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

32. HOW MUCH OF THE TIME, DURING THE PAST MONTH, HAS YOUR DAILY LIFE BEEN FULL OF THINGS THAT WERE INTERESTING TO YOU?

(Circle one)

All of the time..... 1
Most of the time..... 2
A good bit of the time..... 3
Some of the time..... 4
A little of the time..... 5
None of the time..... 6

---

33. HOW MUCH OF THE TIME, DURING THE PAST MONTH, DID YOU FEEL RELAXED AND FREE OF TENSION?

(Circle one)

All of the time..... 1
Most of the time..... 2
A good bit of the time..... 3
Some of the time..... 4
A little of the time..... 5
None of the time..... 6

---

34. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU GENERALLY ENJOYED THE THINGS YOU DO?

(Circle one)

All of the time..... 1
Most of the time..... 2
A good bit of the time..... 3
Some of the time..... 4
A little of the time..... 5
None of the time..... 6

---

35. DURING THE PAST THE PAST MONTH, HAVE YOU HAD ANY REASON TO WONDER IF YOU WERE LOSING YOUR MIND, OR LOSING CONTROL OVER THE WAY YOU ACT, TALK, FEEL OR OF YOUR MEMORY?

(Circle one)

No, not al all	1
Maybe a little	2
Yes, but not enough to be concerned or worried about it	3
Yes, and I have been a little concerned	4
Yes, and I am quite concerned	5
Yes, and I am very much concerned about it	6

---

36. IN GENERAL, WOULD YOU SAY YOUR MORALS HAVE BEEN ABOVE REPROACH?

(Circle one)

Yes, definitely	1
Yes, probably	2
I don't know	3
Probably not	4
Definitely not	5

---

37. DID YOU FEEL DEPRESSED DURING THE PAST MONTH?

(Circle one)

Yes, to the point that I did not care about anything for days at a time	1
Yes, very depressed almost every day	2
Yes, quite depressed several times	3
Yes, a little depressed now and then	4
No, never felt depressed at all	5

---

38. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU FELT LOVED AND WANTED?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

39. HOW MUCH OF THE TIME, DURING THE PAST MONTH, HAVE YOU BEEN A VERY NERVOUS PERSON?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

40. WHEN YOU GOT UP IN THE MORNING, THIS PAST MONTH, ABOUT HOW OFTEN DID YOU EXPECT TO HAVE AN INTERESTING DAY?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

41. HOW OFTEN HAVE THERE BEEN TIMES IN YOUR LIFE WHEN YOU FELT YOU ACTED LIKE A COWARD?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

42. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU FELT TENSE OR "HIGH-STRUNG"?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

43. DURING THE PAST MONTH, HAVE YOU BEEN IN FIRM CONTROL OF YOUR BEHAVIOR, THOUGHTS, EMOTIONS, FEELINGS?

(Circle one)

Yes, very definitely	1
Yes, for the most part	2
Yes, I guess so	3
No, not too well	4
No, and I am somewhat disturbed	5
No, and I am very disturbed	6

---

44. DURING THE PAST MONTH, HOW OFTEN DID YOU HANDS SHAKE WHEN YOU TRIED TO DO SOMETHING?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

45. DURING THE PAST MONTH, HOW OFTEN DID YOU FEEL THAT YOU HAD NOTHING TO LOOK FORWARD TO?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

46. WOULD YOU SAY THAT YOU GIVE EVERY PENNY YOU CAN TO CHARITY?

(Circle one)

Yes, definitely	1
Yes, for the most part	2
Yes, I try	3
No	4

---

47. HOW MUCH OF THE TIME, DURING THE PAST MONTH, HAVE YOU FELT CALM AND PEACEFUL?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

48. HOW MUCH OF THE TIME, DURING THE PAST MONTH, HAVE YOU FELT EMOTIONALLY STABLE?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

49. HOW MUCH OF THE TIME, DURING THE PAST MONTH, HAVE YOU FELT DOWNHEARTED AND BLUE?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

50. HOW OFTEN HAVE YOU FELT LIKE CRYING, DURING THE PAST MONTH?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

51. IN CHOOSING YOUR FRIENDS, HOW IMPORTANT TO YOU ARE THINGS LIKE THEIR RACE, THEIR RELIGION, OR THEIR POLITICAL BELIEFS?

(Circle one)

Always very important	1
Almost always important	2
Usually important	3
Not too important	4
Hardly ever important	5
Not important at all	6

---

52. DURING THE PAST MONTH, HOW OFTEN DID YOU FEEL THAT OTHERS WOULD BE BETTER OFF IF YOU WERE DEAD?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

53. HOW MUCH OF THE TIME, DURING THE PAST MONTH, WERE YOU ABLE TO RELAX WITHOUT DIFFICULTY?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

54. DURING THE PAST MONTH, HOW MUCH OF THE TIME DID YOU FEEL THAT YOUR LOVE RELATIONSHIPS, LOVING AND BEING LOVED, WERE FULL AND COMPLETE?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

55. HOW OFTEN, DURING THE PAST MONTH, DID YOU FEEL THAT NOTHING TURNED OUT FOR YOU THE WAY YOU WANTED IT TO?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

56. HOW MUCH HAVE YOU BEEN BOTHERED BY NERVOUSNESS, OR YOUR "NERVES", DURING THE PAST MONTH?

(Circle one)

Extremely so, to the point where I could not take care of things..... 1

Very much bothered..... 2

Bothered quite a bit by nerves..... 3

Bothered some, enough to notice..... 4

Bothered just a little by nerves..... 5

Not bothered at all by this..... 6

---

57. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAS LIVING BEEN A WONDERFUL ADVENTURE FOR YOU?

(Circle one)

All of the time..... 1

Most of the time..... 2

A good bit of the time..... 3

Some of the time..... 4

A little of the time..... 5

None of the time..... 6

---

58. IF IT IS MORE CONVENIENT FOR YOU TO DO SO, HOW OFTEN WILL YOU TELL A LIE?

(Circle one)

Very often tell a lie..... 1

Fairly often..... 2

Sometimes tell a lie..... 3

Almost never..... 4

Never tell a lie..... 5

---

59. HOW OFTEN, DURING THE PAST MONTH, HAVE YOU FELT SO DOWN IN THE DUMPS THAT NOTHING COULD CHEER YOU UP?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

60. DURING THE PAST MONTH, DID YOU EVER THINK ABOUT TAKING YOUR OWN LIFE?

(Circle one)

Yes, very often	1
Yes, fairly often	2
Yes, a couple of times	3
Yes, at one time	4
No, never	5

---

61. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU FELT RESTLESS, FIDGETY, OR IMPATIENT?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

62. HOW OFTEN HAVE YOU DONE ANYTHING OF A SEXUAL NATURE THAT SOCIETY DOES NOT APPROVE OF?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

63. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU BEEN MOODY OR BROODED ABOUT THINGS?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

64. HOW MUCH OF THE TIME, DURING THE PAST MONTH, HAVE YOU FELT CHEERFUL, LIGHTHEARTED?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

65. DURING THE PAST MONTH, HOW OFTEN DID YOU GET RATTLED, UPSET, OR FLUSTERED?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

66. ARE YOUR TABLE MANNERS AT HOME JUST AS GOOD AS THEY ARE WHEN YOU ARE INVITED OUT TO DINNER?

(Circle one)

Yes, always just as good	1
Yes, with rare exceptions	2
Yes, usually, just as good	3
No, usually worse at home	4
No, quite a bit worse at home	5
No, very bad at home	6

---

67. DURING THE PAST MONTH, HAVE YOU BEEN ANXIOUS OR WORRIED?

(Circle one)

Yes, extremely so, to the point of being sick or almost sick	1
Yes, very much so	2
Yes, quite a bit	3
Yes, some, enough to bother me	4
Yes, a little bit	5
No, not at all	6

---

68. DURING THE PAST MONTH, HOW MUCH OF THE TIME WERE YOU A HAPPY PERSON?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

69. HOW OFTEN DURING THE PAST MONTH DID YOU FIND YOURSELF HAVING DIFFICULTY TRYING TO CALM DOWN?

(Circle one)

Always	1
Very often	2
Fairly often	3
Sometimes	4
Almost never	5
Never	6

---

70. DURING THE PAST MONTH, HOW MUCH OF THE TIME HAVE YOU BEEN IN LOW OR VERY LOW SPIRITS?

(Circle one)

All of the time	1
Most of the time	2
A good bit of the time	3
Some of the time	4
A little of the time	5
None of the time	6

---

71. HOW OFTEN, DURING THE PAST MONTH, HAVE YOU BEEN WAKING UP FEELING FRESH AND RESTED?

(Circle one)

Always, every day	1
Almost every day	2
Most days	3
Some days, but usually not	4
Hardly ever	5
Never wake up feeling rested	6

---

72. DURING THE PAST MONTH, HAVE YOU BEEN UNDER OR FELT YOU WERE UNDER ANY STRAIN, STRESS, OR PRESSURE?

(Circle one)

Yes, almost more than I could stand or bear	1
Yes, quite a bit of pressure	2
Yes, some, more than usual	3
Yes, some, but about normal	4
Yes, a little bit	5
No, not at all	6

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