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AN INVESTIGATION OF THE RELATION
BETWEEN LIFE EXPERIENCE, PERSONALITY
CHARACTERISTICS, AND GENERAL SUSCEPTIBILITY
TO ILLNESS

by

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CHAPTER ONE

1. INTRODUCTION

An individual is a living system entirely dependent upon maintaining a satisfactory relationship with his total environment. As a biological system his life is dependent upon his ability to maintain homeostasis. It is also essential for him to maintain a satisfactory "interhuman homeostasis" (Groen, 1971) with other human beings, especially those who, by kinship or long association, have acquired a special meaning for him.

Mc Grath (1976), for example, has identified three systems which are a source of stress for an individual : (1) the physical environment, which includes such noxious or dangerous conditions as extreme cold or heat, hazards, etc; (2) the social environment, which includes the people in it, and which places various kinds of demands or opportunities or constraints on the person; and (3) the "person system", which includes his personality, choice of coping skills, etc. Consequently biological systems are extremely complex, and have been referred to as "open systems", in that they interact not only with the various bodily systems, but also with the environment and other organisms therein (Christ, 1982). It is for this reason that physicians today generally recognize that illness cannot be conceptualized or treated by a single-factor approach, but rather, that illness results from the relationship of the individual to his environment (e.g., Heine and Sainsbury, 1970; Mc Grath, 1976; Mumford, 1982).

In recent years many different studies of the relation of disease onset

to personality, emotional, and environmental factors have been undertaken (e.g., Russek and Zohman, 1958; Valk and Groen, 1967; Liljefors and Rahe, 1970; Siltanen, 1972). Such an integrated approach to health care portrays the patient as more than a biological entity. Each individual is considered in terms of a psycho-socio-cultural background (Smith et al, 1978).

In Krakowski's (1982) view the history of modern medicine has witnessed a swing of the pendulum from an early preoccupation with organ aspects of illness to a more recent focusing on the psychosocial aspects — an outcome of the psychosomatic movement. The gradual accumulation of evidence that social stress may lead to bodily illness has had much to do with bringing "psychosomatic medicine" into prominence (Graham and Stevenson, 1963). Psychosomatic research is concerned primarily with physiological and psychological reactions induced by environmental stimuli which are usually referred to as "psychosocial" (Levi, 1974). To determine the best definition of the term "psychosomatic" is not easy, but a study of the literature suggests that when this term is used, there is usually an implicit or explicit understanding that the disease under discussion is, at least in part, a response to psychosocial stress. In most of the psychosomatically oriented medical literature, various disorders (e.g., cardiac disease, and asthma) have been related to a number of such psychosocial stresses to which patients are said to have been exposed prior to and/or in conjunction with the onset of a particular disease (e.g., Weiner, 1977) or psychiatric disorder (e.g., Crooke and Hole, 1983). Psychosocial stress stems from the interaction of an individual with other individuals in his environment. Although such stress is not the only factor significant in the occurrence of illness, it is highly relevant to most

illnesses (e.g., Graham and Stevenson, 1963).

The view is now current that stress has surpassed the common cold as the most prevalent health problem in the United States of America, and that stress-related illnesses are responsible for an annual loss in industrial productivity to the extent of 10 to 20 billion dollars (Rosch, 1979). The term stress has become so ingrained in our daily language that it is difficult to believe that it came into common use less than 35 years ago and was first coined by Selye (1974) (who borrowed the word from physics) to describe an organism's reaction to a variety of physical noxious influences such as cold and infection as well as certain emotions such as fear and anger.

Today, the relationship between stress and illness has been investigated along several lines. "Life stress" and "stressful" life events have been related to physiological disturbances in most body systems and to many "psychosomatic" diseases (e.g., Weiner, 1977; Krakowski, 1982). The work of Holmes and Rahe (1967) and other behavioural scientists showed that stressful changes in life events could be quantified and used in predicting the development of subsequent illness. Studies by Thomas (1977) strongly suggested that by using psychological stress tests as well as other criteria, (e.g., personality tests) it might be possible to predict the likelihood of becoming mentally ill or of being afflicted by hypertension, coronary disease, or cancer. Stressful life-change events have been associated with conditions ranging from physical disabilities such as athletic injuries (Bramwell et al, 1975), coronary heart disease (e.g., Rahe et al, 1974b; Theorell, 1974), and cancer (Cooper, 1982), to symptoms of psychological distress (Dohrenwend, 1973a; Myers et al 1974) and types of psychiatric disorder (Brown 1974; Paykel, 1974).

The relation between personality and illness has also been the subject of much investigation by several researchers (e.g., Alexander, 1939; Weiss, 1939; Tucker, 1949; Glock and Lennard, 1957; Weiner et al, 1962; Heine and Sainsbury, 1970; Rosenman, 1971). For example, it is said that individuals employ a variety of ego defense mechanisms in dealing with recent life changes (Rahe, 1975b). Moreover, Friedman and Rosenman (1959) have identified a behaviour pattern which they believe is associated with a high risk of coronary disease. The coronary prone behaviour pattern, designated Type A as distinguished from the low risk Type B, is characterized by extreme aggressiveness, competitiveness and ambition, together with feelings of restlessness and a profound sense of time urgency. The importance of a knowledge of the personality of a patient has been emphasized by Parry (quoted by Aitken, 1973, p. 86) who, towards the end of the eighteenth century, wrote :

"It is much more important to know what sort of patient has a disease than what sort of disease a patient has".

1.1 Motivation

The epidemic rise in the importance of heart disease as a cause of morbidity and mortality in most of the developed countries is well documented (WHO, 1969). It is the most common cause of death in the United States of America (e.g., Felton and Cole, 1963; Graham and Reeder, 1972), Australia (Johns, 1973), and the Republic of South Africa (Pulsus, 1982).

In West Germany the number of deaths due to heart disease in men over

the age of 30 years increased six-fold between 1949 and 1973 (Zorn et al, 1977). South Africa, the so-called coronary capital of the world, has a mortality rate from coronary heart disease two-and-one half times higher than that of the U.S.A. (Pulsus, 1982). According to Oversby (1983), the Regional Director of the National Heart Foundation, the mortality rate from heart disease among Indian men between the age of 15 and 64 years is 507,7 per 100 000 compared with an average death rate of 360,7 per 100 000 for White men. Of the cardiovascular diseases, coronary heart disease, which costs the South African economy more than R750 million per annum, has the dubious distinction of being

".... the most devastating in South Africa, reaching epidemic proportions in Whites and Asians!" (Pulsus, 1982, p. 4).

These tragic statistics demand priority action because heart disease strikes South Africans in their prime, when they are economically active and have families to raise and support. It is not uncommon these days to find people suffering from a heart attack at the age of 35 years or even earlier.

Although several factors, known as risk factors (e.g., elevation of serum cholesterol, hypertension, history of cigarette smoking, lack of exercise, and obesity) have been identified with an increased likelihood of heart attack (e.g., Kuller, 1976), it has been established that only about one-half of all the heart attacks in the population can be explained by these risk factors (Corday and Corday, 1975; Marmot and Winkelstein, 1975). The conviction is growing that in the epidemiology of cardiovascular diseases, adequate attention should be given to the personality and sociocultural environments of individuals susceptible to

heart disease (e.g., Kruse, 1960; Syme et al, 1964; Mechanic, 1972; Medalie, 1973; Marmot, 1975; Kleinman, et al, 1978). Persons low in risk factors have been shown to develop coronary heart disease, whereas persons high in risk factors have not (Friedman et al, 1974). From this, it would appear that the existing list of risk factors is either incomplete or insensitive (Samantaray et al, 1975).

Epstein et al (1957) conducted a well-controlled study of cardiac disease in Jewish and Italian men living in New York. Although these two groups were well-matched on several socioeconomic and physiological variables, coronary disease was found to be twice as frequent in Jewish than in Italian men. Thus the known risk factors alone did not account for the difference in the incidence of cardiac disease between the two groups.

In another interesting study (Russek and Russek, 1972) it was shown that the death rate from heart attack among a large number of American physicians who had given up smoking did not drop significantly. The authors concluded :

"This is a disappointing observation since no group in our population has practiced greater abstinence from tobacco in recent years". (Russek and Russek, 1972, p. 84).

Finally, Cappon (1977, p. 9) has said :

".... if medicine is not to lose what is left of its leadership in preserving and fostering physical, mental and social health physicians must join with those of their colleagues who are attempting to prevent illness and enhance the quality of life at the man/environment interface, particularly in urban areas".

1.2 Aims

The present study is designed to examine the relation between life events, personality, and general susceptibility to illness. It would be presumptuous in the extreme to endeavour to investigate a whole repertoire of illnesses (physical and psychological). Moreover, a study of illnesses in general would be too arduous an undertaking for one investigator. Consequently, it was decided — for economic and practical reasons — to limit the present investigation to one broad category of illnesses, namely, cardiac disease.

The primary purpose of the present study was, therefore, to investigate retrospectively the relation between life events, personality, and cardiac disease among Indian adults. To this end, an attempt was made to answer the following questions :

- (1) What, if any, are the differences in personality characteristics between cardiac and non-cardiac persons, as assessed by the Sixteen Personality Factor (16 PF) Questionnaire (Form E) (Eber and Cattell, 1976)?
- (2) Do cardiac subjects differ from non-cardiac subjects in the total frequency (i.e., number) of life events experienced — as measured with the Schedule of Recent Experiences (SRE) ?
- (3) Do cardiac subjects differ from non-cardiac subjects in the amount of life events stress experienced as measured with the Schedule of Recent Experiences (SRE) and expressed as life change unit (LCU) scores ? and
- (4) Is there a clustering of life events stress during the six-

month period immediately preceding the onset of cardiac illness ?

Several investigators have considered the relative merits of prospective and retrospective studies with special reference to behavioural studies. Wardwell and Bahnsen (1964) have cited much of the literature relevant to the study of psychological and social factors in the aetiology of heart disease. They view the large investment of money, energy, and time as the principal disadvantage of prospective studies. A similar view has been expressed by several other researchers (e.g., Brozek et al, 1966). The relative merits and limitations of prospective and retrospective studies are discussed further in Section 4.6.

1.3 The hypotheses

The underlying hypotheses which guided the present study based on Indian adult subjects were that

- (1) There is a significant overall concordance in the ratings, on a 20-point scale, of the various life events of the Social Readjustment Rating Questionnaire (SRRQ) by sub-groups based on the following variables : sex, marital status, occupational status, age, educational level, and income.
- (2) For the hospitalized cardiac patients¹ the overall mean

1. These subjects are described further in Section 5.1.2.1.

total six-month life change unit (LCU) score taken over a two-year period immediately preceding the investigation, and as determined by the Schedule of Recent Experience (SRE), is significantly higher than that of presumably normal, healthy subjects¹.

- (3) For the hospitalized cardiac patients the mean life change unit (LCU) score — as determined by the Schedule of Recent Experience (SRE) — for the six-month period immediately preceding their illness period is significantly higher than that recorded for the six-month period in which their illnesses began.
- (4) When assessed by the Sixteen Personality Factor (16 PF) Questionnaire (Form E) (Eber and Cattell, 1976), there are significant differences in personality between the hospitalized cardiac patients and the presumably normal, healthy subjects¹.

1. These subjects are described further in Section 5.1.2.1.

CHAPTER TWO

PSYCHOSOMATIC ILLNESS

2.1 Definition and Introduction

According to Luban-Plozza and Pöldinger (1974) the term "psychosomatic" was first used in 1918 by Heinroth, a German physician, who also introduced the term "somatopsychic" in 1828 to emphasize the predominance of the somatic factor in the development of certain disorders. However, terms like "psychosomatic disorders" and "psychosomatic medicine" found general acceptance only in the last few decades, following the use of these descriptions by Deutsch, Alexander, Cobb, Dunbar, and others (Luban-Plozza and Pöldinger, 1974).

The term "psychosomatic" or "psychophysilogic" is used to describe a general approach to medical and psychiatric problems which recognizes and appreciates that physical ailments exist within a psychological context. The use of the term "psychosomatic" implies that psychological and social factors can operate in a causative manner in the production of physical illness. Hence psychosomatic disorders (e.g., asthma, cardiac disease, and ulcerative colitis) are diseases with a predominantly somatic symptomatology in which psychogenic factors play the most important role in the aetiology and pathogenesis. The psychosomatic approach is consequently able to account for the role of emotions without neglecting physiological aspects.

A new era began with the publication of Dunbar's Emotions and Bodily Changes (1935), in which the world's available literature (2251

articles) reporting on relationships between somatic functions and feelings, was gathered, abstracted, and synthesized (Grinker, 1953). This publication marked the beginning of a formalized approach to comprehensive medicine. Later, in 1943, Dunbar showed that bodily changes could be attributable not only to bacterial organisms and toxins, but also to mental stimuli and emotions. There followed a rapid systematization of concepts and procedures, the establishment of scientific societies, the founding of a special journal, and the development of departments and institutes within universities and hospitals, all under the auspices of psychosomatic medicine. What was lacking in the past, and seemed to develop rather suddenly, was the formulation of specific hypotheses, and a methodology applicable for fresh investigations in the arena of disease aetiology.

In the late 1930's, Alexander and his colleagues had been utilizing clinical psychiatric interviews to investigate the psychodynamics of conditions such as duodenal ulcers, asthma, and essential hypertension (Harris and Forsyth, 1973). In hypertensive patients, for example, the core problem seemed to be one in which patients showed impulses towards aggression and the problem of the management and control of hostility. The studies of Dunbar (1943), Alexander and French (1948), Halliday (1948), and many other workers supported the hypothesis that certain personality malfunctions are common to specific psychosomatic disorders.

Despite modern trends, the growth of present-day psychosomatic medicine continues to owe a large debt to the work of Freud, Pavlov and Cannon (Wittkower, 1977). In the beginning of the twentieth century Freud, through his work on hysteria and his writings on psychoanalysis, introduced a symbolic interpretation which profoundly influenced

psychosomatic research. His writings established the fundamental dynamic principles of psychological causality (Murray, 1977). Pavlov provided a tool for the measurement of emotions as correlates of physical stress, while Cannon showed that emergency states predisposed the body to "fight or flight" (Luban-Plozza and Pöldinger, 1974). The word "homeostasis" was first applied by Cannon (1929) to imply the balance and constancy of the body, not only in a physiological sense, but also in relation to life in general, which included environmental - psychosocial forces.

2.2 Aetiology

According to Wittkower and Warnes (1974) the aetiological factors in psychosomatic conditions may be divided into non-psychological and psychological factors. Outstanding among the non-psychological factors are hereditary constitution, and prenatal and postnatal harmful events. There are a variety of predilections for and emphases on psychological factors. These depend principally on the focus of the researcher and his orientation. For example, Halliday (1948) views psychosomatic disease against the background of a sick society; Reusch and Bateson (1951) emphasize difficulties in communication as aetiological agents; Wolff (1950) focuses his attention on disturbing life situations; Dunbar (1946) correlates personality profiles with psychosomatic disorders; Alexander and French (1948) demonstrate the relationship between conflict constellation and vegetative dysfunction; and Wittkower and Warnes (1974) emphasize cultural factors in the aetiology of psychosomatic conditions. None of these conceptual models offers a comprehensive view of the complexity and multicausality of psychosomatic disorders.

In the past fifty years, however, developments in psychosomatic medicine have followed two major directions. Firstly attempts have been made to identify specific psychological variables underlying specific somatic disorders. Dunbar's attempts to relate certain diseases to personality types were largely discontinued in favour of Alexander's (1950) more limited proposal that specific emotional states result in disturbances in certain vegetative functions. Alexander (1950) modified the psychoanalytic interpretation and his specificity theory became the main focus of psychosomatic investigation. He emphasized the importance of unconscious motivational factors, e.g., conflict and psychological defense mechanisms, in causing illness. Alexander's approach dominated the field until about 1955 (Lipowski, 1977a). Secondly, attempts have been made by experimentalists and epidemiologists to discover correlations between social stimuli, a person's response to them, and changes in physiological function or health status. This approach has focused on unconscious and measurable psychosocial variables, and is evident today in, amongst others, the epidemiological approaches of Wolf, Hinkle, Holmes and others (Lipowski, 1977a; Murray, 1977). Both these approaches presuppose a set of assumptions about the nature of society and man's interaction with the environment and of the aetiology of disease. These approaches presumed that the study of man simply as a biological organism does not fully explain deviations from health. The realms of thought, motives and feelings, both conscious and unconscious, should be taken into account when examining their interrelation with biological processes. This holistic approach, emphasizing the need for an overarching and unifying science of man's psychobiological functioning in continuous interaction with his environment, is replacing the reductionist view of health and illness (Lipowski, 1977a).

Various authors (e.g., Alexander, 1950) have postulated a specificity of life circumstances associated with the onset of various emotional reactions. Undoubtedly, some of these specific formulations occur in some patients, but there is no evidence to support the view that they are applicable to disease in general (Linford Rees, 1979).

A carefully executed study to evaluate experimentally Alexander's specificity hypothesis as applied to seven diseases (asthma, rheumatoid arthritis, ulcerative colitis, essential hypertension, neurodermatitis, thyrotoxicosis and peptic ulcer) was carried out by the Chicago Institute of Psychoanalysis but the results failed to validate the specificity hypothesis (Linford Rees, 1979). This does not mean that the psychodynamic factors described by Alexander are not important. According to Linford Rees (1979), Alexander's formulation aroused a great deal of controversy. What was overlooked, however, was the fact that his formulations were comprehensive and had to be understood on the basis that specific conflict operated in the presence of "X" factors which, at that time were unknown, and were related to genetic, biochemical and physiological attributes. Furthermore, that the strong emotions accompanying the activated response to specific life situations were mediated by autonomic, hormonal or neuromuscular mechanisms to produce lesions in the target organ.

Most clinicians working in the field of psychosomatic medicine believe that Alexander's formulation carried substance, simply because of its clinical validity (Kalucy, 1979). An example of a study which successfully demonstrated the importance of Alexander's formulation (and its interaction with genetic variables, life events and an "entrapment" — whereby an individual is placed in a stressful situation in which his options are severely limited by the fact that he cannot leave the "field"),

is Weiner's study of naval recruits and their vulnerability to duodenal ulcer (Weiner et al, 1957). His study illustrated the interaction between (1) genetic predisposition, (2) a specific personality structure, (3) a major stress and (4) the problem of "entrapment". Other studies which gave support to Alexander's formulation include those of Goldberg (1958), Fisher (1973), and Kalucy (1976).

Other versions of the specificity hypothesis are those of Dunbar (1943) and Halliday (1948), who have, among others, proposed the hypothesis that for each psychosomatic disorder there were specific personality attributes. Various studies have attempted to evaluate this whether in terms of traits of personality, constellations of traits, personality types or personality profiles, but have failed to support the claim that there are specific personalities correlated to specific psychosomatic disorders. This does not mean that personality disposition is not of importance in psychosomatic disorders. Most workers agree that a patient's personality is of paramount importance in that it influences his reaction to environmental changes, psychosocial stresses and stimuli, and will govern his emotional reactions and arousal to such stimuli. In addition, they will also influence the way in which he perceives such life changes and psychosocial stresses, and also the way with which he copes with these by a variety of different possible mechanisms which can influence the potentially damaging effect of such stresses. Personality factors will also influence the degree to which emotions are contained or adequately expressed in motor activity, speech or in other ways.

One study which seems to support strongly the "specific personality" hypothesis is that of Friedman and Rosenman (1974) who have identified a behaviour pattern which they believe is associated with a high risk of coronary disease. The coronary behaviour pattern, designated Type A, as opposed to Type B, is characterized by extreme aggressiveness, competitiveness and ambition along with feelings of restlessness and a profound sense of time urgency. Friedman and Rosenman (1974) believe that the behaviour pattern represents the interaction of environmental influences and individual susceptibilities. The association between work pressure and coronary disease has gained considerable support (e.g., Caffrey, 1968, 1969; Sales, 1969; Fröberg et al, 1971; French and Caplan, 1973).

Today, the Social Readjustment Rating Questionnaire (SRRQ) developed by Holmes and Rahe (1967) seems to have overcome the old conflict between Alexander and Dunbar on the specificity of psychosomatic disorders. The SRRQ is used to quantify a range of stresses and to summate those stresses occurring within a person's life over a defined period of time (e.g., for one to two years) and to use the numerical values of these stresses as indices of vulnerability to illness. Holmes and Rahe (1967) have emphasized that the critical issue in stress is the amount of "change" required following a stressful event. Thus a job promotion might easily be perceived as a welcome event, but is nonetheless, one which requires major change and adaptation and which could consequently increase vulnerability to illness.

In another study Rubin et al (1971) used the Schedule of Recent Experience (SRE) questionnaire (Rahe et al, 1964) which quantifies the amount of stress related to changes in the following areas of

life : personal, family, social, religious, residential, community, economic, occupational, and health experience. The entire crew of a United States navy battleship was tested prior to setting out for combat in Vietnam and illnesses were recorded during the cruise. Younger and older crew members' stress scores were analyzed separately since their experiences could be quite different. Subjects who had higher "total life change scores" tended to have a greater number of illnesses. Life change scores based on a regression scoring system discriminated significantly those most likely to report future illnesses. Other studies which have examined the precipitating events surrounding the onset of an illness are those of Robbins (1962), Rees and Lutkins (1967), Parkes (1972), Paykel et al (1971), Arce (1972), and Raphael and Maddison (1976), among others.

Another important aspect of the psychosomatic theory of illness is what is known as "clustering" (Hinkle, 1961). Illnesses tend to occur in clusters. In general, the periods during which stress of life increases, appear to be associated with "clusters of illness". The clusters may comprise a variety of illnesses. Generally, the more severe the life change, the more serious the illness experiences (Hinkle, 1961). One-half of all episodes of illness which occur among adults of similar age are experienced by fewer than one-quarter of their number; this small segment of the population seems to account for two-thirds of the days of disability which occur amongst these adults (Hinkle, 1961).

A popular and important concept in the study of psychosomatic conditions is the concept of a "multiple aetiology" (Rooyman, 1973; Shontz, 1975; Lipowski, 1977b; Murray, 1977; Wittkower, 1977; Linford Rees, 1979). Selye (1973, p. 696), looking back on his list of "stress syndrome",

remarked:

"..... very few diseases are monocausal in the sense that their development is the inevitable consequence of one particular pathogen The typical pluricausal diseases are the consequence of 'pathogenic constellations'".

A dynamic unifying concept of psychosomatic disorders takes into account the interaction of multiple forces in terms of adaptation to external forces and changes on the internal milieu to maintain homeostasis, a prerequisite for health and wellbeing (Linford Rees, 1979). According to Lipowski (1977b), it is generally agreed that all diseases, physical and mental, are multifactorial in origin, and that there is growing evidence that psychological and social factors are a class of aetiological factors in all diseases. Their relative contribution, however, may vary considerably from illness to illness, from person to person, and from one episode to another of the same illness in the same person. Further, once the symptoms of a disease are perceived by the person, the resulting psychological processes may influence the patient's experience and behaviour as well as the course of the illness.

Serious practical problems do arise, however, when such a holistic approach is applied to illness in that researchers and clinicians are usually specialists in their own fields and so view people from within that framework (Shontz, 1975). One consequence of this is that while multifactorial causation is acknowledged, treatment is often administered from the standpoint of a single cause. As Rooyman (1973) says, multicausality remains an empty concept if no attempt is made to accurately describe and order the diverse causes of disease, and,

where possible, to assess the relative importance of these causes. One solution to the dilemma of a holistic approach is to adopt a philosophy of "comprehensive care" — a multidisciplinary approach to the treatment of illness (Shontz, 1975; Aitken and Cay, 1977). One of the problems facing such an approach is that although many physicians are becoming aware of emotional factors in somatic disease, they are, however, trained to look for single causes and specific remedies. Such physicians tend to view certain problems as mental and others as physical (Lewis and Lewis, 1972).

2.3 Animal and Human Studies

Various researchers have conducted experiments, some employing animals, others humans, in an effort to examine the effects of various types of stressors on behaviour and/or bodily function.

2.3.1 Animal Studies

Cannon (1914) had shown that irritation and excitation caused the blood of cats to clot faster, and that these stressful situations which required behavioural adjustment, caused their blood pressure levels to rise. Cannon reasoned that this innate response — the emergency reaction — prepared cats for behavioural action, such as running or fighting. The emergency reaction, popularly called the fight-or-flight response has been characterised by increases in blood pressure, heart and respiratory rates, and skeletal muscle blood flow (Cannon, 1914; Abrahams et al, 1960).

The occurrence of sudden death has also been noted in animals under severe stress. For example, that of animals involved in fights (and even when no injury was sustained) (Christian and Ratcliffe, 1952;

Richter, 1958; Fennes, 1968); captive wild rats subjected to an intimidatory display by cage mates attempting to establish dominance (Meinhardt and Robinson, 1962); and in the case of a llama death within minutes of seeing her mate of 13 years shot and killed (Engel, 1968). In a much-quoted study, Richter (1957) provoked sudden death in wild rats by subjecting them in rapid succession to restraint, trimming of the whiskers, and immersion in water. He suggested that death was the result of acute emotional arousal, and not drowning. He noted too, that when rats were trained by repeated brief exposures to the tank, they would quickly adapt and their behaviour turned from one of submission to aggression, and vigorous escape activity. Similar observations were noted by Groover et al (1963) who conducted post-mortems in seven of forty-nine baboons trapped for experimentation. Their deaths were attributed to the events surrounding the trapping and transporting of these baboons in small cages, followed by handling in the laboratory which included weighing, bathing, and tattooing.

In a study by Brady et al (1958) two monkeys with similar backgrounds were strapped into adjacent chairs. Both were given painful shocks every 20 seconds. One of the monkeys, the "executive", could delay the shocks to both itself and its partner by pressing a lever. The other monkey was also given a lever, but it did not work; there was nothing this monkey could do to avoid pain. The "executive" monkey soon developed severe stomach ulcers. Apparently, the strain of being responsible for its own conduct and that of its companion was too onerous for it. The "nonexecutive" monkey, who did not undergo the same stress, did not develop ulcers.

A later study by Weiss (1971), however, reversed these findings. Weiss

found that those rats which were deprived of control were the most likely to develop ulcers.

Barnett (1964) has reported on his observations of the behaviour of wild rats. He reported on the death of vigorous males which had been introduced into a cage in which there was already an active social hierarchy with a dominant male in residence. The dominant rat attacked the intruder who submitted, and was therefore not bitten seriously. Despite this, the then subordinate intruder invariably died in a few days. Similar findings with other animals have been reported by Von Holst (1972).

Medoff and Bongiovanni (1945) produced hypertension in rats by subjecting them to air-blasting for ten minutes daily. By the time these animals were 400 days old, 61 per cent of the experimental animals and only 19 per cent of the control group were hypertensive. They noted too, that those experimental animals which developed hypertension showed higher behavioural reaction to stress than those experimental animals which did not develop hypertension. Schunk (1954) placed cats in a stressful situation by exposing them to barking dogs for prolonged periods of over a month. About 50 per cent of the cats developed hypertension. Henry et al (1967) noted that when rats were exposed to stressful conditions of life in crowded cages, there was a permanent elevation of blood pressure, with an increased mortality due to frequent cerebral vascular lesions. Similar observations with monkeys have been noted by Miminoshvili (1960) and Lapin (1965).

The beneficial effects of stress in animals has also been investigated. Although specific studies vary in their details, when adult animals which had been handled in puphood by man, were contrasted with non-

handled littermate controls, the former were better able to cope with novel situations and with conditions of aversive stimulation than the latter (e.g., Lindzey et al, 1960). Thus, for these animals, the presence of stress in puphood turned out to be a facilitating experience when they had grown older. An example of the beneficial effects of stress concerns the absence of stress, which in some animals has been shown to be harmful (e.g., Riesen, 1966).

2.3.2 Human Studies

Harris et al (1956) have reviewed studies dealing with psychophysiological stress, and have classified experiments of this type according to the kind and duration of stimulus employed. According to these authors, short-term stimuli may be exemplified and categorized into (1) failure stressors (e.g., subjects told about their failures but given one more chance to solve insoluble problems, (2) workload and distracting stressors (e.g., subjects have to perform a task, sometimes at above-normal speed, sometimes being distracted by meaningful or meaningless noises, flashing lights or electric shocks, etc.), and (3) fear-inducing stressors (real or simulated threats of criticism, of being fired, of physical danger, etc.).

The long-term stimuli, on the other hand, may be subdivided, according to Harris et al (1956), into four categories : (1) combat stressors (e.g., subjects are exposed to attack situations), (2) stressors of hazardous duty (e.g., of submarine and aircraft personnel, or soldiers near the front line but not in actual battle), (3) stressors of confinement and isolation (e.g., submarine or astronaut duty, prison confinement, etc.), and (4) prolonged performance stressors (e.g., vigilance tests, monotonous work, etc., resulting in fatigue).

Most of the short-term studies have been performed in a laboratory, whereas long-term stressors are often given in a real-life setting.

Cardiovascular changes in humans have been demonstrated in response to a wide variety of situations comprising psychosocial stimuli, such as matriculation and other examinations (Bogdonoff et al, 1959, 1960; Patkai et al, 1967), centrifuge rides (Silverman and Cohen, 1960; Frankenhaeuser et al, 1962; Goodall, 1962), extensive medical examinations (Ulvedal et al, 1963), dental treatment (Weiss et al, 1965), acrobatic, supersonic and space flight (Hale, 1965), motor-car driving (Smith and Bennet, 1958), water immersion (Goodall et al, 1964), sensory deprivation (Mendelson et al, 1960), hospital admission (Tolson et al, 1965), and a variety of laboratory situations characterized by over-stimulation, under-stimulation, anticipation, and conflict (Frankenhaeuser, 1971). Some of these exposures were of relatively short duration, while others were of long duration.

Epstein (1962) studied the effects of anticipating stress on a group of 28 parachutists. Each subject was asked to describe his feelings before, during, and after his jump. All subjects reported an increase of fear and of the desire to escape as the jump approached. Once they were in line and realized they could not turn back, however, they began to calm down. By the time they reached the most dangerous part of the jump, their fears had subsided.

Investigations of the effects of stress on bodily function have made use of both the laboratory and field study methods. For example, Fröberg et al (1971), in their laboratory studies, have employed a variety of stimuli which were related to habitual activity, and some were of prolonged duration. In their studies, groups of subjects have

been exposed to a variety of psychosocial stimuli including : (1) simulated industrial work (sorting of steel balls), (2) simulated office work (proof-reading), (3) appearance before an audience, (4) film programmes chosen to induce anxiety, aggressiveness, and other emotional reactions, (5) simulated psychomotor tasks, and (6) prolonged function under simulated ground combat conditions. In their field studies, the reactions of various occupational groups to real-life stimuli have been studied, namely the stimuli arising from the subjects' own work situation. These situations included those facing (1) telephone operators, (2) invoicing clerks, (3) office clerks subjected to changes in the work environment, (4) supermarket cashiers (during rush hours and quiet periods), (5) paper mill workers working in three shifts, (6) and engine-drivers working irregular shifts at various seasons.

A large number of experimental studies have examined the effects of psychological stress on the level of blood pressure in humans. Generally, subjects react to stress of any type with a rise in the level of blood pressure (Malmo and Shagass, 1952). Brod et al (1959) for example, used mental arithmetic as a stimulus in eight normotensive and ten hypertensive subjects. Both groups showed a rise in the level of blood pressure. In their other studies, Brod (1960) and Brod et al (1962) showed that in addition to producing changes in blood pressure, mental arithmetic also produced changes in heart rate and cardiac output in both normotensives and hypertensives. Jost et al (1952) subjected hypertensives and normotensives to a variety of unpleasant stimuli which included buzzers, bright lights, emotionally disturbing questions, and memory tests (digit span) of rapidly increasing difficulty. The blood pressure rises induced by these stimuli were

consistently greater and more prolonged in the hypertensives than in the normotensives.

In studies by Hokanson and colleagues (1961, 1962 a, b, 1963), normotensives were deliberately made angry by the experimenter while their blood pressures were being recorded. An elevated blood pressure could be brought back to normal by giving some of the subjects an opportunity to administer electric shock to the experimenter (i.e., some overt expression of hostility). The blood pressure of those subjects who were angered — but not allowed to express their feelings — remained higher than those subjects who were angered but who were permitted to express their feelings. Their findings suggested, *inter alia*, that the expectation that aggression may be expressed was the key factor in altering the level of blood pressure.

The general findings cited above have been confirmed by Schachter (1957), Malmö and Shagass (1952), Shapiro (1961), and Mc Kegney and Williams (1967), and more recently by Henry et al (1975).

Schneider (1950), Macht (1952), and Dreyfuss (1956) showed that individuals subjected to chronic stress had reduced blood coagulation times. Dreyfuss and Czaczkes (1959) and Grundy and Griffin (1959) showed increased cholesterol levels in students before examinations, and in accountants during the income tax season.

From a review of the above findings, it becomes clear that both animals and humans respond to stress with changes in cardiovascular functioning. However, one needs to be cautious in interpreting the findings of the various studies cited above. For instance, although most investigators have been successful in experimentally inducing a rise in the level of blood pressure, they were unable to produce a sustained rise in blood

pressure.

Moreover, from results of well-controlled laboratory studies using animals it would be unscientific to generalize about humans — or for that matter, about animals in their natural environment.

2.4. Mediating Mechanisms

Vital to the understanding of the possible relationship between psychosocial events and illness is the role of the mediating mechanisms interposed between environmental stimuli and physiological responses. Inquiry concerning the way in which psychological processes affect health and disease date back to the time when physicians first began to observe and describe illness (Hinkle, 1974). Today, three major mechanisms have been linked to explain the procedure which intervenes between a symbolic stimulus and a pathophysiological response : the neuro-physiological (e.g., Hinkle, 1968, 1973; Kiely, 1977), the neuroendocrine (e.g., Wolff et al, 1950; Whybrow and Silberfarb, 1977), and the immune mechanism (e.g., Amkraut and Solomon, 1977; Monjan and Collector, 1977). According to Kiely (1977), there are marked individual responses to intrapsychic or environmentally perceived threat, and, regardless of the level of perceptual awareness, a stressful experience gives rise to an organized pattern of physiological change. Kiely (1977) adds that such adaptive mechanisms are similarly evoked by anticipated pleasure, reward or satisfaction. In any case, the sense organs act as "sensors" whereby the nervous system acquires information from the environment. The information is evaluated against "memory", using a combination of innate and acquired programmatic processes, and the nervous system elaborates highly organized patterns of response designed to serve the biological needs of the organism. This process

is communicative in nature, and the response of the organism is directed at the biological meaning of the information which it has acquired (Hinkle, 1973). One might say, therefore, that from a physiological point of view a person may be expected to react to the "meaning" of the information he obtains from his social environment and not necessarily to the "objective" features of that information which are discernible by others (e.g., Hinkle, 1974).

The explanations of neuroendocrine mediating mechanisms began with the works of Cannon (1929), Selye (1946), and Wolff et al (1950). Although the precise details of the processes of this mediation were not clear, their findings made it apparent that probably any biochemical process within the cell could be influenced in some way and to some degree by the central nervous system. Therefore it seemed evident that there would probably be no aspect of human growth, development, or disease which would in theory be immune to the influence of the effect of an individual's relation to his social and interpersonal environment. In explaining the neuroendocrine mechanisms, Whybrow and Silberfarb (1977) say that a mechanism of communication between cells is the key to the survival of the multicellular organism. Endocrine mechanisms would appear to be an evolution of the simplest form of signalling system, that of a chemical substance being liberated from one cell and arriving at the cell surface of a second to modify the behaviour of the latter. Such a mechanism is central to communication in biology (Whybrow and Silberfarb, 1977). Indeed, the nervous system itself may be viewed simplistically as a highly adapted group of cells in which a change in shape has facilitated close physical contact and rapid transmission of information intracellularly (Rose, 1973). The actual movement of information between cells, however, remains dependent

upon the release of a chemical transmitter which passes across the synapse to modify the cell membrane (cell surface) of the receiving cell. Several neurotransmitters are indeed also chemical messengers in the endocrine system (e.g., norepinephrine) (Whybrow and Silberfarb, 1977).

The response of the individual to stressful stimuli is known to be much more complex than was envisioned originally by Selye (Patkai, 1974). Whybrow and Silberfarb (1977, p. 221) are of the opinion that "psychoendocrine tuning" is as important as the concepts of psychological coping and defense, and that

".... the endocrine system constitutes a physiological mechanism of defense adapting the individual to his environment in much the same way that we conceptualize psychological mechanisms of defense".

Endocrine response in humans under stress has been studied in a variety of circumstances : in the parents of children with leukemia (Friedman et al, 1963), in patients with psychiatric disorders (Sachar et al, 1963), in subjects viewing films (Levi, 1968), etc.

Indirect evidence from a variety of sources supports the notion that stress and emotional distress may influence the functions of the immunologic system, presumably via neuroendocrine mediation (Solomon and Moos, 1964). Clinicians have long been aware of the concept of "resistance", which is influenced by environmental factors, in the aetiology of infectious diseases. Many researchers (e.g., Korneva et al, 1972) have implicated the central nervous system (hypothalamus) directly in the regulation of immunity.

According to Lundberg (1982) the immune response might be involved in

the relationship between life changes and susceptibility to illness in general. Animal experiments (e.g., Monjan and Collector, 1977) support the assumption of reduced immune response during short-term stress; the effects of long-term stress being less clear.

Amkraut and Solomon (1977) point out that the immune response and stress-induced physiologic changes vary with the species, the genetic constitution and environmental factors, and can be manifested through multiple pathways. Both systems are multifactorial, and their interaction is extremely complex, tending to make the reproducibility of any effect subject to a large range of outside influences. Physiologic and metabolic factors lying outside the immune system may affect the proper functioning of the system. These factors may also affect the outcome of disease, independent of immunologic events (Amkraut and Solomon, 1977).

2.5 Methodological Considerations in Psychosomatic Research

Research in the field of psychosomatic illnesses is fraught with methodological problems. Some of the well-known problems are :

- (1) The heterogeneity of subject populations studied has been a major methodological weakness of earlier research. These weaknesses have led to hypotheses concerning the role of intrapsychic conflict in the activation of specific organic processes. In studies of peptic ulcers, for example, the experimental population has sometimes included patients with gastric as well as duodenal ulcers. Although these conditions have many features in common, they also present significant differences, which justify their classification as separate morbid entities, brought about by different

aetiological and pathogenetic mechanisms (Kirsner, 1958).

Thus, the investigator in this area is faced with experimental error.

- (2) The lack of reliable data about when an illness began, has crucial implications for studies of the environmental events surrounding the onset of the disease and the subject's psychological responses to these events. No such information is available, for example, with respect to essential hypertension. As Pickering (1961) has pointed out, there is no agreement about the dividing line between normal and elevated blood pressure; the criterion of elevated diastolic pressure shifts is purely an arbitrary one.
- (3) Clinical psychosomatic research has been impeded by methodological problems which are intrinsic to all clinical studies which employ psychological instruments. Psychology and psychiatry are observational sciences, and the

".... human observer is a difficult instrument to calibrate". (Weiner, 1971, p. 480).

Moreover, generalizations have often been formed on the basis of single case studies; subjective inferences and objective observations have often been intermingled; inter-rater or test-retest reliabilities have often not been assessed; and the categories of units of behaviour which are usually observed are either not defined at all, or not operationally defined (Weiner, 1971).

- (4) In most instances, regardless of the specific techniques used, the observer is aware of the nature of his subjects' illness

beforehand. The problem of experimenter bias is compounded by the fact that the subject, in turn, often knows that his illness is supposed to have psychosocial determinants. He may, therefore, select or withhold certain material to please or frustrate the experimenter, or because he fears exposure. Proper controls may circumvent some of the problems but they cannot alleviate all (Weiner, 1971).

- (5) Alexander's (1950) formulations regarding the personality pattern of peptic ulcer patients served to underscore the need to take socioeconomic factors into account in clinical studies, as well as such factors as age, sex, and educational background. Subjects and controls must be matched with respect to each of these variables.

Within an extremely wide field of psychosomatic research, methods are, obviously, numerous and different from one another. These embrace individual psychological investigations, psychodiagnostic techniques, statistical evaluations, ecologic and transcultural considerations, and epidemiological studies — to mention a few.

Johnson (1977) reports that psychophysiology, like other areas of research, has increasingly turned to recording data on frequency - modulated tape recorders for analysis by one of several types of specific - or general - purpose computers. Researchers have been freed from artificial laboratory environments, enabling 24 hour monitoring of situations as varied as medical wards, unusual environmental settings under water or in space, or during various activities in the bedroom.

Psychosomatic research, like other scientific disciplines, can be classified into methods of stimulation, observation, and interpretation.

Graham (1972) has listed five kinds of evidence which could be gathered to support the hypothesis that some diseases are responses to psychological stimuli. Two kinds of evidence come from psychophysiological studies : (1) experiments in which physiological observations are made while the patient is reacting to psychological stimuli presented as words or pictures; and (2) recordings from and observations of subjects during or after exposure to disturbing stimuli of a real-life sort, either experimentally manipulated or naturally occurring. The other three kinds of evidence listed by Graham (1972) are : (1) life histories; (2) correlation between social variables and differences in the incidence of various diseases; and (3) predictive studies of the outcome of illness according to the occurrence of disturbing psychological stimuli known to be present in the patients' lives.

Another popular approach to psychosomatic research is epidemiology — the study of disease based upon the examination of the general characteristics of groups, in contrast to clinical medicine, which studies individuals (Eastwood, 1977). Although the epidemiological approach was developed initially to study infectious disease, its techniques have since been applied usefully to what has been described as the "chronic non-communicable" disorders (Wilson, 1968). With the epidemiological approach it has been possible to examine the distribution, aetiology, course and prognosis of such commonly occurring disorders as cancer, heart disease, and mental diseases. Cooper and Shepherd (1970) have advocated the usefulness of the epidemiological triad (host, agent, and environment) and have recommended for use a modification suggested originally by Vickers (1958), made up of the environmental situation, the physiological and psychological changes engendered by the environment in the individual, and the behaviour consequent upon these

changes. Vickers (1958) suggested that these factors be designated respectively "stress-situation", "stress change", and "stress behaviour". In epidemiological studies it is stress behaviour, i.e., symptoms and signs of psychiatric disorder, which are taken to indicate a morbid process (Eastwood, 1977).

Luborsky et al (1973) have advocated the multiple-level interaction method in psychosomatic research, wherein disease onset studies can be classified into four groups in terms of the main variables focused upon : the external situation (e.g., external stress or life change); the internal state (e.g., helplessness-hopelessness); the type of patient (e.g., patient's attitude assessed by interview); and the physiological condition (e.g., cardiographic recordings). Most studies include only one or two of these main variables. Since symptoms seem to be produced by a multiple interaction among these four groups, studies which include three or four groups of variables are likely to contribute more. A good example is the study by Weiner et al (1957), cited in Section 2.2.

2.6 Current Trends in Psychosomatic Research

A perusal of the literature reveals four current trends in thinking about how emotional and psychological factors are relevant to an understanding of disease. These are :

- (1) A broadening of the field of psychosomatic medicine. The psychological factors in a variety of diseases are being recognized (Singer, 1977), and the field of psychosomatic study is no longer strictly confined to the classic psychosomatic diseases originally propounded by Alexander (1950). In addition to the psychological antecedents of

heart disease (Friedman and Rosenman, 1974) mentioned above, those of cancer (Le Shan, 1959; Thomas and Duszynski, 1974), and tuberculosis (Kissen, 1958) are being recognized.,

- (2) A distinct "softening" of the tendency to link types of disease with particular personality characteristics. The tendency is to look more and more to the circumstances and interpersonal transactions that seem to precede illness (e.g., Singer, 1977). Apparent exceptions to this trend include the current work relating to Type A personality for cardiovascular problems (Friedman and Rosenman, 1974) and the recent thinking about the cancer-prone individual (e.g., Thomas and Duszynski, 1974; Le Shan, 1977)..,
- (3) A dramatic shift in the direction of identifying and investigating the mechanisms of stress-caused disease (Weiner, 1977). It has been found, for example, that asthma, rheumatoid arthritis, ulcerative colitis, and cancer involve immunological factors which were unsuspected about thirty years ago (Bowers and Kelly, 1979). These developments are particularly provocative, since they provide a way of conceptualizing how "mind" events (i.e., events processed by the central nervous system) can be transduced into functional and structural changes of the body (Triesman, 1968; Weiner, 1972; Amkraut and Solomon, 1975); and
- (4) A distinction between true psychosomatic disorders, in which a psychogenic component is regarded as one of the causative factors essential to the existence of the disease (e.g., essential hypertension) and other diseases (e.g., asthma) in

which there may be a contributory psychogenic factor which is not essential to the origin of the disease (Engel, 1967). In one population survey (Schwab et al, 1974) slightly more than 50 per cent of the cases revealed at least one psychosomatic symptom and about 33 per cent of all complaints for which patients consulted physicians originated from emotional problems. Arce (1972) applied the term "somatopsychic" to those categories of patients, e.g., cardiac or cancer patients or instances of terminal cancer, in which reactions to death combine and interact with symptoms of physical illness. Moreover, the entrance of physiological research and, particularly neuroendocrinology, has replaced theorizing about mind-body interreaction with convincing evidence of the brain's control over the body (e.g., hypothalamic dysfunction in anorexia nervosa), and the body's influence on the mind (Nisbett, 1972). The autonomic nervous system and endocrine glands are crucial links between the brain and body tissues and disease (Mason, 1970). The interrelationships between personality and the use of contraceptive pills, and the incidence of side effects, (particularly depression) have, for instance, been shown to exist (Kane, 1971; Schwab, 1971).

2.7 Summary and Conclusion

Psychosomatic medicine is not a specialty. It does not lay particular claim to any one disease or group of diseases. Rather, it is that branch of the clinical sciences of medicine which concerns itself with mind - body interactions and the relevance of these to health

and disease. Its concerns are more with the predisposition to, and the initiation of disease than with pathophysiology.

Insofar as the aetiology of disease is concerned, the emphasis today is on a multifactorial causation. The fact that psychological variables may cause somatic symptoms does not mean that they are a necessary antecedent to these symptoms. The symptoms may be caused by psychological variables in some instances but not in others. Psychological variables are best regarded as sufficient but not necessary causes of certain somatic symptoms.

Much of the impetus for the study of psychosomatic illness is derived from the works of Alexander, Dunbar, French, and Halliday who proposed that specific personality characteristics were common to specific psychosomatic disorders. This view has been replaced by holistic approaches which have been employed primarily by experimentalists and epidemiologists (e.g., Wolf, Hinkle, and Holmes) who have shown correlations between social stimuli, an individual's response to them, and changes in physiological function or in health status.

Studies employing both animal and human subjects have been conducted to show that stress (harmful and beneficial) affects behaviour and/or bodily function. Three major mechanisms which interpose between psychosocial stress and physiological responses have been identified : neurophysiological, neuroendocrine, and immune mechanisms. While information in both endocrinology and immunology is reaching explosive proportions and new facts relevant to these studies are coming to light, the issue of "mechanisms" is of enormous complexity.

Research in psychosomatic medicine is not without methodological difficulties. These include defining related concepts, experimenter bias, and the lack of reliable data concerning when an illness began. In the study of stress and illness increasing use is being made today of sophisticated methods employing, inter alia, computers and frequency-modulated tape recorders. Such methods have the advantage of overcoming experimenter bias.

CHAPTER THREE

3. STRESS

3.1 Introduction

The concept of stress was first introduced into the life sciences by endocrinologist Hans Selye in 1936 (Appley and Trumbull, 1967). In 1950 Selye was the sole author of a treatise on stress, while in 1978 alone, there were close on ten thousand articles written on stress (Rosch, 1979).

The study of stress in man has become a focus of interest in the behavioural and biological sciences, and in a relatively short period of time, a vast number of studies have been conducted on the impact and consequences of stress. Basically studies on stress can be grouped under two broad headings : those studies concerned with the effect of stress upon biological functioning; and those studies dealing with the human organism's ability to adapt to and cope with various types of "stressors".

Studies concerning the effect of stress upon biological functioning fall into three broad areas. The first focuses upon the effect of stress on various physiological processes. Such studies have shown that persons experiencing stress often display changes in, for example, the mucous membrane (Wolff et al, 1948), cardiac functioning (Wolf et al, 1948; Stevenson and Duncan, 1950), gastric function (Margolin et al, 1950), and blood pressure levels (Harburg et al, 1973).

A second area of study has shown stress to be related to the genesis,

onset, course, and outcome of a wide variety of human ailments, including such diseases as cardiovascular disorders (e.g., Wolff, 1950; Reiser et al, 1950), ulcerative colitis (e.g., Lindemann, 1950), dermatitis (e.g., Kepecs and Robin, 1950), and rheumatoid arthritis (e.g., Gottschalk et al, 1950).

A third area consists of general studies of the effect of stress upon illness. These have focussed primarily on the relationship between life experiences and the number of illnesses experienced by an individual during a given period of time. These include studies by Reusch et al (1948), Hinkle et al (1958), and Mechanic and Volkart (1961).

Whereas the studies mentioned above have focussed on the relationship between stress and illness, other studies (e.g., Grinker and Spiegel, 1945; Basowitz et al, 1955; Glass and Singer, 1972; Cooper and Marshall, 1977) have been concerned with the ways in which the human organism attempts to cope with stressful situations, experiences, or events. These studies have focused much attention on the defensive reactions, and the effort to maintain equilibrium, in the face of difficult or intolerable circumstances.

Another major category of human stress studies (e.g., Rubin and Rahe, 1974) has investigated man's capacity to withstand unusually high demands on his abilities. This type of study is concerned typically with questions of task complexity.

All three of these types of human stress studies have at least one thing in common : researchers have been interested primarily in the effect of the actual stressful situation or event on human behaviour.

An as yet small but growing number of studies (e.g., Lazarus and Baker, 1957) has shown primary concern for the effect of the threat of unpleasant social or ego-damaging events on human behaviour. These investigators have recognized that merely anticipating unpleasant events can have a marked effect on an individual's behaviour. Such anticipatory stress, according to Wherry (1966), is not only a real phenomenon, it is often more disruptive of behaviour than the occurrence of the unpleasant event itself.

3.2 A Conceptualization of Stress

Although a great deal of information has been amassed concerning man's reactions to stress, there appears to be some disagreement about the meaning of the stress concept (e.g., Janis, 1958; Howard and Scott, 1965).

Researchers have been guided by various definitions of stress. Stress has been examined, for example on at least three different levels : sociological stress — which includes sociologically defined events and their impact on the social structure; physiological stress — which includes the effects of physical assault on bodily tissues and the physiological mechanisms involved; and psychological stress — which includes interpersonal disturbances and various life experiences especially of a disturbing nature, regardless of whether the initial source of stress is a societal event or an individual one, and as long as the mediating processes are considered in psychological terms (Lazarus, 1966).

It is apparent that the three different levels of stress listed above might be combined in the same study. For example, psychological stress

situations might be employed in a study which focuses primarily on physiological responses and their mechanisms. Usually, in such cases, the major focus of research is on only one of those levels at a time (e.g., Reavley, 1974). Social or personality psychologists frequently employ physiological indicators of stress reaction, but their interest is usually not in the physiological mechanism per se (e.g., Harburg et al, 1964).

In recent comprehensive reviews of the literature three main usages of the concept of stress have been identified and compared : stimulus-based, response-based, and interactional definitions (e.g.,Mason, 1975a, 1975 b; Mc Grath, 1970b;Lazarus and Launier, 1978; Cox, 1978). Each of these categories encompasses quite different approaches.

Stimulus-based approaches may be subdivided into those that explicitly acknowledge the importance of individual appraisals of events and those which ignore such mediating cognitive processes. In Spielberger's Trait-State Anxiety Theory stress is used to denote environmental conditions which are characterized by some degree of objective physical or psychological danger (Spielberger, 1972). Spielberger assumes that stressful conditions must be appraised as threatening in order to evoke an anxiety reaction. Following this conception of stress, objectively nonstressful situations may be appraised as threatening if a person perceives them as harmful. On the other hand, objectively stressful situations may be regarded as non-threatening by certain persons. The actual appraisal of a situation as physically or psychologically dangerous is determined by individual differences in personality dispositions, aptitudes, and personal experience with similar situations in the past which may lead an individual to develop coping skills.

Instead of making a conceptual distinction between stress, as an objective condition, and threat as the consequence of the appraisal process, other writers prefer to include the subjective appraisal of a situation in the definition of stress. Chan (1977) who views stress as stimuli or a situation which severely tests the coping resources, argues that an event becomes stressful only when it is perceived as such.

Another group of researchers (e.g., Holmes and Rahe, 1967) has proposed situation-based stress models which do not consider differences in individual appraisals of life stress events. The basic assumption behind their life stress approach has been that the amount of readjustment required to cope with life changes, regardless of the desirability of these changes, is associated with the occurrence of illness.

The most popular response-based definition of stress has been developed by Selye (1976). He defines stress as the non-specific response of the body to any demand made upon it (Selye, 1974). According to Selye (1974) stress is manifested by a General Adaptation Syndrome (GAS). The first stage of this syndrome is the alarm reaction, which includes an initial shock phase (in which defensive mechanisms become active). A second phase of resistance follows, during which maximum adaptation occurs. Should the stressor persist, however — or the defensive reaction prove ineffective — a stage of exhaustion is reached in which adaptive mechanisms collapse. Selye (1956) calls this process non-specific because the body shows the same effects regardless of the particular stimulus. What varies is the degree of response, which in turn depends only on the intensity of the demand for adjustment.

"Thus, it is immaterial whether the stress-producing factor — or stressor, as it is properly called — is pleasant or unpleasant While it is difficult to see how such essentially differing conditions can produce an identical reaction in the body, the truth of this has been experimentally verified beyond doubt". (Selye, 1980, p. 128).

Stress, according to Selye, (1980) is not something to be avoided.

"Indeed, by definition, it cannot be avoided, since during every moment of our lives some demand for life — maintaining energy exists. Even while we are asleep, the heart, the respiratory apparatus, and many other organs continue to function. Complete freedom from stress is death". (Selye, 1980, p. 128).

The validity of Selye's nonspecificity of stress has been questioned by Mason (1971,1975a), who argues that the nonspecific physiological responses in Selye's General Adaptation Syndrome may largely be a reflection of the ubiquity of emotional arousal. He contends that the conventional physical stressors (e.g., heat, cold, exercise, and fasting) used by Selye very often elicit psychological reactions related to pain, discomfort, or the emotions. When psychological variables are controlled or minimized in the study of physical stimuli, the pituitary-adrenal cortical system is not activated in the nonspecific manner described by Selye. Although Selye has disagreed on several issues with Mason's conception of stress, he has tended to consider problems of individual perception and interpretation of stimuli in his more recent writings (Taché and Selye, 1978).

More recently, Selye (1980) has pointed out that in addition to the general adaptation syndrome (GAS), there develops, in tissues more directly affected by stress, a local adaptation syndrome (LAS).

Inflammation is one of the most important features of this response. Chemical alarm signals are sent out by the directly affected tissues from the LAS area to the coordinating regions in the nervous system and hence to the endocrine glands, especially the pituitary and the adrenals. The endocrine regulators participate in the control of localized inflammation and also produce hormones to combat wear and tear on the body. Hence, there are close interactions between the LAS and the GAS. A primarily local stress, if sufficiently severe, can produce a GAS, and general stress influences the LAS (Selye, 1980).

Mason (1974) and Lazarus et al (1980), who adhere to a specificity view on illness susceptibility, argue that specific stressors are connected via different physiological and endocrine systems to specific illnesses. The nonspecificity view of stress and illness susceptibility has been supported mainly by studies of the relationship between life changes and the onset of illness, whereas the results of studies on the aetiology of coronary heart disease could be taken as evidence for the specificity view (Lundberg, 1982).

In the third general approach stress is conceived of as the interaction between individuals and situations. For example, Cox (1978) believes that stress arises from the existence of a particular relationship between the person and the environment. Interactional approaches to stress have been proposed to overcome the inadequacies of models which define stress solely in terms of stimulus or response parameters (Laux and Vossel, 1982).

Laux and Vossel (1982) point out that stimulus-related and response-related models of stress, which refer to some appraising, perceiving, or interpreting processes, are also examples of an interactional approach.

Typical interactional definitions of stress emphasize that

".... stress occurs when there is a substantial imbalance between environmental demand and the response capability of the focal organism". (Laux and Vossel, 1982, p. 5).

In this view, stress exists in an imbalance between perceived demand and perceived response capability (Laux and Vossel, 1982).

Mc Grath (1982) refers to social-psychological stress as stress in the context of person-to-person behaviour. That term equates with what Cofer and Appley (1964) mean by psychological as distinct from systemic stress.

3.3 Coping

The concept of coping has developed into a central concept in current theoretical models of stress and emotion (Coelho et al, 1974; Lazarus and Launier, 1978).

Chodoff et al (1964, p. 744) have defined coping as

".... the sum total of all the strategies employed by an individual to deal with a significant threat to his psychological stability".

These strategies include the preferred use of overt responses such as avoidance, escape, or attack, as well as covert (intrapsychic) processes (e.g., redefinition or denial) (Lazarus, 1966).

A person's coping behaviour can refer to the handling of an external fact appraised as threatening, as well as to dealing with internal emotional and cognitive processes evoked by threat appraisal (e.g., Haggard, 1943; Mechanic, 1962; Lazarus, 1974).

In Lazarus' theory of stress (1966, 1976) the major determinant of the stress response is the appraisal of threat. This view has become generally accepted and has been described by Mc Grath (1970c, p. 76) as an

".... Emotional experience, and to some extent physiological and performance measures, are in part a function of the perceptions, expectations, or cognitive appraisal which the individual makes of the (stressing) situation".

Lazarus and Launier (1978, p. 311) have defined coping as

".... efforts, both action oriented and intrapsychic, to manage (that is, to master, tolerate, reduce, minimize) environmental and internal demands and conflicts among them which tax or exceed a person's resources".

The view has been expressed that coping takes place over time.

Lazarus (1968), for example, has shown that immediately repeated exposure to psychologically disturbing stimuli does not reduce the threat-impact, but repeated exposure after a substantial time lapse (one week) does show such reduction. This finding suggests that coping requires time for its accomplishment.

Mechanic (1970), like Lazarus (1968) has shown that an individual's interpretation of the nature of a situation and his relation to it is likely to change substantially over long time periods. Presumably such changes in perception of the stress event are due to various coping procedures, whether behavioural, affective or cognitive. Such coping procedures would appear to alter the meaning of the stress situation for the individual. In addition, Mechanic (1970) has proposed that

some personality types will probably be unable to cope with stress. Specifically, Mechanic (1970) has claimed that poor copers are those persons who accept their inability to exert control over their lives. They appear to formulate few plans or alternatives for taking on some of the problems which confront them. He says too, that in some persons, the "giving up" or acceptance of "fate" may be adaptive in that it appears to result in less tension or anxiety when compared to people who struggle actively against difficulties.

Mc Grath (1970a) has listed four important characteristics of coping behaviour. These are : (1) coping behaviour may take place before, during, or after the occurrence of a stress-inducing condition; (2) at whatever stage, coping behaviour may be directed toward preventing or removing the stress-inducing condition, or toward preventing or undoing the consequences of that stress; (3) coping techniques may be categorized in terms of a healthy - unhealthy, or an effective - ineffective dichotomy. Among ineffective outcomes are those which do not accomplish the removal of the stressor or of its consequences; those which are effective in the short run but not in the long run; and those which work but do so at a cost — in damage to the organism or its aims; and (4) the extent to which an organism uses multiple coping techniques, simultaneously or in succession, rather than just a single coping method.

Mc Grath (1970a) is of the opinion that those individuals who can alter their degree of sensitivity to stressors, and perhaps utilize a spectrum of methods for coping with stress, are at a strategic advantage in coping. Steiner (1970) on the other hand, gives a different view of the problem. He has shown that those who tend to use any one single coping method for resolving interpersonal

disagreements experience less stress than those who tend to use multiple methods. Thus, according to him, any coping procedure used consistently is more effective than the alternating use of more than one coping method.

Certain types of behaviour can be interpreted as coping with stress before the actual onset of stress. One set of such behaviour has to do with ways in which the organism uses objects in and properties of the microsetting to initiate, maintain, prevent, or otherwise manage interpersonal interaction. Altman and Lett (1970) refer to these as environmental props. Another interesting form of coping before the onset of stress is mentioned in the work of Steiner (1970). He found that subjects who showed systematic preference for any one of several alternative techniques for the resolution of interpersonal disagreement experienced less psychological stress as evidenced by GSR readings than subjects who used alternative techniques for their resolution. Furthermore, differences in GSR levels begin to appear after the possibility of interpersonal disagreement has become apparent but before any actual disagreement has occurred. These findings suggest that some individuals "carry with them" preferred coping techniques for handling interpersonal stress situations, so that being forearmed, they are less affected by incipient or actual interpersonal stress than others who do not carry such preferred coping modes.

Lazarus (1966,1976) has divided coping mechanisms in stress into two classes : (1) direct actions in order to eliminate the factors causing stress; and (2) defense mechanisms such as denial and intellectualization. In some cases, according to Lundberg (1982), one may distinguish a third class of coping strategies : the effort invested by the individual in counteracting the detrimental effects of stressful

stimulation (e.g., noise) on behaviour. These actions are directed, not toward the factors causing stress or on the perception of stress, but toward behaviour during stress, for example, performance. This coping strategy probably leads to mental and/or physiological "costs". For example, where subjects have managed to maintain a high performance level during noise exposure, various negative "aftereffects" (e.g., headaches) have been reported (Glass and Singer, 1972).

In 1978 Lazarus (Lazarus and Launier, 1978) reorganized and expanded his classificatory scheme for coping. Of prime interest is his emphasis on the two main functions of coping : (1) altering the troubled transaction with the environment, as for example, when he attempts to demolish, avoid or flee the harmful agent, or to prepare somehow to meet the danger (instrumental or "direct-action" type of self-regulation). Thus if a student, faced with an important and potentially threatening examination, spends the anticipatory interval reading relevant books, rehearses his understanding of the subject with others, attempts to find out or guess what questions will be asked, etc., he is engaged in direct action forms of coping, whether these are effective or not; and (2) palliative modes of coping, which involve regulating or controlling the emotion. Palliation occurs when direct action is either too costly to undertake, or when the individual is unable successfully to manage the environmental transaction.

The intended effect of the "direct action" type of self-regulation is to alter the stressful person-environment relationship. Palliative coping on the other hand, consists of efforts to manage the somatic and subjective components of stress emotions (e.g., anxiety, anger, depression) without changing the actual person-environment relationship

(Lazarus and Launier, 1978). Such modes of control include ego-defenses, selective attention deployment, taking tranquilizers, alcohol, sleeping pills, or engaging in a variety of other techniques such as muscle relaxation, biofeedback therapy, meditation, and hypnosis. Palliative forms of coping are focused on possible ways of reducing the affective, visceral or motor disturbances which are distressing, as opposed to attempts to master the environmental transaction on which the stress emotion and its distressing accompaniments itself depends (Lazarus, 1977).

The concept of coping, as viewed by Cox (1978) is that the chain of events leading up to pathology must be broken in order to cope with stress. Within the framework of his stress model, Cox (1978) proposed that coping behaviours can take place at numerous stages in the stress sequence. Actual demand, for example, can be altered by direct-action coping behaviour. Further, the individual's coping ability can be improved by education or training, or at the least, can be supported by help from others while dealing with the stress. Such action provides a second point in the sequence of stress events where any ill-effects of stress may be averted. A third step in the stress sequence, viz., the individual's perception of stress, is amenable to coping behaviour. For example, stress perception may be altered by a wide range of factors such as drugs, alcohol, psychotherapy, meditation or religion. In addition, the individual's behavioural response to stress may be altered by, for example, some type of behaviour modification programme. The physiological stress response may also be artificially manipulated as a coping mechanism, for example by the use of such drugs as antidepressants.

The view expressed by Schulz and Schönplüg (1982) is that, in general,

no stress is experienced if the perceived capacity of an individual exceeds his or her perceived task demands. Critical however, are states in which task demands equal or exceed the capacity of an individual. The demand/capacity ratio will have an impact on the individual's uncertainty of proceeding : the more demands are conceived of as outbalancing the capacities of an individual, the higher will be his or her lack of information about effective continuation of activity (Schulz and Schönpflug, 1982). There are two ways of reducing the uncertainty of proceedings : (1) by removing the preponderance of demands over capacities by raising capacity. A person's capacity can be improved by practice (Vossel and Laux, 1978) or by increment of effort (Kahneman, 1973); and (2) by removing the preponderance of demands over capacities by reducing task demands. In many situations a person can reduce the individual task demands by lowering his or her aspiration level (Schönpflug, 1982). In all situations the person can resign from the task, thereby reducing task requirements to zero (Averill, 1973).

If, according to Schulz and Schönpflug (1982), attempted coping with a problem situation is not followed by success, the person involved is confronted with the experience of a sustained or even deteriorated ratio between task demand and capacity at a moment when he or she expects a change in favour of capacity. Subjective uncertainty is not reduced but rather increased during such a phase; furthermore, a continuation or even increment of uncertainty, despite coping attempts, gives rise to further inadequate reactions including affective responses. A state of stress due to inadequate coping attempts may last until the person involved finally succeeds in effective coping. Ineffective coping, while enhancing the uncertainty of proceeding,

may also reduce the uncertainty of non-proceeding. When the uncertainty of non-proceeding reaches a liminal value, it can be assumed that the person involved will give up (Schulz and Schönplflug, 1982).

According to Schulz and Schönplflug (1982) a problem or task situation can be conceived of as an actual state being discordant to a required state. In order to resolve discrepancies between actual and required states, regulatory acts can be performed. Averill (1973), as well as Schulz and Schönplflug (1982), have grouped regulatory acts in stress situations into three different classes : (1) if there is a source of stress external to a system, the system can operate in such a way that the external source ceases to function as a stressing agent. This type of operation is referred to as external control. Thus if high work load is the stressing agent, external control will consist of applying effective methods of accomplishing the work assigned. If loud noise is the stressing agent, switching off the noise is an instance of external control; (2) internal control, on the other hand, is a regulatory activity directed toward agents within the system, as for example, diverting attention from an annoying noise. External control leads to changes in structures being external to the operating system while the structure of the system itself remains unaffected. Internal control on the other hand changes the structure of the operating system, leaving external structures unaffected; and (3) control of confrontation, during which neither internal nor external structures are affected. Instead, the system operates in such a way that a decision on the time, locus, and circumstances of problem solution can be made. A typical case of the control of confrontation is the delay of action.

Methods of coping with stimulus overload, especially in urban environments have also received special attention. Milgram (1970), for example, has summarized the results of various studies of the experience of and adaptation to city life. He points out that the concept of stimulus overload links the objective facets of an urban social environment, such as high population density and heterogeneity on the one hand and the individual's experience related to these demographic variables on the other. Milgram (1970) says that stimulus overload influences the daily lives of city dwellers at several levels, i.e., it impinges on role performance, evolution of social norms, cognitive functioning, and the use of facilities. Overload leads to adaptive responses which characterize urban populations. First, there is a tendency to select and allocate less time to each input and to deal with other people in a functional and segmented way. Second, norms of behaviour are evolved which promote non-involvement with others, impersonality and aloofness. Third, cognitive coping strategies are employed which are largely designed to screen out and ignore much of the information and stimulus inputs. Fourth, there is ruthless competition for scarce facilities in the city.

3.4 Theoretical Issues in Stress Research

Although empirical research on social-psychological factors in stress has been somewhat inconclusive to date, Mc Grath (1976) has identified several general themes or propositions, all of which have received some empirical support. These are :

- (1) Cognitive appraisal. Subjectively experienced stress is contingent upon the individual's perception of the situation. That is, emotional, physiological, and behavioural responses

viewed as indices of subjectively experienced stress are greatly influenced by the individual's interpretation of the "objective" or external stress situation.

- (2) Experience. Past experience, in the form of familiarity with the situation, past exposure to the stressor condition, and/or practice or training in responses to deal with the situation, can operate to affect the level of subjectively experienced stress, or to modify reactions to that stress.
- (3) Reinforcement. Positive and negative reinforcements — past successes and failures — can operate to reduce or enhance, respectively, the level of subjectively experienced stress from a given situation.
- (4) The inverted U. There is a nonlinear, inverted U-shaped, relationship between the degree of stress (as subjectively experienced) and the level or quality of performance. The most pervasive form of this theme hypothesizes that, at low levels of arousal, performance is "poor"; that increases in stress up to some optimal (for that particular individual and that particular task) level enhance performance; but that further increases in stress beyond such optimal level lead to performance decrements.
- (5) Task differences. The nature of the tasks or activities in which the person is involved, and the relationship of those activities to the stressor conditions, influence the direction and shape of the relationships between subjectively experienced stress, task performance, and ensuing consequences.

- (6) Interpersonal effects. The presence or absence of, and the activities of, other persons in the situation influence both the subjective experience of stress, and behaviour in response to stress.

There are several other issues which are relevant to the concept of stress. Cappon (1977) has stated that the dimensions of stressors are estimated by means of six measurable variables — the type of stress, amount, intensity, duration, onset and frequency. This omits the meaning of stress to the person, which cannot be measured in the same way as other variables. Overcrowding is an example of stress which is quantified by population density; its intensity by the peaks it reaches in public transportation, on the streets, and in living quarters; its duration by the possibility of its avoidance; its onset by the time of its beginning in the life of the individual and of the city. Its frequency is self-evident. In addition, the meaning of overcrowding for an individual will depend not only on the location and type of crowd in question, but also on the preference and cultural adaptation of the individual.

Coleman (1973) points out that the longer a stress operates the more severe it is likely to be. Also, a number of stressors operating at the same time or in rapid succession, keeping an individual off balance, the more stressful these are likely to be than if they occurred separately (Coleman, 1973).

According to Coleman (1973), the severity of stress refers to the degree of disruption in the system that will occur if the individual fails to cope with the adjustive demands made upon him by his environment. The severity of stress is, in turn, determined primarily by three factors :

the characteristics of the adjustive demand, the characteristics of the individual, and the external resources and supports available to him. Selye (1969) has shown that under severe and sustained stress there is irreversible wear and tear on the system. This he refers to as aging and it cannot be completely repaired by rest.

Another important issue in the field of stress tolerance, which, for Coleman (1973) refers to the degree of stress which an individual can tolerate without undergoing disorganization. Selye (1969) believes that different individuals have different hereditary capacities to withstand stress but once the individual's "adaptation" energy has been expended, there is no known way in which such energy can be replenished. He believes, further, that at some time in the future it might be possible to produce from the tissues of young animals a substance which could replenish stress energy.

A further issue in the field of stress is the form in which it manifests itself on the individual. This includes disturbed interpersonal relationships, hyperirritability, and sleep disturbances, as well as a wide range of somatic and psychological patterns detrimental to the individual (e.g., Eitinger, 1960; and Hersen, 1972).

Mc Grath (1970a), for example, has emphasized that stress results from an imbalance between the demands made upon an individual, and the capacity of the individual to meet those demands. Thus, stress varies not only with environmental and social conditions which affect demand, but also with the native endowment, training and bodily conditions which affect the individual's coping capacity. Sells (1970) adds the further point that for stress to occur, the consequences of failure to meet the demand must be appraised as important by the individual concerned.

It must be pointed out that the "demand", which to a layman implies some form of excessive load, can in stress research or theory imply an underload as well (e.g., Mc Grath, 1970b) As Welford (1973) points out, some stress is necessary to bring out the best in us; stress is a problem only when it becomes too severe. Levi (1972, p. 15) emphasized this point by referring to William Cowper who, in the eighteenth century said,

*"Absence of occupation is not rest.
A mind quite vacant is a mind
distressed".*

Likewise, Rosch (1979, p. 428) has said,

*"Stress may be the spice of life or
the kiss of death : the means to
express our talents and energies
and the pursuit of happiness or
the cause of nervous tension,
accidents, heart disease, or
ulcers. Without stress there would
be no life".*

A further characteristic of the stress situation is that stress need not necessarily have a negative connotation. A demand or stress situation (e.g., winning a race or an election) can be a pleasant situation which does require adaptation on the part of the individual. Hence Selye (1974) distinguishes between pleasurable or "eustress" and painful or distress, when referring to one's experiences.

A major issue in the field of stress is that a stress situation may last for a very brief period of time (e.g., electric shock), or for a very long time (e.g., the stress of war). In research dealing with the role of stressful life events (e.g., Dohrenwend and Dohrenwend, 1974a) the temporal accumulation of stressful life events is examined in terms of the individual's ability to cope with such stressful events. Mc Grath

(1982) has emphasized the role of temporal factors which have been largely ignored in stress research.

Finally, an important issue in the field of stress is the importance of the environment in which the stress occurs. Jessor and Jessor (1973) and Bronfenbrenner (1977) have emphasized that the environment can be described on a continuum ranging from a macro-to a microlevel. The physical environment on the macrolevel consists of the topography of the landscape, parks, streets, homes, etc., and on the microlevel of the equipment of a room, objects, etc. The social macrolevel is defined by the laws, norms and values which are common to the whole society or a culture, while the social microlevel consists of the norms, attitudes, habits, and the like of the specific groups and persons involved in the situation. At all levels the environment plays a very important role in determining an individual's behaviour in a certain situation in two main ways. First, the environment at all these levels, and in both its physical and its social properties, influences the developmental learning process in which the individual's specific way of dealing with and reacting to environmental conditions of different kinds is formed. Second, it forms the frame of reference and offers the stimulus conditions (i.e., circumstances) for behaviour in the specific situation (Magnusson and Stattin, 1982). Hence for a better understanding of an individual's behaviour on a particular occasion in a specific situation we need to know his or her life history, including the different types of environments at different levels he or she has encountered.

3.5 Methodological Considerations in Stress Research

As in any empirical research, selection of a laboratory or a field

setting in stress research involves a trade-off of realism versus precision and control. To begin with, the existence and degree of stress or arousal depend on the individual's interpretation of the situation (e.g., Bowers and Kelly, 1979). If the individual perceives the situation as unreal or just a game, in many cases it would not be appropriate to talk about the existence of a stress condition at all (Mc Grath, 1982). Moreover, a laboratory scientist should not impose a very high degree of intensity in the conditions imposed on subjects, mainly because it would be unethical to do so. Lazarus and Launier (1978) have argued strongly against the laboratory experiment as an adequate research strategy for studying stress and coping. Their arguments may be summarized as follows :

- (1) Laboratory experiments do not readily provide information about the sources of stress responses in daily life.
- (2) Laboratory experiments do not provide information about long-lasting effects of stress and coping, since the laboratory experiment is normally a very time-limited event.
- (3) Practical as well as ethical considerations make it impossible to generate stress reactions as intense as those observed in real life.
- (4) Often the desired laboratory control cannot be achieved, since uncontrolled effects, such as experimenter effects or demand characteristics may be of greater importance than the manipulated stimulus conditions.

From their discussion of the disadvantages of the laboratory experiment in stress research, Lazarus and Launier (1978) conclude that the study

of stress and coping must be performed in real-life settings.

Mc Grath (1982) on the other hand feels that Lazarus and Launier tend to underestimate the possibilities of the laboratory experiment and overestimate the advantages of field studies. Thus Mc Grath (1982) argues convincingly that stress need not necessarily be at its maximum strength in real-life settings, since the strength of any stress condition is not under the perfect control of the researcher, and since persons in natural stress situations may already have successfully attenuated the effects of stress by coping processes.

Summarizing the discussion on field and laboratory experiments, Mc Grath (1982, p. 35) says :

"All strategies - field and lab - bring with them certain inevitable costs and potential benefits. Whichever choice the researcher makes, one must make sure to reap the potential benefits of the chosen strategy, because one surely will reap the costs associated with that strategic choice".

Magnusson and Stattin (1982) differentiate between an objective situation approach and a subjective situation approach to the study of stress. The former refers to the analysis of situations in terms of their actual physical and social properties (e.g., work conditions, urbanization, migration, and socioeconomic level); while the latter refers to analyses made in terms of the situation's psychological significance to individuals.

An interesting approach which combines both the objective and subjective situation approaches can be found in empirical studies of life stress and bodily disease (e.g., Holmes and Rahe, 1967;

Lundberg and Theorell, 1976). The Social Readjustment Rating Questionnaire developed by Holmes and Rahe (1967) emphasizes objective measures of life situations in that it assumes that a linear relation exists between the frequency of stressful events per se and the strength of stress symptoms. The subjective situation approach is evident in the subject's experience and reporting of stressful life events.

As mentioned earlier, stress can be studied in terms of its effects on one or more levels (e.g., physiological, psychological), which levels must be considered in any research dealing with stress. Moreover, a researcher can use one or more of a variety of methods of observation when investigating stress. These methods of investigation include subjective reports or questionnaires, observations of behaviour, archives or records and trace measures, e.g., blood or urine sample analyses on a physiological level, or responses to the TAT on a psychological level. Consequently, when designing research in the field of stress, it would be beneficial to examine more than one level of stress functioning and to use more than one method of measurement (Mc Grath, 1970b).

3.6 Summary and Conclusion

This chapter has reviewed some of the research strategies, conceptualizations, coping strategies, and theoretical and methodological issues, related to stress.

Stress, which has both positive and negative connotations, is unavoidable. Man is constantly subjected to stress during every moment of his life.

The term stress has been defined differently by different investigators. Nevertheless, the critical theoretical, and empirical issues of stress are quite similar. These are the external and internal forces which produce stress reactions, the form which these reactions take, and the process which intervene between the stressor and the stress response. Moreover, the concept of stress is clearly related to such psychological aspects as emotion and adaptation.

Adaptation and coping mechanisms in stress are affected by a host of factors. Only some propositions, such as those dealing with the intensity of the stressor, its duration, an individual's personality, and his previous exposure to the stressor, have gained satisfactory empirical support.

Stress has been examined primarily on three levels — physiological, sociological, and psychological. The level at which a researcher chooses to examine stress depends on his own interests and research objectives. Moreover, several usages of the concept of stress have been identified and compared, each comprising quite different approaches.

CHAPTER FOUR

4. LIFE EVENT STRESS AND ILLNESS

4.1 Introduction

In recent years a great deal of research has focused on the stressful nature of important events in life. Negative life events such as the loss of one's job are clearly a source of stress. There is also reason to believe that positive life changes can be stressful (e.g., Sarason et al, 1973). Marriage, the birth of a child, and job promotion are examples of life events which most people consider as positive, although stressful, necessitating adjustments in patterns of living. An individual reacts to pleasant changes with the same preparation as for increased physical activity. The latter has been described to occur when facing situations requiring fight or flight, i.e., with stress (e.g., Fröberg et al, 1971).

Stressful life events have been associated with conditions ranging from physical disabilities such as athletic injuries (Bramwell et al, 1975) and coronary heart disease (Rahe et al, 1974b; Theorell, 1974), to symptoms of psychological distress (Dohrenwend, 1973b; Myers et al, 1974) and types of psychiatric disorder. (Brown, 1974; Paykel, 1974). Some studies (e.g., Arthur, 1974; Kinston and Rosser, 1974) have examined the effects of catastrophic events (e.g., concentration camp, earthquake) upon mental and physical states. Such events have been observed to eventuate in shock, regressive behaviour, extreme dependency, retreat into fantasy, defects in memory, and a wide range

of psychosomatic ailments. So influential are these experiences that their indirect effects have been observed in the children of those who suffered them (Sigal and Rakoff, 1971).

4.2 Historical Background

The foundation for systematic experimental research on the effects of stress was laid by Cannon (1929) in his detailed observations of bodily changes related to pain, hunger, and the major emotions.

His experimental work provided a link in the argument that stressful life events can prove harmful. That is, he showed that stimuli associated with emotional arousal cause changes in basic physiological processes. However, his admittedly speculative attempt to forge a further link by specifying the conditions under which these physiological changes develop into pathological conditions, while pointing to life events, left it to others to grapple with the complexity of these events and their effects (Dohrenwend and Dohrenwend, 1974b). Intro.

A major contribution to this task was made in the 1930's by Adolf Meyer through his advocacy of the life chart as a tool in medical diagnosis. For Meyer, events to be noted on a life chart included changes of habitat, of school entrance, graduations or failures; change of various jobs; dates of possibly important births and deaths in the family, and other fundamentally important environmental incidents (Dohrenwend and Dohrenwend, 1974b). Thus Meyer said that life events may be an important part of the aetiology of a disorder and that they need not be bizarre or catastrophic to be pathogenic. Instead, he suggested that even the most normal and necessary life events were

potential contributors to the development of pathological conditions.

About fifteen years later, Wolff and others (Wolff et al, 1950) began to incorporate the concepts of Cannon, Freud, Pavlov, and Skinner in the Myerian schema. The research which resulted from this synthesis adduced powerful evidence that "stressful" life events, by evoking psychophysiological reactions, played an important causative role in the natural history of many diseases (e.g., Holmes et al, 1950; Wolf et al, 1950; Grace et al, 1951).

In the late 1940's and early 1950's, Holmes and his co-workers began to gather data using life events charts, and to study the relation of events in a person's life to the onset of illness (Holmes and Masuda, 1974). Much of the impetus for this work came from Wolf's laboratory. Their (Holmes and his co-workers) studies examined the clustering of psychosocial events in relation to the onset of diseases such as cardiac disorders, tuberculosis, and skin diseases (Smith et al, 1978). In 1964, Rahe and colleagues investigated the proposition that many, if not all, diseases have their onset in a setting of mounting frequency of social stress (Rahe et al, 1964). This required the use of a self-administered questionnaire — the Schedule of Recent Experiences (SRE) — documenting both demographic data and data related to social readjustment. They concluded that different disease entities occurred in a setting characterized by significant clustering of changes in social status, and found that changes in the years just prior to the onset of illness were best correlated with illness onset. These changes were felt to be contributory and necessary but not all-inclusive factors related to disease (Rahe et al, 1964). Similarly, the association of what has been termed "life stress", "emotional stress", "object loss", and so forth, and illness onset was demonstrated by other investigators (Greene, 1954; Greene et al, 1956;

Kissen, 1956; Hawkins et al, 1957; Greene and Miller, 1958; Smith, 1962; Graham and Stevenson, 1963; Fischer et al, 1964; Rahe and Holmes, 1965). Their studies also adduced that the clustering of social, or life, events achieved aetiologic significance as a necessary, but not sufficient, cause of illness and accounted in part for the time of onset of disease. The life events included family constellation, marriage, occupation, economics, residence, recreation, health, etc. One theme was commonly identified with all these life events : the occurrence of each event usually evoked, or was associated with, some adaptive or coping behaviour on the part of the individual concerned. Thus, each item was constructed to contain life events whose advent was either indicative of, or required a significant change in, the ongoing life pattern of the individual. The emphasis is on change from the existing steady state and not on psychological meaning, emotion, or social desirability (Holmes and Masuda, 1974).

Methodologically, the questionnaire technique used in earlier studies (e.g., Holmes, 1964) yielded only the number and types of events making up the cluster. Thus, for several years no allowances were made for the relative degrees of life change inherent in the various life change events included in the SRE. One life change such as death of a spouse, was counted as equivalent to another life change, such as a residential move. Consequently, some estimate of the magnitude of these events was required in order to add greater precision to this area of research and to provide a quantitative basis for new epidemiological studies of diseases. In 1964, a scaling experiment for the various degrees of life change inherent in the various SRE life change events was carried out (Holmes and Rahe, 1967). For this, Holmes and Rahe (1967) gathered a list of 43 life events which were

empirically derived from clinical experience. These 43 life change events, which comprised the Social Readjustment Rating Questionnaire (SRRQ), were scaled according to the proportionate scaling method of Stevens (1957; 1966). A sample of convenience, composed of 394 subjects of both sexes and of differing ages, race, religion, education, social class, and marital status was selected. The subjects were instructed that one of the life change events, namely, marriage, had been arbitrarily assigned a life change unit (LCU) value of 500. Subjects were then instructed to assign LCU values for each of the remaining life change events in the SRRQ, using marriage as the module. These other LCU values were each to be in proportion to the 500 LCU arbitrarily assigned to marriage. For example, when a subject evaluated a life change event, such as change in residence, he was to ask himself : "Is a change in residence more, less, or perhaps equal to the amount and duration of life change and readjustment inherent in marriage?" If he decided it was more, he was to indicate how much more by choosing a proportionately larger LCU value than the 500 assigned to marriage. If he decided it was less, he was to indicate how much less by choosing a proportionately smaller number than 500. If he decided it was equal, he was to assign 500 LCU to it. This process was repeated for each of the remaining life change events contained in the SRRQ, (Rahe, 1975a). In assigning LCU values, the subject was instructed to utilize all of his experiences. This meant a subject's personal experience (where it applied) as well as his estimate based on the experiences of other people. Since some persons accommodate change more readily than others, subjects were required to give an opinion of the average rather than the extreme degree of readjustment necessary for each event (Holmes and Masuda, 1974).

The Social Readjustment Rating Scale (SRRS) was then derived from the Social Readjustment Rating Questionnaire (SRRQ) by taking the mean score of each item, dividing it by ten (for convenience in handling), and arranging the items in rank order of LCU scores. The mean score of an item was the magnitude of change in adjustment required for the life event (Smith et al, 1978).

Since the original scaling experiment, life change scaling studies have been conducted by various investigators in several parts of the United States and in several other countries such as Belgium, Denmark, France, Japan, Norway, Spain, and Sweden. Results from all of these life change scaling experiments have been strikingly similar (Rahe, 1969a). Most divergent results have been found between a sample of Swedish subjects living in Stockholm and comparable subjects living in Seattle, United States.

The practical value of these LCU weightings is that recent life change information can be given quantitative estimates in terms of the average degree of intensity of change inherent in the life change events. Arbitrary time intervals over which life change units have been summed (in order to find the most appropriate time interval for illness prediction), have varied between two years, one year, six months, three months, one week, and one day (Rahe et al, 1967; Rahe and Arthur, 1968; Holmes and Holmes, 1970; Theorell and Rahe, 1971).

The questionnaires compiled by different investigators have also varied in the number of items. For example, Myers et al (1972) used a list of 62 life events; and Chalmers (1981) used a list of 88 life events. Questionnaires have also varied in content; for example, "court martial" was specific to the questionnaire used with military personnel (Rahe

et al, 1967); and experience in Nazi concentration camps was included in research done in Israel (Antonovsky and Kats, 1967). The methods of scaling items have also varied. Chalmers (1981), for example, used a 10-point scale instead of using "marriage" as a module. Some researchers have used a different module instead of marriage.

The list of life events has also varied in its content, according to the needs of the researcher. Bramwell (1971), for example, attempted to develop a Social and Athletic Readjustment Rating Scale for special use in evaluating life change and injuries to college athletes. Thirty-eight of the 43 original items of the SRRS were retained in the scale used by Bramwell (1971), with slight modifications. A different module item — entering college — replaced marriage and was assigned a value of 500. Instructions for scaling — similar to those given in the original study — were given to 80 college athletes. The Spearman rank order correlation coefficient between the 38 items common to both scaling methods was high ($r=0,85$). Rahe et al (1971) have also reported a high correlation in the ranking of life events, using the module : adding a new family member.

4.3 Conceptualization of Stressful Life Events

According to Gunderson (1974) "life stress" refers to a broad area of ^{Intru} research concerned with events in daily living which affect susceptibility to illness. Holmes and Rahe (1967, p. 217) defined stressful life events as those

".... whose advent is either indicative of or requires a significant change in the ongoing life pattern of the individual".

Brown and Birley (1968, p. 204) referred to stressful life events as

".... events which on common sense grounds are likely to produce emotional disturbance in many people"

Similarly, Myers et al (1972, p. 399) defined life "crises" or "events" as

".... experiences involving role transformations, changes in status or environment, or impositions of pain".

Antonovsky and Kats (1967, p. 16) referred to "life crises" consisting of

".... objective situations which, on the face of it, would seem to be universally stressful"

and involving

".... an experience which either imposed pain or necessitated a role transformation".

These definitions indicate broad agreement at an abstract level concerning what is stressful about life events apart from their outcome. The agreement centers on the idea that stressful life events include those which involve change in the usual activities of most individuals who experience them.

Further agreement has been shown on the part of most investigators (e.g., Ander et al, 1974) who have expressed the need to distinguish events which are likely to be perceived as negative (e.g., loss of job) from those likely to be perceived as positive (e.g., job promotion) or ambiguous (e.g., major change in living conditions).

Some of the items on the Social Readjustment Rating Scale (SRRS) are worded in such a way that they convey an ambiguous meaning; hence one does not know whether such events are positive or negative. For example, "major change in living conditions" may be good or bad for an individual. Rahe (1968) emphasizes that change rather than valence is of primary concern. This view has been endorsed by Dohrenwend (1973b) who has obtained evidence that it does not matter whether such life events are viewed as desirable or undesirable (distressing) by the person involved; the magnitude of life changes is the critical determinant.

According to Kaplan (1980) life events may reflect either change or continuity in personal experiences. Where the events reflect changing circumstances, life events are manifested as an individual's loss, addition, or redefinition of social positions. Any one event may imply one or more of these changes. The death of a wife, for example, implies loss of the status of the husband, redefinition of the role expectations of the status of father (insofar as functions normally performed by the mother must now be performed by the remaining members of the family), and addition of the status of widower, with its new sets of rights and obligations. These events may have a clearly demarcated beginning against which changes may be noted.

Life events, according to Pearlin and Lieberman (1979), may be divided into two classes of events : normative and nonnormative. Normative events are expected and regular in their occurrence. Illustrative events in a number of different role areas include the first job, getting married, becoming pregnant, becoming a parent, retirement from work, and death of spouse. Nonnormative events are frequently

crises which, while of common occurrence, are not easily predictable by people. Examples of such events include being fired from work and divorce.

Life events which reflect continuity in personal experiences reflect problems that are chronic, and hardships which people have to contend with in their occupations, their economic life, and their family relations. Examples of such events include job pressures or work overload, and marital discord (Kaplan, 1980).

Life events, according to Kaplan (1979), also have a function. With regard to function, the experience, recall, or anticipation of life events have short - and long-term implications for both affective responses and the adaptive - coping - defensive patterns. Although the significance of an event varies for different persons (depending upon psychosocial history and consequent need - value system), such life events as marriage, job promotion, death of a close family member, divorce, job demotion, or any other event generally have different but specifiable effects regarding intensity, duration, and polarity (positive-negative) of emotional response. On the other hand, these events, independently of their intrinsic affective significance, usually have a differential impact regarding adaptive - coping - defensive responses (although individual effects depend on such factors as the person's past experience with the event, the subjective probability of the event, and his personal coping dispositions for dealing with novel events). Thus, getting fired may predictably disrupt the individual's peer relationships, which are used to defend against or to cope with adverse life circumstances. A job promotion may disrupt normal adaptive mechanisms by removing the individual from familiar ways of behaving (perhaps by requiring

residential mobility). Thus, although a job promotion may involve increases in status and income, it may also elevate performance demands, lead the person to question his competence and performance, or in other ways threaten personal comfort or disrupt working routines. Events such as marriage or joining a new organization, regardless of the intrinsic affect evoked, may generally provide the individual with, or deprive him of, social resources for mitigating the effect of "stressful" experiences (Kaplan, 1979).

Myers et al (1974) have categorized life events in terms of an evaluated dimension corresponding to social desirability. In accordance with current social values, such events as engagement, marriage, and job promotion are considered to be desirable, whereas academic failure, divorce, trouble with in-laws and death of a loved one are, for most persons, undesirable. Ambiguous events, for Myers et al (1974), are those items for which there is probably disagreement about their social desirability. Examples of ambiguous life events include pregnancy, retirement from work, and a major change in the number of arguments with one's spouse. According to this categorization of life events, the direction of an event is defined in objective terms rather than in terms of an individual's experience. Thus, although some people might, for example, perceive their divorce as a change for the better (or desirable), the event is, however, categorized as undesirable by Myers et al (1974). This system of categorization of life events is based on that of Dohrenwend (1973b), who uses the terms "social gain" and "social loss".

Another way of classifying certain life events is according to the changes that these life events involve in the immediate social field of the subject (Paykel, 1974). Thus entrance - related events are

those events (e.g., addition of new family member, and marriage) which involve the introduction of a new person into the social field, whereas exit-related events (e.g., death of close family member, divorce) are those events which clearly involve a departure from the social field.

4.4 Factors Influencing Reactions to Stressful Life Events

Different people are affected by stress in different ways. The loss of a job may be devastating to one person, mildly upsetting to another, and viewed as an opportunity to find a better career by a third person. Similarly, the same person may handle stress easily on one occasion and be very upset by it the next. Although much remains to be learnt about why such differences exist in the ways people handle stress, enough is presently known to outline some of the factors that seem related to individual differences in reactions to stress.

Stress reactions are generally less severe when an individual has had some prior experience with the stressful event (Askenasy et al, 1977). For example, a soldier who is going into combat for the fourth time will usually be less stressed by it than a soldier facing combat for the first time.

From a psychological standpoint, it is very important to have control over events — particularly aversive ones. Generally, life events are less stressful when they are predictable than when they are not; and they are less stressful when an individual perceives that he can exert some degree of control over the stress (e.g., Lahey, 1983).

When people are placed in situations in which aversive events occur

unpredictably and outside their personal control, the result is feelings of helplessness, incompetence, frustration, depression, anxiety, and ^{DISC} fatigue (Wills and Langner, 1980). The relation between unpredictable events and stress reactions has been demonstrated repeatedly in the laboratory (e.g., Schulz, 1976; Weidner and Matthews, 1978). Although life events researchers have not classified life events in terms of perceived control, several studies have indicated the importance of this variable. For example, Myers et al (1971) noted that negative events outside the control of the individual were particularly important for differentiating those persons with high scores on psychiatric impairment, from those with low scores. Similarly, Dohrenwend (1973) found that correlations between life events and scores on psychiatric impairment were greatest for events classified as being outside the control of the individual.

In the literature dealing with life events, a debate has taken place about whether change per se, or the negative valuation of change, accounts for the various adverse outcomes. It is becoming increasingly clear, however, that the relationship is accounted for by the subjective undesirability of the event (e.g., Kaplan, 1980). When a life event is stress-inducing, it is so because it is intrinsically undesirable or has undesirable consequences. Consistent with this conclusion is the observation that certain life events cease to be related to subjective distress once their undesirability has been controlled (Ross and Mirowsky, 1979). Perhaps what makes events subjectively undesirable involves all three effects : judgments of intrinsic undesirability; perception of new obligations or needs, the fulfillment of which is problematic; and the disruption of normal response patterns ordinarily employed to forestall the experience of

undesirable life events, thus rendering the person vulnerable to the future experience and effects of such adverse life circumstances (Kaplan, 1980). Relevant to this speculation are data indicating that persons rate undesirable events as requiring more readjustment than other events (Ross and Mirowsky, 1979).

It has been said (Matsumoto, 1970; Cassel, 1976; Brown and Harris, 1978; Lahey, 1983) that the magnitude of reactions to stress is considerably less for individuals with good social and emotional support from close friends and family members than for individuals with inadequate social support. Although it is not clear how social support functions as a buffer against stress, having someone who will listen, understand, give advice and reassurance is an important factor determining our reactions to stress. Habif and Lahey (1980), for example, found a strong relationship between the amount of depression experienced by college students and the amount of life stress if they had inadequate social support, but there was little relationship between stress and depression for students with good social support. In another study, Nuckolls et al (1972) found that 90 per cent of pregnant women who had experienced severe stress and had poor social support had some form of birth complication, and that only 33 per cent of severely stressed women with adequate social support experienced complications.

The importance of individual perception in determining the stressful impact of a stimulus has been widely discussed (e.g., Cofer and Appley, 1964) and is an issue which requires consideration. Hinkle (1974) has reported on a phenomenon which he termed "emotional insulation" or the ability to experience major life changes with little effect on the health of some people.

Bowers and Kelly (1979) say that although a particular life event may or may not be stressful for particular individuals, there seems to be a growing consensus that certain classes of events are particularly stressful for most individuals in Western culture. They (Bowers and Kelly, 1979) have produced a list of generic threats which they feel is a reasonable summary of what the relevant literature deems threatening and hence stressful : (1) a perceived lack or loss of control (together with related factors such as event uncertainty and unpredictability); (2) the anticipation and occurrence of physical or psychological pain; (3) the loss of close emotional and social supports; and (4) effortful "trying" to avoid aversive stimuli or conditions. Support for these generic threats or stressors have been given by Cassel (1976) and Glass (1977).

Researchers appear to differ in the amount of perceptual consensus about life changes which they assume exists. According to Dohrenwend and Dohrenwend (1974a), three general positions can be taken. These are : (1) the perception of the extent to which a particular life event is stressful is idiosyncratic, differing from individual to individual (e.g., Theorell, 1974; Lazarus, 1977); (2) stress perception is the same within culturally or otherwise homogeneous groups, but differs from group to group (e.g., Holmes and Masuda, 1974; Miller et al, 1974); and (3) the extent to which a particular event is stressful is universally similar (Brown, 1974).

4.5 The Domain of Possibly Stressful Life Events

Most current measures of stressful life events are based on the assumption by researchers, who develop and use them, that there is

only one population of stressful life events or, if there are more than one, that there is a great deal of overlap among them where many of the most commonly occurring events are concerned. Some support for such assumption might be seen in the fact that seemingly dissimilar events — for example, objective in contrast with subjective events — entail changes in a person's activities; or in the fact that the individual may be more or less responsible for events such as divorce or separation, depending on the circumstances in each instance. In this general view, it is quite legitimate, according to Dohrenwend (1974), to measure severity of stress in terms of the number of events an individual experiences or, more strongly, in terms of the life change unit (LCU) scores of these events. Other investigators imply that there are several very different event populations, by making distinctions, for example, between subjective and objective events, gain and loss events, and events for which an individual may and may not be responsible — a view shared by Dohrenwend (1974).

Most of the lists of life events which have been utilized by researchers are samples drawn from the domain of possibly stressful life events, defined usually as life changes. In drawing these samples, investigators have depended heavily on subjective judgements. Such judgements seem, for example, to be the basis of Meyer's (1951) suggestion that a life-chart of certain events (e.g., failures in life; and changes of habitat) should prove diagnostically useful. Life events of this nature are included in most subsequent lists, presumably in part because of investigators' agreement with Meyer about their importance. Unfortunately, although there may be biases built into these subjective judgements, there is no way to analyze them to determine what these

biases might be (e.g., Dohrenwend and Dohrenwend, 1974a).

Life event lists have also been composed in part or wholly of events drawn by objective procedures. For example, Markush and Favero (1974) supplemented an intuitively chosen list by adding events reported by a systematic sample of community respondents in answer to the question, "What was the last major event that, for better or for worse, changed or interrupted your usual activities?" This procedure had the advantage of broadening the sample of life events beyond the experience of the investigator.

In another objective sampling procedure, Holmes and Rahe (1967, p. 215) compiled a list of

*".... life events empirically observed
to cluster at the time of disease onset".*

However, one cannot safely make the aetiological inference that life events cause illness (e.g., Dohrenwend and Dohrenwend, 1974a).

The number and kind of life events investigated has also varied. Some investigators have studied the effect of specific life events, such as widowhood (e.g., Clayton et al, 1968; Parkes, 1972; Clayton, 1975), severe injury (e.g., Hamburg and Adams, 1967), and loss of job (Kasl et al, 1975; Cobb and Kasl, 1977). Such studies were not intended to lead to conclusions concerning life stress in general but were, instead, designed to increase comprehension of a particular event and its sequelae. Others, in contrast, aimed to derive principles from particular events which would apply to life events in general. The domain to which these generalizations were to be applied has been described as including

".... threatening, difficult experiences for many individuals. Some of these are inherent components of the life cycle; others reflect major features of urbanized, technologically complex societies". (Hamburg and Adams, 1967, p. 277).

Such description of the general domain of life events makes two useful points : first, that stressful life events are not limited to those that are inherent in the life cycle; and second, that their domain extends beyond a set of "dramatic" and obvious life events.

Life event lists compiled by different investigators often overlap. Thus events such as marriage, loss of job, and death of a loved one, are common to most life event lists. However, these lists are by no means identical. They vary in the number of items and in content.

In laboratory studies of responses to stressful stimuli the domain from which stimuli are drawn is usually defined in terms of apparent noxiousness (e.g., Frankenhaeuser, 1971). However, this straightforward definition, according to Dohrenwend and Dohrenwend (1974a), has not generally been used for research on stressful life events. Instead, most studies on this topic have investigated events which change a person's life — whether the change appears to be for better or for worse. Conversely, stimuli which elicit habitual activities have not generally been included in studies of stressful life events, regardless of their quality (Dohrenwend and Dohrenwend, 1974a).

Gersten et al (1974) are of the opinion that a life event list should have a nonevent as well. A nonevent is an event that is desired or anticipated and does not occur. Nonevents could be either desirable (e.g., job promotion) or undesirable (e.g., loss of job). In other words, a stressful situation could be a general deprivation of events.

Although such nonevents (e.g., not getting job applied for) could be integrated into an undesirability scale, they would present problems for a total "change" score and for a score based on social readjustment ratings. Hence the addition of nonevents is incompatible with measurement procedures based on the concept of readjustment, which (procedures) are used in a considerable portion of current research on stressful life events.

The suggestion that the domain of possibly stressful life events should be narrowed has been implied by Hudgens (1974) in a study of depression by the limits he placed on his sample of events of "personal catastrophes". A somewhat ambiguous limitation was implied by Brown's (1974, p. 227) decision in studies of schizophrenia and depression to investigate events

*".... which on commonsense grounds
are more likely than most to
produce marked emotional arousal".*

In contrast, the evidence from Paykel's (1974) research suggests that when the effects being studied are certain major psychiatric disorders, only undesirable life events should be included in the domain of potentially stressful life events. And, when depression in particular is the effect under investigation, the domain might be narrowed to include only events which involve the exit of someone from the social field of the subject.

Kellam (1974) has pointed out that investigations of stressful life events should take into account the stage of life of the subjects being assessed. Life events experienced during childhood or adolescence, for example, would be quite different from those experienced in old age. Hence, inventories of stressful life events

should be carefully constructed, taking into account the stage of life of the subjects concerned.

In their study of child behaviour, Gersten et al (1974) obtained results which supplemented and are generally consistent with Paykel's (1974) findings. Their results showed that most of the childhood disorders they investigated, and the disorders that they considered to have the most serious long-term implications for the child, were related to undesirable but not to desirable life changes. They also found, however, that regressive anxiety was affected by life changes of the desirable as well as the undesirable kind.

In selecting events for a life events list, Dohrenwend (1974) emphasized that if the investigator's objective is to develop an instrument for predicting the onset of illness, without necessarily explaining it, Holmes and Rahe's (1967) procedure for sampling life events is optimal, and the more closely the sample of events is tied to the onset of a particular illness, the more effective it will be.

Dohrenwend and Dohrenwend (1978) have proposed that there are at least three distinct populations of life events which must be sampled and kept distinct for purposes of analysis. These are : (1) a population of events that is confounded with the psychiatric condition of the subject; (2) a population of events consisting of physical illnesses and injuries to the subject; and (3) a population of events whose occurrences are independent of either the subject's physical health or his psychiatric condition. However, Dohrenwend and Dohrenwend (1974a, p.323) say, that in general

".... the appropriate procedure for sampling life events as well as the domain from which they are sampled depends on the purpose of the study".

Finally, Cleary (1981) has stated that there is no accepted procedure for deciding which events should be included in a list of life events.

4.6 Methodological Issues in Life Event Studies

Hudgens (1974), who has surveyed the difficulties in the interpretation of results dealing with the relationship between stress and illness, has listed the following methodological requirements of a valid study :

- (1) the time of onset of an illness must be established within a reasonable time span. This is difficult to achieve, especially retrospectively, and especially with a psychiatric illness in which early symptoms may be subtle or forgotten;
- (2) the time of occurrence of life events must be established, although this may be difficult to achieve;
- (3) life event reports should be verified by informants such as other family members;
- (4) there should be a quantification of the importance of each type of event for each patient;
- (5) suitable control groups must be selected; and
- (6) life events which are possible consequences of the illness in question should be excluded from consideration as possible precipitants of the illness.

Many researchers (e.g., Hinkle, 1974; Holmes and Masuda, 1974) in the

field of life events have been criticised on the grounds that their studies have been retrospective. It may be suspected that a patient is more aware of events which have a temporal association with the onset of illness than of other events. In such cases the patient may interpret those events as being the "cause" of his illness. Brown (1974) has called this direct contamination. Consequently, researchers (e.g., Hudgens, 1974) have recommended a prospective design for research in this field. Such a design overcomes the problem of subject "bias" but causes other problems. For example, rather than an event contributing to an illness, both the event and the illness may be caused by some other factor (Brown, 1974). Such indirect contamination may be further confounded by the subject's experience of events affecting his reporting of them. Such contamination has been called "spuriousness" by Brown (1974). For instance, the loss of a job may play a part in a subsequent asthma attack, but it is equally possible that anxiety, a third unmeasured factor, may have led to both the loss of the job as well as to the asthma. Consequently in research designs where indirect contamination or spuriousness may occur, it is strictly accurate to reach conclusions of a correlational nature only rather than of a causative nature. For instance, using the above example, it is accurate to conclude that events (loss of job) are correlated with illness (asthma), but it is risky to conclude that the event (loss of job) caused the illness (asthma). It is generally agreed that correlational studies are valuable in themselves, and the majority of studies published in the field of life events at present utilize this approach.

Several studies which have utilized the retrospective approach in studying stressful life events, have produced reliable retrospective

data. For example, Holmes (1970) followed 54 medical students from the beginning of their first year to the end of their last year of study. The SRE was used to gather data, and the life-change magnitude of the year before entrance to medical school was used to predict disease occurrence for a full two-year period at risk. At the end of that time, the SRE was administered a second time, so that retrospective data could be compared with the prospective data. The outcome of both approaches was essentially the same.

Paykel (1974) has also used the retrospective approach to the study of life events and psychiatric disorders, and the validity of the retrospective approach was supported by his findings which

*".... would be hard to attribute
merely to bias". (Paykel,
1974, p. 148).*

Other investigators who have used the retrospective approach include Wardwell (1973) and Wardwell and Bahnson (1973).

Whether a researcher chooses to adopt a prospective design or a retrospective design, he has to decide whether he will examine life events from a perceptual approach, an action approach, or a reaction approach.

It has been proposed that individual behaviour and interindividual differences in spontaneous reactions in a new situation can be predicted under three conditions : (1) if we know how situations of this kind are interpreted by the individual or groups of individuals; (2) if we know their dispositions to behave in the kind of situations being evaluated; and (3) if we have a theory providing a link between (1) and (2) (Magnusson, 1976). Lazarus (1966) underlined that the strength

of the stress reaction and the kinds of adaptation mechanisms employed in the situation are determined by the way in which the individual perceives, constructs, and evaluates the outer stress situation. Thus investigators like Katz (1967), Maddox (1970), and Magnusson (1976) emphasize that an individual's perception and subjective construction of a situation (i.e., the situation in the eye of the beholder) is the important basis for his reactions and actions in the situation.

This leads to a need for knowledge about how individuals perceive and interpret life events or situations in order to describe, classify, and understand human behaviour adequately. From this point of view, situation perception seems to be one of the most fruitful areas of research (Magnusson and Stattin, 1982). However, though this need has been strongly underlined by many researchers, very few empirical studies have been made of situations in terms of perceptions and interpretations. One obvious reason is the lack of appropriate methods for systematic use of the information stored in individuals' perceptions and interpretations of situations.

In addition to the perceptual approach to the study of stressful situations, there is the reaction approach, in which stressful situations are described and classified in terms of the spontaneous reactions they evoke in individuals. Magnusson and Stattin (1982) distinguish between spontaneous reactions and actions without implying that there is a clear boundary between the two kinds of behaviour. Further, Magnusson and Stattin (1982) have identified a psychic reaction factor ("I become worried", "I become nervous", etc.) and a somatic reaction factor ("My hands shake", "I get into a sweat", etc.). For the study of stressful situations by means of situation

reactions, various methods of collecting data on reactions to specific situations can be employed : ratings, self-reports, and strictly objective methods such as devices for measuring hormonal excretion, skin conductance, or pulse rate.

Yet another approach to the study of stressful situations is the action approach in which the description and classification of situations is based on the actions taken by the individual in response to the situations (Magnusson and Stattin, 1982). Rotter (1954) and Frederiksen (1972) suggest that situations could be described and categorized with reference to the behaviour individuals express in them. They proposed that situations could be grouped on the basis of the similarity of behaviour they evoke in individuals. For some purposes it might be appropriate and useful to classify stressful situations on the basis of the kind and direction of the actions taken by participants. Using an action approach one can distinguish between covert and overt action tendencies. Two broad types of covert coping activities (intrapsychic coping mechanisms) have attracted particular attention in research on stress : "defense-vigilance" and "repression-sensitization" (Weinstein et al, 1968; Monat et al, 1972). The grouping of overt actions in anxiety and stress situations is trichotomized as (1) escape, (2) passivity, and (3) attack (Horney, 1950). In an effort to study the relationship between threatening stimuli and action tendencies, Poetter and Gulas (1973) compared the tendency of individuals to go "toward", "away from", and "against" hypothetical neutral and fear-arousing stimuli in the Fear Survey Schedule (Wolpe and Lang, 1964) with measures of general fear arousal for the same situations. The predominant response style was to move toward neutral stimuli but to move away from or against threatening stimuli. Persons with a high

fear arousal were more likely to move away from all stimuli, irrespective of the cue properties, than persons with low fear arousal level. Unfortunately the authors did not report the relation between the character of the threatening stimuli and the different action tendencies. Nevertheless, the study indicates one possible way of categorizing situations on the basis of action tendencies.

4.7 Stressful Life Events and Illness

It has long been recognized that there is a relationship between stressful life events in a person's life and the onset of illness *Intro* (Zung and Cavenar, 1980), or between personality traits and illness (Minter and Kimball, 1980). Conversely, when an individual's life is in a relatively steady state of psychosocial adjustment with few ongoing life changes, little or no illness tends to be reported (Rahe et al, 1967; Rahe and Arthur, 1968).

One conclusion which has been firmly supported is that the correlates of stressful life events are not limited to any particular type of disorders. On the contrary, life events have been shown to be related to many somatic disorders including heart disease (Hinkle, 1974; Holmes and Masuda, 1974; Theorell, 1974), fractures and childhood leukemia (Holmes and Masuda, 1974), performance deficits among teachers and college students (Holmes and Masuda, 1974), and to psychological disorder including acute schizophrenia (Brown, 1974), depression (Hudgens, 1974; Paykel, 1974), and suicide attempts (Paykel, 1974).

The wide variety of illnesses studied has been matched by a wide variety of life events, which have included personal, familial, marital,

occupational, recreational, economic, social, interpersonal, and religious changes in life adjustments.

Today, a large number of investigators are using lists of stressful life events. Some investigators (e.g., Rahe et al, 1967; Thurlow, 1971) have studied the relation of life events to episodes of physical illness in general, some (e.g., Antonovsky and Kats, 1967; Theorell, 1970) to specific types of physical illness, some (e.g., Brown and Birley, 1968) to various types of psychiatric disorder, and some (e.g., Coates et al, 1969) to various types of psychological symptoms.

Specific physical illnesses have included cardiac disorders (e.g., Hinkle, 1974; Rahe, 1974), hypertension (e.g., Finnerty, 1971) and cancer (Cooper, 1982).

Moreover, some investigators have studied the effects of just one or two life changes on illness susceptibility. Thus, Syme et al (1968) studied residential and job mobility; Maddison and Viola (1968) as well as Parkes et al (1969) studied bereavement following the death of a spouse; Sheldon and Hooper (1969) studied poor marital adjustment; Parens et al (1966) Cleghorn and Streiner (1971) studied the effects of a poorly resolved separation from home in student nurses; and Kasl and Cobb (1970) studied the effects of losing one's job.

Whether the investigator has provided his own list (e.g., Murphy et al, 1962; Holmes and Rahe, 1967; Antonovsky and Kats, 1967), used a list provided by others (e.g., Coates et al, 1969; Thurlow, 1971), or some combination of these (e.g., Myers et al, 1972; Cochrane and Robertson, 1973), there have been two main bases for arguing on a priori grounds that a particular list is a good one. One basis consists of an appeal

to "commonsense"; that is, it is assumed that most people would agree that the events chosen are stressful (e.g., Holmes and Rahe, 1967; Brown and Birley, 1968). The other basis is that patient histories taken in the hospitals in which the investigators have worked contain retrospective reports by patients that the kind of occurrence included on the lists preceded their admission for treatment (e.g., Holmes and Rahe, 1967; Cochrane and Robertson, 1973).

Hinkle and his co-workers (Hinkle et al, 1956, 1957, 1958, 1960; Hinkle and Wolff, 1957a, 1957b, 1958; Hinkle, 1961) were the first to attempt large-scale studies of the relationship between life events and illness. In studies of telephone company employees covering a period up to 20 years, they reported the following findings : (1) a small number of people (25 per cent) had most of the illness episodes (50 per cent); (2) as the number of illness episodes increased, the number of organ systems involved also increased; (3) as the number of episodes of illness increased, the individual exhibited an increased number of aetiologies of illness; (4) as the number of episodes of illness increased, the number of disturbances in mood, thought, and behaviour also increased; (5) clusters of illness were observed to occur and were not related to activity, diet, rest, or exposure to infections; and (6) clusters of illness occurred most often when a person had experienced a life situation described as unsatisfactory or when he experienced difficulty in adapting to his environment. Hinkle and Plummer (1952) found that most absences from work for illness were restricted to a small number of people, and that, compared to a low-absence group, the high-absence group had more major and minor illnesses, operations, injuries, and disturbances of feeling state, thought, and behaviour. Those with high-absence rates were described

as discontented, unhappy and difficult to supervise; they had more conflict and anxiety, and had been exposed to more stressful situations and experiences. These investigators felt that

".... something happened in the ill group to render them subject to many bodily disturbances" and that "... this had not happened to the well group". (Hinkle et al, 1958, p. 373).

In their (Hinkle et al, 1958) studies, measurement of the amount of life dissatisfaction was made by three judges who had no access to medical records. All illness data were obtained (by the researchers) retrospectively from medical records and reports made by patients. The pioneering studies of these researchers stimulated others to investigate the nature of this life dissatisfaction and its relationship to illness onset. What was needed was a quantitative measure of life events. This challenge was taken up by Rahe, Holmes, and their co-workers (Holmes and Rahe, 1967; Masuda and Holmes, 1967b; Rahe et al, 1967, 1970, 1971) who developed the first quantitative measure of life events. These investigators developed and utilized the Schedule of Recent Experience (SRE)¹ and the Social Readjustment Rating Questionnaire (SRRQ) to study life events and illness onset. The results of their numerous studies (Gunderson and Rahe, 1974) can be summarized as follows : (1) clusters of life changes preceded the onset of reported illness; increased life change unit (LCU) scores for the several years preceding the study period repeatedly showed a positive, significant correlation with incidence of illness during the study

1. The SRE and SRRQ are described in Sections 4.2; 5.1.1.2.2; and 5.1.2.2.2 of the present study.

period; (2) a small proportion of the sample had most of the illness episodes; (3) most (80 per cent) of the illness episodes were minor; (4) more illness episodes occurred during stressful periods (combat on a navy ship); and (5) a higher incidence of illness was observed in subjects performing physically demanding or hazardous tasks.

Subsequently, the techniques developed by Rahe, Holmes, and their co-workers have been employed either in their original form or in a modified way, by various researchers who were interested in the association between life events and illness. For example, Sheldon and Hooper (1969) studied the health of newly-married couples. Compared to the five best-adjusted couples, the five worst-adjusted couples had more symptoms, more days in bed for illness, more current organic disease, and poorer health. Berkman (1969) studied spouseless motherhood and its possible effect on illness. Compared to married mothers, spouseless mothers reported significantly more illness and had lower morale, more psychological predisposition to stress, and lower ego strength.

Bruhn et al (1972) used the SRE to study first-, second-, and third-generation Italian - Americans living in the same community. They found that life change unit scores correlated with illness and these scores were highest in third-generation subjects and lowest in first-generation subjects. Differences were found in types of life changes : family change occurred more often in first-generation subjects; personal life change, in second-generation subjects; and work and changes in finance, in third-generation subjects.

Schmale (1972) showed that people who felt helpless to anticipate and control significant life events were particularly likely to suffer

serious illness or even death when stressful events impinged on them.

Eitinger (1973), as well as Arthur (1974), found increased mortality and morbidity in survivors of concentration camps compared with the rest of the population.

Several investigators have studied separation as a precipitant of illness. For example, Greene (1965) as well as Schmale (1972) showed that separation from significant persons occurred frequently prior to hospitalization of some patients. Parens et al (1966) also studied object loss and reported more illness among persons with more past actual or symbolic object losses. Also, many studies (e.g., Lindemann, 1944; Marris, 1958; Schmale, 1958; Rees and Lutkins, 1967; Parkes et al, 1969) have shown a positive association between grief and certain psychosomatic conditions, particularly cardiac disorders. The acute phase of grief is normally completed within 6-12 weeks of death, and certainly within two years (Hodge, 1971).

Mutter and Schleifer (1966) studied family patterns of children hospitalized for acute illnesses. They found that families of ill children were more disorganized and that they had exposed these children to more psychological and social changes compared with the families of the control group. Meyer and Haggerty (1962) also studied family stress. In a well - controlled prospective study, they found that infections of the throat were four times as likely to be preceded as to be followed by acute family stress, the difference being highly significant statistically.

As an index of stress Roghamann and Haggerty (1973) used objective evaluation of the amount of coping required by a specific reported event. They found that the onset of illness correlated with a stressful

event and that the presence of stress increased utilization of medical services, whether or not illness was present.

The association between job-related stress and illness has received a great deal of attention from various investigators. Work is an essential part of a man's life, since it gives him status and binds him to society. Ordinarily, men and women find satisfaction in their work. However, when they are dissatisfied, the fault lies in the psychological and social conditions of the job rather than in the worker (Brown 1964).

Many conditions, such as interpersonal conflicts which occur at work, affect the health of workers (Margolis et al, 1974). It is one of the widely - held hypotheses of psychosomatic medicine that interhuman conflicts which are not acted out in speech or action may upset the internal (somatic) homeostasis of the individual and thus produce a psychosomatic illness (Groen, 1970). An employee not only spends a large part of his time at his work, but its character can also affect the nature of many of his activities. Above all, it determines whether he achieves job satisfaction, which is one of the essential elements for the maintenance of mental health.

There is a growing awareness that working life subjects many people to considerable, possibly dangerous, psychosocial stimuli (Kagan and Levi, 1971), which in turn might cause psychosomatic disorders (Miall and Oldham, 1958).

One often speaks of the stress of working life, meaning the consequences of competition, and of the urge for advancement and success. We live in a highly competitive society in which there is a premium on economic achievement and financial security. Although many people

deplore the quest for material things and regard it as undesirable, the fact remains that a substantial proportion of the population struggles endlessly to improve its financial position (Brown, 1964).

Alienation at work has robbed many people of interpersonal support. The interhuman relation between the "boss" and his coworkers is often impersonal, "cold", and businesslike. For most factory workers, apart from the money, there is little gratification in the work, no common ideal, no warmth, and no personal friendship. Moreover, many comrades are at the same time rivals, communicating only technically and intellectually without any show of feelings. As Groen (1970) mentions, workers today hardly ever discuss their problems with their co-workers or their work problems with their wives.

A series of studies by French and his colleagues (1965) has shown associations between feelings of work overload and elevated risk of heart disease in a variety of populations. Work overload refers to feelings that job demands exceed one's capacities, given one's available time, resources, and abilities. Deadlines are a frequent source of overload (House, 1974). Among 104 university professors in the United States, those who felt overloaded had significantly higher levels of cholesterol than those who did not feel overloaded (French et al, 1965).

Russek and Zohman (1958) found in one study, that 25 per cent of young coronary patients had been working at two jobs and an additional 45 per cent had worked at jobs which required (because of work overload) 60 or more hours per week. They added that although prolonged emotional strain preceded the attack in 91 per cent of the cases, similar stress was only observed in 20 per cent of the controls. Breslow and Buell (1960) have also reported findings which support a relationship between

hours of work and death from coronary disease. They observed that workers in light industry, under the age of 45 years, who were on the job more than 48 hours a week, had twice the risk of death from coronary heart disease compared with similar workers working 40 or less hours per week.

A study by Theorell (1973) of male cardiac patients below 65 years of age showed that the patients reported excessive overtime work and had experienced lack of satisfaction in their work more often than control subjects. Bruhn et al (1968) found in a group of cardiac patients that they often held jobs which were superior to their qualifications; consequently, they felt distressed in their occupational roles. They often said that their employers were demanding, did not understand them, and did not give them recognition for their work, despite long hours, hard work, and concern for doing a good job.

Job dissatisfaction and stress related to work have been found among cardiac subjects by several researchers. Jenkins (1971) found that persons with coronary disease were significantly more dissatisfied with their overall jobs or aspects thereof (e.g., tedious details, lack of recognition, poor relations with co-workers, and poor conditions of work) and/or had more work "problems" and difficulties than control subjects. Similar results have also been found by Sales and House (1971).

Russek (1959) showed in one study that young coronary patients could be differentiated from healthy control subjects far more readily by the dimensions of occupational stress than by differences in heredity, diet, obesity, exercise or tobacco consumption.

The work of Theorell (1974) has shown that increased responsibility at work, change of work schedule, and conflicts with superiors or colleagues were reported more frequently by cardiac patients than by a control group.

A study by Orth-Gomér (1979) showed that Swedes with cardiac disorders ascribed their periods of stress almost exclusively to problems at work.

González (1980) refers to several studies which have shown that retirement from work may predispose one to cardiac disease.

While there is little doubt that many factors at work can cause stress, which in turn can pose serious threats to the physical and psychological well-being of the worker, two points need to be mentioned :

- (a) the various work-related stress factors discussed above should not be construed as being specific to persons with cardiac disorders. Similar factors have been found among patients with other illnesses as well. For example, gastrointestinal patients have been reported to be dissatisfied with their jobs, changed jobs frequently, worried about low earnings, or felt that their work was too strenuous (Klein, 1948); and
- (b) neither the job nor the money itself can be seen as sufficient to cause disease, unless there is a real threat to the patient's security. Nickel (1978) makes the point that a job situation may cause disease if the worker is harrassed by people in authority, making him want to quit — although the work is needed for survival. *"But, here again, it is a personal threat and not the job"*. (Nickel, 1978 p. 679).

4.8 Models of the Life Event Stress Process

One way in which stress may contribute to cardiac disease is by repeatedly engaging the body's nonspecific reactions to aversive stimulation (Glass and Carver, 1980). It is widely agreed that such stimulation leads to discharge of the sympathetic nervous system and to increases in hormones such as adrenaline and nonadrenaline (e.g., Mason, 1972). There is evidence that high levels of these hormones, which are collectively termed catecholamines, may have special significance in the development of cardiac disease (e.g., Glass and Carver, 1980). For example, it is well known that these substances raise the level of blood pressure. Some research indicates further that they can accelerate the rate of arterial damage, and in fact, induce myocardial lesions (e.g., Raab et al, 1964). Catecholamines also potentiate the aggregation of blood platelets, which is considered to be an important factor in the genesis of thrombosis (e.g., Theorell, 1974). Hence any psychological factor — such as stressful life experiences — that serves to increase catecholamines in the blood may be a potential pathogen for cardiovascular functioning.

Hinkle (1974, p. 41), on the basis of his studies of telephone company employees living in stable social situations and of political refugees whose life situations had been severely disrupted, said

".... the effect of a social change, or a change in interpersonal relations, on the health of an individual cannot be defined solely by the nature of the change itself. The effect depends on the physical and psychological characteristics of the person who is exposed to the change and on the circumstances under which it is encountered".

According to Rahe (1974), life experiences are evaluated by an individual on the basis of his past experience so that some events are emphasized and others ignored.

"Some life-change events are 'diffracted away' by various ego defense mechanisms and cease to be of significance; others pass through one's defenses with little 'deflection'".
(Rahe, 1974b, p. 74).

Events which are regarded as important on the basis of past experience are further filtered out by the psychological defenses operating within the individual. Life experiences which cannot be handled by such defense mechanisms as the individual has, will, according to Rahe (1974b), actually affect the physiological processes of the body causing arousal and activation. Such arousal may be handled by the individual by means of his coping processes, such as his ability to disseminate the arousal by relaxation. Thus, a subject's physiological reactions to his recent life - change events occur only when those events "penetrate" his psychological defenses. Finally, if physiological arousal is not dealt with adequately by coping mechanisms it will result in illness much as would be predicted by Selye's (1956) theory of the GAS. Such illness, too, is subject to the individual's particular approach to illness in terms of whether it is perceived as debilitating or not. Thus, Rahe's (1974b) model proposes a series of "filters" through which life events and their concomitant physiological changes have to pass before they reach a level sufficient to manifest as illness.

Cobb's (1974) model of the processes taking place between the experience of life events and the occurrence of illness is similar in several ways to that of Rahe (1974b). Cobb (1974) suggests that a

life event has to pass through succeeding stages before it results in illness. Firstly, a life event comprising either objective or subjective stress may result in such situations as work overload or "role ambiguity". Such overload, excessive responsibility or ambiguity leads to physiological, affective or behavioural manifestations of strain. Suicide attempts, for example, would be indicative of behavioural strain whereas increased catecholamine levels would reflect physiological strain. Such strain, if of sufficient magnitude, may, according to Cobb (1974), result in illness. In addition, Cobb (1974) proposes that the shift from life event to illness is affected by personal characteristics of the individual as well as by the social situation in which the individual finds himself. Personal characteristics comprise, for example, the psychological defense mechanisms of the individual, his abilities, needs, genetic predisposition to illness, his past experiences and his attitudes to illness and medical care.

The view expressed by Krakowski (1982) is that predisposition to disease is due to conflict and sensitivities which are specific for the individual or to his diminished adaptive capacity. For the disease to become manifest the person must be predisposed genetically, or by viral infection, by endocrine or other physiological factors such as disturbances of regulation. When psychological adaptation fails the individual may manifest anxiety, depression and helplessness and finally the "giving-up" process. The exact mechanism of how the predisposition is transformed and especially how the psychological factors acting as stressors are transformed to physiological effects even in persons who are predisposed to illness are not truly known (Krakowski, 1982). MI

4.9 Summary and Conclusion

Events and changes in the environment acquire a meaning for people, and may have a continuous impact on their minds. In the course of everyday events, human beings, when preparing for or engaging in some activity, respond psychophysiologicaly; that is, they change from a mental and physiological steady-state to one of alertness, attention, and concentration, with accompanying autonomically and hormonally mediated responses. Thus, regardless of whether events in life are positive (pleasant) or negative (unpleasant), they are a source of stress which requires adjustment on the part of individuals experiencing them. It is not surprising, therefore, that most definitions of stressful life events emphasize change in the usual activities of the person experiencing these events.

In recent years attempts have been made to quantify stress. These have been due largely to the pioneering work of Holmes and Rahe (1967) who emphasized that the amount of "change" required by a stress-producing event or situation was more important than whether the event or situation was pleasant or unpleasant. Today, their method of quantifying stress in life events is, despite certain limitations, used increasingly in various parts of the world. Their technique is aimed at deriving a "life change unit" (LCU) score for each life event. The LCU scores represent the magnitude of change in adjustment required by life events.

Life events have been conceptualized in several ways, such as according to their social desirability, and according to exits from and entrances to the social field of a person.

The type of life events included in life event questionnaires employed by other researchers have varied in content and number, often with a great deal of overlap. Moreover, the technique of scaling life events has also varied.

Some of the methodological issues in the study of life events, and models of life event stress processes were presented in this chapter.

An extensive body of clinical and epidemiological research suggests that stressful life events are causally implicated in a variety of undesirable effects on health. Some studies (e.g., Smith et al, 1978) have shown a clustering of life events just prior to the onset of illness.

It must be pointed out that life events stress is not the only factor significant in the occurrence of any illness. There is no evidence, to the knowledge of the author, to justify such a contention. Indeed, it is obvious that for many illnesses in which life event stress is significant, other factors (e.g., diet) also have a contributory effect.

CHAPTER FIVE

5. THE PRESENT INVESTIGATION

The present study which examines the association between life events, personality, and cardiac disease, is a study in the area of psychosomatic disorders, as perceived from a holistic point of view. It is essentially a field-study approach — employing experimental and control groups — for the study of the relationship between stressful life events, personality, and cardiac disease. Moreover, the present study is a cross-sectional study which combines both the subjective and the objective situation approaches to the study of life stress, personality, and illness.

Following the dominant outlook, which today seems to favour a strong generality position (Lazarus et al, 1980), the present research programme adopts an assumption of "generality" as opposed to "specificity" in its approach to psychosocial influences on physiological functioning. The "generality" approach to psychosomatic illness implies that the nature of the stress itself, and the particular forms of coping used, are less important than the general mobilization accompanying any emotion, which precipitates tissue damage or increased vulnerability to illness through the direct and indirect effects of associated neuroendocrine activity (e.g., Lazarus et al, 1980). Thus according to this view, any noxious stimulus can evoke physiological reaction patterns commonly associated with stress. The present study does not, however, attempt to elucidate the mediating mechanisms that interpose between psychosocial stimuli (external situation) and physiological mechanisms. Also, although it has been widely accepted that obesity,

hypertension, diabetes, overconsumption of animal fat, cigarette smoking, and lack of exercise enhance the likelihood of cardiac disease, there is a growing number of studies (e.g., Engel, 1971; Wolf, 1971; Friedman and Rosenman, 1974; Krakowski, 1982) which have examined the aetiological role of other factors in the genesis of cardiac disease. In particular, life event stress

".... is certainly one of the most important risk factors which contribute to cardiovascular disease". (Harris, 1980, p. 50).

In the light of this, the present study attempts to examine the association between stressful life events, personality, and cardiac disease.

The investigative approach is a multi-level approach in that stress is examined on a sociological, physiological, and a psychological level. Following the advice of Laux and Vossel (1982), the present study has adopted an interactional model of stress.

The design of the study is such that the stressors have been examined temporally — covering a period of two years prior to the investigation — and have been conceptualized as an overload rather than an underload. In addition, the stressors examined are not necessarily assigned negative affective connotations. Rather, the stressors may be perceived as positive ("eustress") or negative (distress), depending on the subjects' own perceptions of life experiences.

Following the advice of Miller et al (1974) that caution should be exercised in utilizing norms derived from one group or another without first checking the consensus values appropriate to the particular

population under consideration, the present investigation undertook to derive norms for Indian adults rather than utilizing norms based on other cultures, as derived by other investigators.

Data for the present investigation have been gathered primarily through two observational methods : questionnaires and medical records. The stressful environments have been examined on a macro-microlevel.

Life events examined in the present investigation cover such diverse areas as health, social, personal, family, finance, and work. These life events are examined both for their total frequency of occurrence, as well as their magnitude, expressed in terms of life change unit (LCU) scores which represent the average perceptions of life events by individuals.

In the first part of the investigation, life events are categorized according to their social desirability, as well as according to exits from, and entrances to the social field of the respondent. In the second part of the investigation, life events are examined retrospectively in relation to one illness, namely, cardiac disease. The experience of life events covers a period of two years prior to the time of the investigation.

Finally, the present study does not attempt to investigate stress tolerance in individuals, their adaptation - coping strategies, or the therapeutic aspects of cardiac disease.

5.1 Procedure

5.1.1 Part I of the Investigation

The prime objective of Part I of the present investigation was to derive local norms for the Social Readjustment Rating Questionnaire (SRRQ) based on Indian adults. These norms were required for application in Part II of the investigation.

5.1.1.1 The Sample

The sample for Part I of the investigation comprised 317 Indian adults from the Greater Durban area. The sampling technique employed in the selection of the subjects was "essentially random". According to Vockell (1983, p. 109)

"'Essentially random' is a term which is often applied to samples which were not randomly selected but which the researcher thinks are unbiased anyway".

It is reasonable to say that the sample for Part I of the present study was an "essentially random" one, and hence representative, for the following reasons :

- (a) the 317 subjects which comprise the sample, appear to be well distributed according to the demographic variables reflected in Table 5.1;
- (b) on the major variable of income the subjects are approximately normally distributed : 40 (12,62 per cent) subjects earn less than R200 per month; 217 (68,45 per cent) earn R200 - R999

per month; and 60 (18,93 per cent) earn over R1 000 per month;

- (c) 228 (71,92 per cent) subjects were drawn from suburbs of which the predominant population were middle income earners. These suburbs were : Central Durban, Clare Estate, Mobeni and Overport. Another 49 (15,46 per cent) subjects were drawn from predominantly lower income suburbs. These suburbs were : Chatsworth, Merebank, Phoenix, and Sea Cow Lake. Forty (12,62 per cent) subjects were drawn from predominantly upper income suburbs. These suburbs were Asherville, Isipingo Beach, Parlock, Reservoir Hills, and Westville. All these suburbs together account for the large majority of the Indian population of Greater Durban; and
- (d) the sample composition according to religion is as follows (Table 5.1) : Christian : 19,56 per cent; Hindu : 63,09 per cent; and Moslem : 17,35 per cent. This compares favourably with the urban population figures for Indians given in the Official Yearbook of the Republic of South Africa (South Africa, 1983), based on the 1980 census results : Hindu : 457 980 (61,57 per cent); Moslem : 148 420 (19,95 per cent); and the balance, including Christians : 137 420 (18,47 per cent).

TABLE 5.1 Demographic Characteristics of the Norm Sample (N=317)

Demographic variable	N	%
<u>Sex</u> : male	192	60,57
female	125	39,43
<u>Marital status</u> : married	170	53,63
never married	147	46,37
<u>Occupational status</u> : professional and technical	161	50,79
administrative and managerial	151	47,63
unemployed	5	1,58
<u>Age</u> : below 30 years	186	58,68
30 years and above	131	41,32
<u>Religion</u> : Christian	62	19,56
Hindu	200	63,09
Moslem	55	17,35
<u>Educational level</u> : less than Std. 5	4	1,26
standard 5-10	193	60,88
post-matric degree/diploma	120	37,85
<u>Income (p.m.)</u> : less than R200	40	12,62
R200-R599	120	37,85
R600-R999	97	30,60
R1 000 and over	60	18,93

5.1.1.2 The Instruments

5.1.1.2.1 Biographical Inventory

A biographical inventory (Appendix A) compiled by the author was utilized to gather information on each subject on such demographic variables as age, sex, marital status, religion, educational level, occupation, and income.

5.1.1.2.2 The Social Readjustment Rating Questionnaire (SRRQ)

The Social Readjustment Rating Questionnaire (SRRQ) is a self-administered paper-and-pencil test developed by Holmes and Rahe (1967),

and consists of 43 life events ranging from the relatively unimportant events such as minor violations of the law, to catastrophic events, such as death of a spouse. The SRRQ¹, which covers life events relating to such areas as health, work, home and family, personal and social, and finance, was devised in order to obtain numerical estimates of the average degree of life change and readjustment required by an individual for each life event (Holmes and Rahe, 1967). It is perhaps the most widely-used instrument in research studies dealing with the long - term effects of stress on an individual (Coleman, 1973).

The life events were scaled by Holmes and Rahe according to the proportionate scaling method of Stevens (Stevens and Galanter, 1957; Stevens, 1966). The method employed by Holmes and Rahe in quantifying the amount of change in adjustment required by the 43 life events referred to was derived from psychophysics —

".... the study of the psychological perception of the quality, quantity, magnitude, and intensity of physical phenomena". (Holmes and Masuda, 1974, p. 47).

It is considered that every psychosocial change can act as a stressor, and, in general, deprivation or excess of almost any intensity is found to be stress provoking in Selye's sense of the word (Levi, 1972). Therefore, the questionnaire is based on the concept that any change, desirable or undesirable, pleasant or unpleasant, is considered a

1. Further description of the SRRQ is given in Section 4.2.

stressor (Graham and Reeder, 1979). However,

".... there is no real consensus even among social scientists as to what stress is or how to measure it"
(Wardwell, 1973, p. 523).

The list of events (Appendix B) employed in the present study was based essentially on the SRRQ (Appendix C) developed by Holmes and Rahe (1967) with certain modifications which were deemed necessary prior to and following a pilot study (Section 5.1.1.3). The main purpose of utilizing the SRRQ in the present study was to derive the mean life change unit (LCU) score for each life event.

Reliability estimates of the SRRQ have varied from as low as 0,26 to as high as 0,90 (Casey et al, 1967; Thurlow 1971; Mc Donald et al, 1972).

In general the SRRQ appears to have a high degree of reliability and validity with respect to the life events it covers, although some question has been raised about the adequacy of the coverage itself relative to stressful life events which might have been included (Coleman, 1973). In this respect, the SRRQ employed in the present study made allowance for subjects to list "other" life events which might not have been listed by the author. In fact some subjects did list "other" items, but these did not warrant their inclusion as they were very similar in meaning to items on the questionnaire.

In the present study, a reliability estimate based on the test-retest method, separated by approximately seven months, was obtained from the ratings of a sample of convenience of 28 subjects. The computed Spearman rank-order correlation coefficient was 0,67 ($p < 0,005$).

Further evidence of the reliability of the SRRQ used in the present study, and based on 21 "sub-groups", has been produced in Chapter Six

(Section 6.2.1).

The validity of the statistical basis on which the rank orderings have been done, and the scale constructed, has been subjected to rigorous scrutiny by Masuda and Holmes (1967a). They found that three standard measures of central tendency — the arithmetic mean, the geometric mean, and the median — were closely associated and that, in response to the SRRQ, the American population was homogeneous with regard to both item scoring and the ranking of items.

Cross-cultural studies conducted by several investigators (e.g., Komaroff et al, 1968; Harmon et al, 1970; Rahe et al, 1971) have indicated concordance in the rank ordering of events in diverse cultural settings.

Life event questionnaires employed by previous investigators (e.g., Antonovsky, 1974; Gersten et al, 1974; Holmes and Masuda, 1974; Markush and Favero, 1974; Myers et al, 1974; Paykel, 1974; Theorell, 1974; Chalmers, 1981) have included life events concerning personal and family life, the work situation, social interaction, and legal encounters. Life events of a similar nature were included in the SRRQ employed in the present study.

In evaluating the technique of scaling life events, Dohrenwend and Dohrenwend (1978, p. 11) have said :

"It seems to us that there is a strong argument for the general procedure developed by Holmes and his colleagues. It makes sense that some events are, objectively, of greater magnitude than others. Who would want to suggest, for example, that the 'death of a pet' is inherently as large an event as 'death of a spouse'?"

Furthermore, two psychiatrists attached to the Medical School of the University of Natal were requested by the author to examine the face validity of the SRRQ employed in the present study. Both psychiatrists were familiar with the SRRQ and both indicated independently of each other, that the SRRQ had sufficient face validity.

Further validating evidence of the SRRQ used in the present study has been presented in Section 6.2.2.1.

5.1.1.3 The Pilot Study

The Biographical Inventory, together with the SRRQ was administered by the author to a sample of convenience comprising 20 Indian adults. Prior to the administration of these instruments, certain changes were made to the SRRQ items. These were :

- (1) the omission of two items (item 42 - changing to a new school; and item 43 - beginning or ceasing formal schooling) which were not applicable to the population under study; and the omission of a further five items, in favour of items which were considered to be either more frequent in their occurrence, or more important in terms of their potential stressfulness. The five items omitted were :

- Item 8 - foreclosure on a mortgage or loan
- Item 30 - wife beginning or ceasing work outside the home
- Item 34 - taking on a mortgage or loan less than \$10 000
- Item 37 - major change in social activities
- Item 41 - Christmas.

(2) the addition of the following 13 items (Appendix B) :

- Item 9 - engaged to be married
- Item 11 - troubles with co-worker (s)
- Item 16 - death of a close relative
- Item 17 - major decisions regarding the future
- Item 24 - major violations of the law
- Item 25 - extramarital affair (spouse)
- Item 26 - extramarital affair (self)
- Item 27 - building a house
- Item 33 - court appearance
- Item 34 - unwanted pregnancy
- Item 35 - academic/scholastic failure
- Item 36 - menopause
- Item 37 - miscarriage or stillbirth.

Of these, items 16 and 34 were added to the list by the author, whereas the remaining 11 items were selected from other life event lists.

Following the pilot study, further changes were made to the SRRQ. These were :

- (1) The rating of life events on a 20-point scale in favour of using the item "marriage" as a module with which to compare and rate the remaining items. This was necessary as some respondents experienced difficulty in comparing life events with a given module.
- (2) Items 22 (marital separation from mate) and 26 (divorce) were combined into one item — divorce or separation. This

was done because most subjects tended to give similar ratings to these items.

In view of the numerous changes effected to the SRRQ, by the author, the questionnaire deviates appreciably from its original form, in terms of its content, length, wording of items, and the method of rating the items. Therefore, the SRRQ adapted for use in the present study is called the Social Readjustment Rating Questionnaire - Chohan's Adaptation (SRRQ-CA).

5.1.1.4 Administration and Scoring of the Instruments

Applying the "essentially random" sampling technique described in Section 5.1.1.1 above, the Biographical Inventory and the SRRQ-CA were distributed to 360 subjects by 26 second-and later-year voluntary students from the Faculty of Education of the University of Durban-Westville.

These students were given specific instructions, by the author, regarding the areas to be sampled, the purpose of the study, the age range of subjects and the number of males and females to be interviewed, the manner of approaching subjects, and about thanking the subjects for their participation in the study. Students were requested to explain to subjects the instructions for completing the questionnaires. These instructions, as well as the order in which the life events were listed, are indicated in Appendix B.

Basically the subjects were requested to rate each life event in terms of how easy or difficult it was to adjust to the event. An equal-appearing interval scale, ranging from 0 (indicating an event easy to adjust to) to 20 (indicating an event difficult to adjust to)

was used.

Of the 360 questionnaires that were distributed, a total of 317 (88,06 per cent) were utilized for the analysis of data; the remaining 43 were either spoilt or were not returned by subjects.

The SRRQ is not scored as such, but rather, the geometric mean value for each item is calculated. As in previous studies (e.g., Rahe, 1969a; Rahe and Lind, 1971; Theorell and Rahe, 1971), the geometric mean value of an item is referred to as the life-change unit (LCU) weight of the item, and it represents the average degree of life-change and social readjustment necessary for an individual to cope with that life event (item).

Reason for the choice of the geometric mean over the arithmetic mean for the estimation of the degree of life change and social readjustment in the present study is given in Section 6.1.3.

The LCU scores of the 49 items of the SRRQ-CA, based on the sample of 317 subjects, are shown in Section 6.1.

5.1.2 Part II of the Investigation

The prime objective of Part II of the study was to examine the association between life change unit (LCU) scores, personality, and cardiac illness.

5.1.2.1 The Subjects

Three groups, each comprising 60 Indian adult subjects, male and female, between the age of 18 and 64 years, were formed as follows :

Group A. This group comprised 60 hospitalized patients diagnosed by a physician as having cardiac problems. The cases of cardiac problems included angina pectoris, myocardial infarction, and cardiac failure not necessarily related to angina pectoris or myocardial infarction. Subjects for Group A were selected from two general hospitals — 40 from the R.K. Khan Hospital in Chatsworth, Durban, and 20 from the St. Aidan's Indian Mission Hospital, Durban. The former is a state-owned hospital, established in the heart of a densely-populated area, for Indians who are predominantly from the lower socioeconomic class. It is situated approximately 20 kilometres south-west of Durban. The latter is a private hospital situated about the centre of Durban, and caters predominantly for the middle and upper socioeconomic groups of Indians.

Group B. This group of 60 subjects served as a control group and comprised patients who were free of cardiovascular problems. Included in this group were 43 patients hospitalized for minor surgical treatment such as appendicectomy, tonsillectomy, incision and drainage of abscesses, and dilatation and curettage (D and C). As for Group A, 40 subjects were selected from the R.K. Khan Hospital, and twenty from the St. Aidan's Indian Mission Hospital.

Group C. This group of 60 subjects served as a second control group, consisting entirely of non-hospitalized persons, presumably normal and healthy — i.e., these subjects reported that they were free of any psychological or physical illness, and that they were not under any psychiatric or medical treatment whatsoever, at the time of the investigation.

TABLE 5.2 Demographic Characteristics of the Three Groups (Percentages are shown in parentheses)

Demographic variable	Group A N=60	Group B N=60	Group C N=60
<u>Age</u>			
below 30 years	22 (36,67)	28 (46,67)	30 (50,00)
30 years and older	38 (63,33)	32 (53,33)	30 (50,00)
<u>Sex</u>			
male	30 (50,00)	30 (50,00)	30 (50,00)
female	30 (50,00)	30 (50,00)	30 (50,00)
<u>Marital status</u>			
married	30 (50,00)	43 (71,67)	42 (70,00)
never married	21 (35,00)	14 (23,33)	15 (25,00)
divorced/separated	9 (15,00)	3 (5,00)	3 (5,00)
<u>Religion</u>			
Christian	4 (6,67)	2 (3,33)	7 (11,67)
Hindu	38 (63,33)	31 (51,67)	26 (43,33)
Moslem	18 (30,00)	27 (45,00)	27 (45,00)
<u>Occupational status</u>			
professional and technical	7 (11,67)	4 (6,67)	12 (20,00)
administrative and managerial	44 (73,33)	52 (86,67)	40 (55,00)
unemployed	9 (15,00)	4 (6,67)	8 (13,33)
<u>Educational level</u>			
below std. 5	10 (16,67)	7 (11,67)	2 (3,33)
std. 5-10	38 (63,33)	39 (65,00)	45 (75,00)
post-matric degree or diploma	8 (13,33)	12 (20,00)	11 (18,33)
post-graduate degree or diploma	4 (6,67)	2 (3,33)	2 (3,33)
<u>Income (p.m.)</u>			
Less than R400	6 (10,00)	5 (8,33)	8 (13,33)
R400-R699	29 (48,33)	32 (53,33)	24 (40,00)
R700-R999	14 (23,33)	18 (30,00)	19 (31,67)
R1 000 and over	11 (18,33)	5 (8,33)	9 (15,00)

The subjects in Group B and C were equated with those in Group A on as many socio-demographic variables as was practicable. This was a difficult and time-consuming task in view of the large number of variables involved.

For the present study the population is defined as all Indian persons aged 18 to 64 years, having cardiac problems, and living in the Greater Durban area.

The sampling technique employed in the selection of the subjects for the three groups was "essentially random".

In the present study the subjects selected for inclusion in Group A and B were considered to be unbiased and representative of the Indian population for the following reason : the R.K. Khan and the St. Aidan's Indian Mission Hospitals serve catchment areas representing almost the entire Indian population of the Greater Durban area. Moreover, all of the field work was conducted over a period of approximately 15 months from June 1980 to September 1981, during which time some 600 patients were interviewed to determine whether or not they were eligible for inclusion in the sample. Of these, approximately 300, i.e., 50 per cent, were patients with cardiac problems.

5.1.2.2 The Instruments

5.1.2.2.1 Biographical Inventory

A biographical inventory (Appendix D) compiled by the author was utilized to gather information on each subject on such demographic variables as age, sex, marital status, religion, educational level, occupation, and income.

5.1.2.2.2 The Schedule of Recent Experience (SRE)

The Schedule of Recent Experience (SRE) developed by Rahe et al (1964), is a self-administered, paper-and-pencil questionnaire which documents significant changes in a subject's life. These changes represent a broad spectrum of life events which are roughly classifiable into five major categories : health, work, home and family, personal and social, and financial events. The SRE is organized in such a way that subjects not only indicate to investigators whether or not they have recently experienced various life change events documented in the SRRQ, but when, over the past few years, these changes occurred (Rahe et al, 1964).

In 1969 the SRE was translated into Swedish and Finnish for epidemiologic studies of men with coronary heart disease (Rahe, 1975b). The SRE has provided a great deal of the evidence from which the conclusion has been made that stress increases the likelihood of illness (Holmes and Masuda, 1974).

Reliability and validity studies with the SRE have shown variable results. Reliability estimates of the SRE based on college students and a test-retest interval of only one week, ranged from 0,87 to 0,90 (Hawkins et al, 1957; Rahe, 1974b). When the interval between test and re-test was extended to six to nine months, the reliability estimates based on physicians as subjects were in the region of 0,70 whereas U.S. Navy enlisted men obtained a correlation coefficient of 0,55 (Rahe, 1974; Rahe et al, 1974a).

In a study of more than 600 subjects with coronary heart disease the subjects' recent life changes were noted by means of the SRE and an interview. The SRE yielded a valid, though conservative estimate of the subjects' recent life change experiences (Rahe et al, 1974b).

In several validity studies conducted by Rahe et al (1974b), spouses separately agreed with their mates' scoring of their recent life changes with correlations ranging between 0,50 and 0,75 over one to two years prior to testing. Validity studies suggest that life change data over the past year are of acceptable veracity (Rahe, 1977). When the SRE was followed up by personal interview, questionnaire errors were almost always in the direction of subjects underreporting their recent life changes on the SRE. Thus, the SRE is most probably a conservative estimate of subjects' recent life changes (Rahe, 1977).

Hawkins (1958, p. 176) has referred to the SRE as

".... the only schedule which effectively rules out observer bias and the only one repeatedly pre-tested for readability by semiliterates".

Although the measurement of stressful life events with the use of the SRE is not a precise technique, Theorell (1973, p. 130) has stated :

".... as far as I know, there is no better similar instrument".

In the present study the SRE (Appendix E) was utilized to provide a means of investigating the association between life events and cardiac disease. Moreover, the SRE used in the present study documents life events over four six-month periods. This contrasts with time intervals of one year, six months, three months, one week, and even one day, which have been used in other studies (Rahe, 1972).

It is obvious that many patients, especially those with cardiac problems would be advised by their physicians to do regular exercise, to take adequate rest and sleep, to go on a diet, or to revise some personal habit, e.g., to give up smoking — all of which are part of the total therapeutic regime for cardiac illness. Consequently items 14 (major personal injury or illness), 20 (major change in recreation), 21 (major change in sleeping habits), 22 (major change in eating

the SRE lest they yield biased frequency of reporting, especially by cardiac patients. Thus the final list of life events used in the present study comprised 44 items. The wording and numbering of these items were the same as those in the SRRQ-CA.

In view of the changes effected to the SRE, by the author, the schedule deviates from other versions in terms of its content, length, wording of items, and the time period that it covers. The SRE adapted for use in the present study is, therefore, called the Schedule of Recent Experience - Chohan's Adaptation (SRE-CA).

In the present study, scoring of the SRE-CA was done by following the standard procedure (e.g., Rahe et al, 1970; Rahe and Lind, 1971; Coddington, 1972; Bell, 1977; Graham and Reeder, 1979; Horowitz et al, 1974; Kobasa, 1979) of examining the items checked by a respondent, and assigning to these their corresponding LCU scores (i.e., weights) determined in Part I of the present study. If an item was checked twice (i.e., if an event had occurred twice) during a given six-month period, it was assigned twice its LCU weight. The LCU scores were then summed, giving the respondent's LCU score for that period. For example, in the present study, a subject who reported having experienced, during the 19-24 month period, a loss of job (item 39); the death of two close relatives (item 16); and troubles with in-laws (item 7), was assigned the following LCU values : 13,4 for item 39; 10,5 (x2) for item 16; and 7,7 for item 7. These yielded a total LCU score of 42,1 for that individual, for the 19-24 month period. The same procedure of assigning corresponding LCU weights was followed for the remaining three six-month periods, so that for each individual four six-month LCU total scores were determined. These LCU total scores represent a quantitative estimate of the relative intensities of the various life events.

5.1.2.2.3 The Sixteen Personality Factor (16 PF) Questionnaire (Form E)

The Sixteen Personality Factor Questionnaire, often referred to as the 16 PF, is an objectively-scored paper-and-pencil test which gives

".... the most complete coverage of personality possible in a brief testing time". (Eber and Cattell, 1976, p. 5).

The rationale for the choice of Form E for the present study is that Form E represents a special adaptation of the test for use with persons of limited educational and cultural background.

The personality factors measured by Form E are the same as those included in Forms A, B, C, and D. These are described in Table 5.3 below. Eight items are provided for each of the sixteen factors, giving a total of 128 items for Form E.

Detailed instructions for answering the questions are printed on the front page of the test booklet; and the answers are recorded as pencil marks in the boxes on a separate answer sheet.

Since the 16 PF is an objectively scored questionnaire, its conspect coefficients (i.e., agreement between two scorers) are potentially perfect, i.e., equal to + 1,0 (Eber and Cattell, 1976).

The direct concept validities of the 16 scales range from 0,21 for Factor N, to 0,83 for Factor Q₄; most being well in the region of 0,70. Furthermore, each scale has a relatively small amount of overlap with other scales in the test.

TABLE 5.3 "Capsule" Description of the Sixteen Personality Factors

Factor	Low score description	High score description
A	Reserved, detached, critical, aloof, stiff.	Outgoing, warmhearted, easy-going, participating.
B	Less intelligent, concrete thinking.	More intelligent, abstract-thinking, bright.
C	Affected by feelings, emotionally less stable, easily upset, changeable.	Emotionally stable, mature, faces reality, calm.
E	Humble, mild, easily led, docile, accommodating.	Assertive, aggressive, stubborn, competitive.
F	Sober, taciturn, serious.	Happy-go-lucky, enthusiastic.
G	Expedient, disregards rules.	Conscientious, persistent, moralistic, staid.
H	Shy, timid, threat-sensitive.	Venturesome, uninhibited, socially bold.
I	Tough-minded, self-reliant, realistic.	Tender-minded, sensitive, clinging, overprotected.
L	Trusting, accepting conditions.	Suspicious, hard to fool.
M	Practical, "down-to-earth" concerns.	Imaginative, bohemian, absent-minded.
N	Forthright, unpretentious, genuine but socially clumsy.	Astute, polished, socially aware.
O	Self-assured, placid, secure, complacent, serene.	Apprehensive, self-reproaching, insecure, worrying, troubled.
Q ₁	Conservative, respecting traditional ideas.	Experimenting, liberal, free-thinking.
Q ₂	Group-dependent, a "joiner" and sound follower.	Self-sufficient, resourceful, prefers own decisions.
Q ₃	Undisciplined self-conflict, lax, follows own urges, careless of social rules.	Controlled, exacting will power, socially precise, compulsive.
Q ₄	Relaxed, tranquil, unfrustrated, composed.	Tense, frustrated, driven, overwrought.

Scoring of the 16 PF is achieved through the use of a plastic key. Unlike other forms of the 16 PF, each response on Form E is scored 0 or 1 point. Raw scores are converted to stens with the use of appropriate norm tables provided in the manual. These norm tables are based on a total sample of over 3 000 Americans. Data have been included from such diverse samples as rehabilitation clients, psychiatric patients, and various minority groups.

Although a large number of personality questionnaires and inventories have been published since the second decade of this century, only a few have been well founded on factor analytic research showing that separate traits or dimensions of personality, which they claim to measure, are real, functionally unitary, and psychologically significant dimensions (Cattell and Eber, 1957). The 16 PF has been claimed to meet a long-standing demand for a personality-measuring instrument properly validated with respect to the primary personality factors which are rooted in general psychological research (Cattell and Eber, 1957). The sixteen dimensions used have been based on considerable research directed at locating unitary, independent, and practically important "source traits", i.e., traits such as intelligence, emotional stability, super-ego strength, surgency, and dominance, all of which affect much of the overt personality. (Cattell and Eber, 1957). The sixteen dimensions or scales are essentially independent; that is, the correlation between any two scales is usually quite small. Therefore, a certain position on one dimension does not prevent the person having any position whatever on the other. Thus, each of the sixteen dimensions yields an entirely new piece of information about the person, a condition not found in many alleged multi-dimensional scales (Cattell and Eber, 1962).

In recent years a considerable amount of evidence has accumulated regarding cultural differences on the primary personality factors, mainly on the 16 PF. It has been shown, for example, that significant differences exist on source-trait levels. Results have been obtained from Australia, Brazil, Britain, Canada, Chile, Czechoslovakia, France, Germany, Holland, India, Italy, Japan, etc. (Cattell et al, 1970). These results have both practical and theoretical value — practical in that they move toward different norm standards for use in each country; theoretical in that they provide supports and checks for theories about the dynamics of culture patterns. Regarding the latter, there is always a controversy about how much of the differences observed can be racial and cultural in origin. The only clear methodological contribution is the finding that the acculturation of Japanese in the United States, over generations, reduces, but does not entirely obliterate, the mean profile difference (Meredith and Meredith, 1966).

Various investigators (e.g., Ostfeld et al, 1964; Bakker, 1967; Lebovits et al, 1967; Finn et al, 1969; Hoy, 1969; Coleman and Riley, 1970; Johnson and Leonard, 1970; Fozard and Nuttall, 1971; Finn et al, 1974) have employed the 16 PF to demonstrate an association between personality characteristics and certain psychosomatic disorders. Generally, persons with psychosomatic disorders are higher on ego strength (C), and lower on guilt proneness (O) than persons without psychosomatic disorders (Eber and Cattell, 1976).

The primary purpose of employing the 16 PF in the present investigation was to compare the personality profiles of hospitalized patients with cardiac disorders with those of persons without cardiac disorders.

5.1.2.3 The Pilot Study

A pilot study was conducted by the author, on a sample of convenience comprising 16 Indian adult subjects as follows : three male and one female cardiac patient, two male and three female surgical patients, all hospitalized at the St. Aidan's Indian Mission Hospital in Durban, and seven non-hospitalized subjects, comprising four males and three females who were presumably normal and healthy. These latter reported that they were in good health, and were not under any medical or psychological treatment.

Subjects were requested to complete the Biographical Inventory, the SRE-CA and the 16 PF as follows. With the assistance of the author, the 16 PF was completed for each subject in approximately 45 minutes. The Biographical Inventory and the SRE-CA were completed with the assistance of the author for only two of the three male cardiac patients. These took approximately ten minutes, and one hour respectively. The remaining 14 subjects were requested to complete the Biographical Inventory and the SRE-CA at their leisure during the course of the following day. Between six and eight days later, 12 of the 14 patients were re-visited, two of the female surgical patients having been discharged. The purpose of the second visit was to examine the consistency of their responses to the SRE-CA items. A Spearman rank-order correlation coefficient of 0,72 was significant at the 0,005 level. Whether in fact all the subjects had carried out the request to complete the SRE-CA on the following day is questionable. Nevertheless, it is reasonable to assume that the SRE-CA can be reliably completed by the subjects without the personal assistance of a test administrator.

5.1.2.4 Administration of the Instruments

Permission to administer the instruments to the patients in Groups A and B was obtained from the following :

- (a) The R.K. Khan Hospital. Permission was obtained verbally from the Medical Superintendent of the hospital;
- (b) The St. Aidan's Indian Mission Hospital. Permission was obtained in writing from the Honorary Medical Superintendent of the hospital (Appendix F);
- (c) The physicians under whose care the patients were. Permission was obtained in writing (Appendix G); and
- (d) The patients themselves, from whom written permission was obtained (Appendix H).

All the interviews with subjects in Groups A and B were conducted at their bedside as soon as the patients felt well enough to be interviewed. On the average, the first interview took place about five days after the patient was admitted to hospital. Patients transferred from an intensive-care unit to the wards were not interviewed until two days after their transfer.

During the first interview the nature and purpose of the interview were made known to the patient. Briefly, it was explained that as a researcher the author was interested in the association between the life experiences and life styles of people, and the relation of these to illness. It was made clear to the patient that the interviews were not related to their treatment, although such information could eventually be of help to others. The author emphasized the

confidentiality of all information gathered from the patients.

During this first interview the Biographical Inventory and the 16 PF were administered by the author. These took approximately 10 minutes and 45 minutes respectively.

The second interview was conducted two days after the first interview. During this interview which lasted approximately an hour, the SRE-CA was administered by the author. If it was ascertained during the first interview that a patient was to be discharged from hospital on the following day, an attempt was made to hold the second interview before the patient was discharged. This was applicable to eight cardiac patients.

The order of presentation of the various instruments was uniform for the entire sample.

Most of the subjects in the three groups showed their willingness to participate in the research. However, a total of 26 subjects were excluded from the sample, and had to be replaced by an equivalent number of suitable subjects. Those excluded from the sample were :

- (a) five "normals" and ten patients who refused to participate in the study when approached by the author;
- (b) two cardiac patients and three non-cardiac patients who refused to continue their participation in the study. For ethical reasons, no attempt was made to persuade them to continue;

- (c) two non-cardiac patients who indicated their inability to understand the instructions and/or questions used in the various instruments;
- (d) two cardiac patients with a history of psychiatric disorders; and
- (e) two cardiac patients — one who appeared to be depressed, and one who manifested anxiety.

The entire field work (Parts I and II) was conducted over a period of approximately sixteen months from October 1980 to January 1982, during which time some six hundred patients were interviewed to determine whether or not they were eligible for inclusion in the sample.

CHAPTER SIX

6. ANALYSIS OF DATA, RESULTS AND DISCUSSION

6.1 Analysis of Data

All the hypotheses to be tested were set using a two-tailed test; and the alpha level was set at the 0,05 level throughout the study.

Raw data were supplied to the Computer Centre of the University of Durban-Westville. The statistics computed therefrom included the geometric means, standard deviation, standard errors, Kendall's coefficient of concordance, Kruskal-Wallis one-way analysis of variance by ranks, and the Mann-Whitney U tests. Those statistics computed personally by the author included the single classification and three-way classification analysis of variance, chi square tests, and t tests, which were all derived with the use of a Casio fx-19 scientific calculator.

The following is a brief description of the major statistical techniques employed in the analysis of the data of the present study :

6.1.1 Analysis of Variance (ANOVA)

The analysis of variance is a parametric technique for testing the general null hypothesis of no difference among the means of several groups. In the present study a single classification, as well as a two-and three-way classification analysis of variance were employed.

The two-and three-way classifications are complex in their application, and the reader is referred to such authorities as Mc Nemar (1959) and Lewis (1967).

The analysis of variance is evaluated by making the following F test :

$$F = \frac{\text{mean-square for between groups}}{\text{mean-square for within groups}}$$

(Downie and Heath, 1974, p. 211).

In the above formula the mean-squares are derived from dividing the sum of squares for the between groups and the sum of squares for the within groups by their respective degrees of freedom. The between sum-of-squares is calculated by the formula

$$\sum x_b^2 = \sum (\bar{X} - \bar{X}_k)^2 n;$$

and the within sum-of-squares by the formula

$$\sum x^2 = \sum X^2 - \frac{(\sum X)^2}{n}.$$

The total sum-of-squares is calculated by the formula

$$\sum x^2 = \sum X^2 - \frac{(\sum X)^2}{N}$$

When an overall statistically significant difference among means is found, the next step is to locate the difference or differences. For this purpose the Scheffé (1957) test, recommended by Downie and Heath (1965) and Kerlinger (1965), was applied, using the formula

$$F = \frac{(\bar{X}_1 - \bar{X}_2)^2}{s_W^2 (N_1 + N_2) / N_1 N_2}$$

(Downie and Heath, 1974 p. 212)

where s_W^2 is the mean-square for the within groups.

Phillips (1982), for example, says that any statistic, such as the ANOVA, which takes into consideration all the evidence (data), will be more stable than one based on only part of it.

6.1.2 Chi Square (χ^2)

The Chi Square (χ^2) is a nonparametric test used to test the significance of differences among k independent groups when the observed data are expressed in frequencies. The general formula for chi square is

$$\chi^2 = \sum_{i=1}^r \sum_{j=1}^k \frac{(O_{ij} - E_{ij})^2}{E_{ij}} \quad (\text{Siegel, 1956, p. 104}).$$

In the present study a simplified formula was used:

$$\chi^2 = \sum \frac{(O - E)^2}{E} \quad (\text{Downie and Heath, 1974, p. 190}),$$

where O and E are the observed and expected frequencies respectively.

When any of the expected frequencies were less than 10 and the degrees of freedom one, the chi square formula applied with Yates' correction for continuity was

$$\chi^2 = \sum \frac{(|O - E| - 0,5)^2}{E}$$

(Downie and Heath, 1966, p. 166)

Examples of the application of chi square one-sample test, as well as for k independent groups are given in Siegel (1956), pp. 44-46; and pp. 176-178 respectively. Both these techniques were employed in the present study.

6.1.3 Geometric Mean (GM)

The geometric mean of two measures is the square root of their product;

of three measures, the cube root of their product; and of n measures, the n th root of their product. For the present study, the geometric mean was calculated by the formula

$$GM = \sqrt[n]{(X_1)(X_2)(X_3) \dots (X)_n}$$

(Downie and Heath, 1974, p. 48).

In a comprehensive review, Stevens (1966) concluded that human judgement of a social consensus was effectively quantifiable and recommended the use of the geometric mean as the best statistic for calculating the average. Further, Miller et al (1974) have pointed out that the geometric mean is less influenced by extreme judgements than the arithmetic mean.

6.1.4 Kendall's Coefficient of Concordance (W)

The Kendall's coefficient of concordance, W , may be used to determine the association between k sets of rankings. For the calculation of W the formula below, corrected for ties, was used :

$$W = \frac{s}{\frac{1}{12}k^2(N^3 - N) - k \sum T}$$

(Siegel, 1956, p. 234)

where s = sum of squares of the observed deviations from the mean of R_j , that is,

$$s = \sum (R_j - \frac{\sum R_j}{N})^2 ;$$

k = number of sets of rankings, e.g., the number of judges;

N = number of entities (objects or individuals) ranked;

$\frac{1}{12} k^2 (N^3 - N)$ = maximum possible sum of squared deviations, i.e.,
the sum which would occur with perfect agreement
among k rankings; and

where \sum_T directs one to sum the values of T for all the k rankings.

In the above formula,

$$T = \frac{\sum (t^3 - t)}{12}$$

(Siegel, 1956, p. 234)

where t = number of observations in a group tied for a given rank;
and

\sum directs one to sum over all groups of ties within any one
of the k rankings.

For an example of the application of the Kendall's coefficient of
concordance, the reader is referred to Siegel (1956, pp. 234-238).

6.1.5 Kruskal-Wallis One-way Analysis by Ranks (H)

The Kruskal-Wallis(H) test is used to test whether or not a group of
independent samples is from the same or from different populations.

For the calculation of H the following formula corrected for ties
was applied :

$$H = \frac{\frac{12}{N(N+1)} \sum_{j=1}^k \frac{R_j^2}{n_j} - 3(N+1)}{\left| \frac{\sum T}{N^3 - N} \right|}$$

(Siegel, 1956, p. 192).

where k = number of samples;

n_j = number of cases in j th sample;

N = $\sum n_j$, the number of cases in all samples combined;

R_j = sum of ranks in j th sample (column);

$\sum_{j=1}^k$ directs one to sum over the k samples (columns);

T = $t^3 - t$ (when t is the number of tied observations in a tied group of scores);

N = number of observations in all k samples together, i.e.,

$N = \sum n_j$; and

$\sum T$ directs one to sum over all groups of ties.

For an example of the application of the Kruskal-Wallis (H) test, the reader is referred to Siegel (1956, pp. 189-193).

The Kruskal-Wallis test has been described as a powerful nonparametric test (Downie and Heath, 1974) and one more efficient than the extension of the median test because it utilizes more of the information in observations, converting the scores into ranks rather than simply dichotomizing them as above and below the median (Siegel, 1956). The Kruskal-Wallis test seems to be the most efficient of the nonparametric tests for k independent samples (Siegel, 1956). In comparison with the F ratio from the analysis of variance, the Kruskal-Wallis test "*.... shows up extremely well*". (Hays, 1963, p. 639).

6.1.6 Mann-Whitney U Test

The Mann-Whitney U test is used to test whether two independent groups have been drawn from the same population.

In the present study U was calculated by the formula

$$U = n_1 n_2 + \frac{n_1 (n_1 + 1)}{2} - R_1$$

(Siegel, 1956, p. 120).

where R_1 = sum of the ranks assigned to the group whose sample size is n_1 .

The z ratio is then computed by the following equation for tied observations :

$$z = \frac{U - \frac{n_1 n_2}{2}}{\sqrt{\left(\frac{n_1 n_2}{N(N-1)} \right) \left(\frac{N^3 - N}{12} - \sum T \right)}}$$

(Siegel, 1956, p. 124).

where $N = n_1 + n_2$;

$T = \frac{t^3 - t}{12}$ (where t is the number of observations tied for a given rank); and

$\sum T$ is found by summing the T 's over all groups of tied observations.

Examples of the application of Mann-Whitney U test are given in Siegel (1956, pp. 121-126).

The Mann-Whitney U test has been described as one of the most powerful of the nonparametric tests, and an excellent substitute for the t test (Siegel, 1956).

6.1.7 Spearman Rank-order Correlation Coefficient (Rho)

The Spearman rank-order correlation coefficient, sometimes called rho is a measure of association between two sets of scores which have been ranked. It is the most widely used of the rank correlational methods, and particularly well suited to situations where the number of cases is 25 to 30 or less (Downie and Heath, 1974). It is also much easier and faster to compute than the Pearson r.

In the present study, the formula applied to calculate rho was

$$\rho = 1 - \frac{6 \sum D^2}{N(N^2-1)}$$

where N = the number of pairs; and

ρ = rho, the rank-order correlation coefficient

6.1.8 t Test for Correlated Data

The t test is a parametric test of statistical significance between means and it has been advocated when the size of the sample is small, especially when it is less than 30 (Downie and Heath, 1965).

In the present study the t test formula applied for correlated data was

$$t = \frac{\text{mean difference}}{\text{standard error of the mean difference}}$$

(Downie and Heath, 1974, p. 178)

where the standard error of the mean difference ($s_{\bar{D}}$)

$$= \frac{s_D}{\sqrt{N-1}} ;$$

where $s_D = \sqrt{\frac{\sum d^2}{N}}$; and

where $\sum d^2 = \sum D^2 - \frac{(\sum D)^2}{N}$

Ferguson (1966) has referred to empirical evidence which suggests that even for quite small samples, say, of the order of 5 or 10, reasonably large departures from normality will not seriously affect the estimation of probabilities for a two-tailed t test.

6.2 The Social Readjustment Rating Questionnaire - Chohan's Adaptation (SRRQ-CA)

The aims of the analysis of data relating to the SRRQ-CA were as follows :

- (1) to determine the geometric mean for each of the 49 life events on the SRRQ-CA;
- (2) to determine whether or not there is a consensus in the ratings of the list of life events by sub-groups based on the following variables : sex, marital status, occupational status, employment status, age, religion, educational level, and income;
- (3) to classify life events according to direction — i.e., according to social desirability, and changes in the immediate social field of the respondent; and
- (4) to attempt to make a cross-cultural comparison of life event rankings with some previous studies.

6.2.1 Geometric Means and Rank Order of Life Event Ratings

The geometric means for each of the 49 life events (LE) of the SRRQ-CA were calculated for the total sample of 317 subjects, and ranked in descending order of magnitude. These, together with the standard deviations and the standard errors of the means are presented in Table 6.1. The geometric means ranged from 3,6 (item 10-addition of new family member) to 15,7 (item 12-death of spouse); the standard deviations ranged from 2,91 (item 12-death of spouse) to 6,92 (item 4-marital reconciliation).

The geometric mean magnitude estimation for each life event signifies the mean amount of social readjustment required by a person. For the purpose of the present study, the geometric mean score for an item will be referred to as the life change unit (LCU) score.

In the next analysis the total norm sample was divided into sub-groups based on the following variables : sex, marital status, occupational status, age, religion, educational level and income. This resulted in 20 sub-groups. For each sub-group the geometric means (LCU scores) for each of the 49 events were derived (Table 6.2). The degree of agreement in the ratings of the 49 life events, among the 20 sub-groups plus the one group comprising the total sample, was determined by the use of Kendall's coefficient of concordance (W). There was a significant overall concordance ($W = 0,60; p < 0,01$) in the relative rank orderings of the 49 life events of the SRRQ-CA by the members of the 21 "sub-groups"¹; hence establishing the reliability of the SRRQ-CA.

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1. For the purpose of the present study, the 20 sub-groups plus the one group comprising the total sample of 317 subjects, will be referred to as the 21 "sub-groups". It should be noted too, that the Kendall value is somewhat inflated due to inter-group dependence.

TABLE 6.1

Mean LCU Item Scores and Ranks Based on the Total Norm Sample (N =317)

Item no.	Life event	LCU score ¹ (Geometric mean)	Rank ²	Standard deviation	Standard error of Geometric mean
12	Death of spouse	15,7	1	2,91	0,16
13	Death of a close family member	14,3	2,5	3,40	0,19
47	Jail sentence	14,3	2,5	3,12	0,18
48	Major change in financial state	13,8	4	3,92	0,22
14	Major personal injury or illness	13,5	5	3,23	0,18
39	Loss of job	13,4	6	4,11	0,23
46	Divorce or separation	12,4	7	3,84	0,22
35	Academic/scholastic failure	12,2	8	6,42	0,36
5	Death of close friend	11,7	9	3,93	0,22
34	Unwanted pregnancy	11,6	10	3,75	0,21
24	Major violations of the law	11,3	11	3,30	0,18
37	Miscarriage or stillbirth	11,2	12	4,97	0,28
25	Extramarital affair (spouse)	11,1	13	3,46	0,19
16	Death of a close relative	10,5	14,5	3,37	0,19
43	Troubles with boss	10,5	14,5	3,89	0,22
3	Major change in health of family member	10,4	16	3,83	0,22
15	Sexual difficulties	10,2	17	3,77	0,21
6	Major change in the number of arguments with spouse	9,8	18,5	3,29	0,18
33	Court appearance	9,8	18,5	3,54	0,20
8	Son or daughter leaving home	9,6	20,5	5,49	0,31
17	Major decisions regarding the future	9,6	20,5	4,81	0,27
32	Change in religious convictions	9,3	22	4,39	0,25
49	Mortgage or loan over R10 000	9,0	23	3,82	0,21
44	Major change in hours or conditions of work	8,7	24	3,10	0,17
11	Troubles with co-worker/s	8,6	25,5	4,94	0,28
18	Major change in living conditions	8,6	25,5	3,79	0,21
26	Extramarital affair (self)	8,3	27	4,22	0,24
7	Troubles with in-laws	7,7	28,5	3,88	0,22
28	Major business readjustment	7,7	28,5	3,47	0,20
31	Major revision of personal habits	7,4	30	4,36	0,24
21	Major change in sleeping habits	7,2	31,3	6,12	0,34
36	Menopause	7,2	31,3	6,37	0,36
42	Major change in work responsibilities	7,2	31,3	5,21	0,29
41	Change of job	7,1	34	4,10	0,23
27	Building a house	6,6	35,5	3,76	0,21
29	Change in residence	6,6	35,5	5,94	0,33
22	Major change in eating habits	6,4	37,5	4,31	0,24
45	Embarked on studies	6,4	37,5	3,72	0,21
40	Retired from work	6,0	39	3,29	0,18
4	Marital reconciliation	5,8	40,5	6,92	0,39
38	Major change in the number of family get-togethers	5,8	40,5	5,32	0,30
30	Minor violations of the law	5,6	42	4,99	0,28
2	Pregnancy	5,5	43	3,17	0,18
20	Major change in recreation	5,2	44,5	4,33	0,24
1	Marriage	5,2	44,5	3,86	0,22
23	Vacation	3,9	46	4,20	0,24
19	Outstanding personal achievement	3,8	47	4,36	0,24
9	Engaged to be married	3,7	48	3,81	0,21
10	Addition of new family member	3,6	49	5,13	0,29

1. Possible scale values ranged from 0-20

2. Events ranked in descending order of magnitude.

TABLE 6.2

Mean LCU Item Scores of 21 "Sub-Groups" on the SRRQ-CA¹

Item no.	Life event	Sub-Groups																				
		Total Sample (N=317)	Male (N=192)	Female (N=125)	Married (N=170)	Never married (N=147)	Professional and Technical (N=161)	Administrative and managerial (N=151)	Unemployed (N=5)	Gainfully employed (N=312)	Age below 30 years (N=186)	Age 30 years and above (N=131)	Christian (N=62)	Hindu (N=200)	Moslem (N=55)	Education less than Std 5 (N=4)	Education Std 5-10 (N=193)	Post-matric degree/diploma (N=120)	Income (p.m.) less than R200 (N=40)	Income (p.m.) R200-599 (N=120)	Income (p.m.) R600-999 (N=97)	Income (p.m.) R1,000 and over (N=60)
1.	Marriage	5,2	5,2	5,2	4,9	5,4	5,5	5,7	9,8	5,1	4,8	5,7	6,0	5,0	4,8	4,8	4,8	4,8	5,3	4,3	5,3	8,8
2.	Pregnancy	5,5	5,2	5,9	5,0	5,9	5,4	4,6	5,4	5,5	5,3	5,7	5,8	5,4	4,9	8,0	5,1	5,8	5,8	5,0	5,2	6,8
3.	Major change in health of family member	10,4	10,1	11,0	10,7	9,9	10,6	11,1	9,8	10,4	10,0	11,0	11,2	10,0	11,1	17,1	10,3	10,2	11,0	9,6	10,3	11,7
4.	Marital reconciliation	5,8	5,5	6,3	5,6	5,9	6,6	5,5	9,1	5,8	5,2	6,8	7,2	5,5	5,0	11,1	4,9	5,7	5,7	5,1	5,6	9,8
5.	Death of close friend	11,7	12,0	11,4	10,5	13,8	10,3	15,1	13,9	11,7	12,6	10,7	11,0	12,6	11,6	7,4	13,2	11,1	12,1	12,6	10,9	9,3
6.	Major change in the number of arguments with spouse	9,8	9,2	10,8	9,3	10,4	9,4	8,0	7,3	9,8	10,4	9,0	11,0	9,5	10,4	12,1	10,1	9,7	10,0	9,9	9,2	9,6
7.	Trouble with in-laws	7,7	7,2	8,4	6,8	8,9	6,8	11,9	10,6	7,6	8,8	6,3	6,9	7,6	9,2	11,9	8,7	7,4	8,8	7,9	6,4	5,6
8.	Son or daughter leaving home	9,6	9,5	9,7	8,5	11,1	8,5	13,2	14,8	9,5	10,4	8,5	8,9	9,5	11,0	7,5	11,0	8,5	11,0	9,6	8,1	7,7
9.	Engaged to be married	3,7	3,8	3,7	3,3	4,3	3,8	4,3	7,7	3,7	3,7	3,8	4,0	3,6	3,7	4,2	3,9	3,0	4,2	2,9	4,0	5,4
10.	Addition of new family member	3,6	3,6	3,7	3,4	3,8	3,7	3,1	4,3	3,6	3,5	3,8	4,4	3,3	3,8	3,8	3,6	3,0	3,9	2,9	4,3	5,3
11.	Troubles with co-worker(s)	8,6	8,8	8,4	8,2	9,1	8,3	7,9	8,2	8,6	9,2	7,9	9,5	8,4	8,9	3,9	9,3	7,7	8,7	8,8	8,1	8,4
12.	Death of spouse	15,7	15,3	16,4	15,9	15,6	15,5	19,2	19,4	15,7	16,2	15,1	16,4	15,7	16,5	16,6	16,4	14,5	15,5	16,9	12,2	16,8
13.	Death of a close family member	14,3	14,3	14,4	14,2	14,8	13,8	18,1	18,5	14,3	14,7	13,8	15,3	14,6	13,7	8,7	15,0	14,3	14,3	15,3	12,1	13,8
14.	Major personal injury or illness	13,5	13,5	13,5	13,7	13,3	13,2	10,7	9,0	13,5	13,1	14,0	14,4	13,6	13,1	9,0	13,2	13,9	12,6	13,9	12,9	15,2
15.	Sexual difficulties	10,2	10,7	9,5	9,5	11,2	9,2	10,3	8,4	10,2	10,9	9,3	10,2	10,7	9,2	5,9	10,8	10,0	10,0	10,7	9,5	9,9

1. Possible scale values ranged from 0-20

TABLE 6.2 (continued)

Item no.	Life event																					
		Total Sample (N=317)	Male (N=192)	Female (N=125)	Married (N=170)	Never married (N=147)	Professional and technical (N=161)	Administrative and managerial (N=151)	Unemployed (N=5)	Gainfully employed (N=312)	Age below 30 years (N=186)	Age 30 years and above (N=131)	Christian (N=62)	Hindu (N=200)	Moslem (N=55)	Education less than Std 5 (N=4)	Education Std 5-10 (N=193)	Post-matric degree/diploma (N=120)	Income(p.m.)less than R200 (N=40)	Income (p.m.)R200-599 (N=120)	Income (p.m.)R600-999 (N=97)	Income(p.m.)R1 000 and over (N=60)
16.	Death of a close relative	10,5	10,7	10,2	10,1	11,2	9,6	14,3	16,9	10,4	11,0	9,8	10,9	10,7	10,5	8,2	11,2	10,6	10,9	11,0	9,2	9,3
17.	Major decisions regarding the future	9,6	9,8	9,4	9,8	9,5	9,6	7,5	8,5	9,6	9,2	10,2	10,7	9,5	9,5	6,3	9,5	9,3	9,8	8,7	10,4	11,7
18.	Major change in living conditions	8,6	8,6	8,5	8,1	9,2	8,4	7,5	8,7	8,6	8,6	8,6	9,9	8,1	8,9	6,1	8,6	8,3	9,1	8,1	7,7	9,9
19.	Outstanding personal achievement	3,8	3,6	4,0	3,8	3,6	4,1	3,7	5,6	3,7	3,3	4,5	4,4	3,7	3,0	3,8	3,7	3,3	3,7	3,4	3,8	5,4
20.	Major change in recreation	5,2	4,8	6,0	5,1	5,3	5,2	6,2	7,3	5,2	5,3	5,1	5,9	5,0	5,2	4,4	5,1	5,7	5,3	5,5	4,6	4,7
21.	Major change in sleeping habits	7,2	6,9	7,6	6,9	7,6	6,9	10,0	9,4	7,1	7,7	6,5	6,8	7,1	8,0	3,2	7,2	7,6	7,3	7,4	6,6	6,8
22.	Major change in eating habits	6,4	6,2	6,8	6,3	6,6	6,2	10,3	11,4	6,4	6,6	6,2	5,8	6,3	8,3	3,2	6,3	7,0	6,5	6,4	6,9	5,7
23.	Vacation	3,9	4,0	3,9	3,9	4,0	4,1	3,4	4,9	3,9	3,5	4,5	4,2	4,2	2,7	3,5	3,8	3,7	4,2	3,2	5,0	4,9
24.	Major violations of the law	11,3	11,3	11,3	11,5	11,3	11,7	8,8	8,4	11,4	11,1	11,6	13,3	10,7	12,0	8,6	11,0	11,3	10,7	12,0	9,8	12,9
25.	Extramarital affair(partner)	11,1	10,0	13,1	11,0	11,2	10,8	10,4	8,6	11,1	10,9	11,4	12,2	11,3	9,8	11,6	11,4	10,5	11,5	10,5	10,7	12,6
26.	Extramarital affair (self)	8,3	7,7	9,3	8,4	8,3	8,5	8,8	11,9	8,3	8,4	8,1	10,2	8,2	7,2	5,5	8,1	8,0	8,7	7,4	8,3	10,4
27.	Building a house	6,6	6,1	7,5	5,8	7,6	6,2	8,0	8,2	6,6	6,9	6,2	7,7	6,3	6,5	4,7	6,5	7,0	7,0	6,5	6,2	6,1
28.	Major business readjustment	7,7	7,5	8,0	7,6	7,6	7,6	8,3	6,6	7,7	7,5	7,9	8,9	7,2	8,2	6,7	7,6	7,3	7,5	7,3	7,3	10,1
29.	Change in residence	6,6	6,6	6,7	6,9	6,3	6,8	5,8	6,3	6,6	6,5	6,8	7,9	6,1	7,5	6,7	6,2	7,4	6,8	6,3	7,1	6,9
30.	Minor violations of the law	5,6	5,5	5,7	5,6	5,4	5,4	3,0	3,1	5,6	5,6	5,5	6,2	5,4	5,5	10,5	5,3	5,9	5,8	5,6	4,6	6,0
31.	Major revision of personal habits	7,4	7,2	7,9	7,5	7,3	7,1	7,5	7,3	7,4	7,6	7,3	7,2	7,4	7,8	4,7	7,1	7,5	7,9	7,0	6,8	8,4
32.	Change in religious convictions	9,3	9,0	9,8	8,9	10,0	8,5	10,2	9,4	9,3	9,9	8,5	8,5	9,1	11,8	5,1	9,1	10,1	10,0	9,1	8,6	8,8

TABLE 6.2(continued)

Item no.	Life event																					
		Total Sample (N=317)	Male (N=192)	Female (N=125)	Married (N=170)	Never married (N=147)	Professional and Technical (N=161)	Administrative and managerial (N=151)	Unemployed (N=5)	Gainfully employed (N=312)	Age below 30 years (N=186)	Age 30 years and above (N=131)	Christian (N=62)	Hindu (N=200)	Moslem (N=55)	Education less than Std 5 (N=4)	Education Std 5-10 (N=193)	Post-matric degree/diploma (N=120)	Income (p.m.)less than R200 (N=40)	Income (p.m.)R200-599 (N=120)	Income (p.m.)R600-999 (N=97)	Income (p.m.)R1 000 and over (N=60)
33.	Court appearance	9,8	9,1	11,1	9,6	10,4	9,0	4,3	5,0	9,9	9,9	9,7	11,0	10,2	8,2	9,3	10,6	9,0	10,5	9,9	8,5	9,2
34.	Unwanted pregnancy	11,6	10,8	13,0	10,4	13,3	10,5	11,6	9,8	11,7	12,3	10,7	13,6	11,4	10,9	4,8	12,4	11,0	13,5	10,7	8,4	14,0
35.	Academic/scholastic failure	12,2	12,0	12,4	11,3	13,6	11,0	10,4	14,5	12,1	12,9	11,2	12,8	12,1	12,9	9,7	12,8	12,8	13,8	11,8	9,9	11,6
36.	Menopause	7,2	6,8	7,9	6,3	8,8	6,1	9,1	16,9	7,1	7,5	6,9	7,3	7,3	7,0	4,1	7,9	7,2	10,2	6,0	5,0	7,5
37.	Miscarriage or stillbirth	11,2	10,3	12,8	10,2	12,6	9,6	14,4	16,5	11,1	12,5	9,5	10,5	11,9	10,2	14,1	12,6	11,7	13,1	11,4	8,3	9,1
38.	Major change in the number of family get-togethers	5,8	5,7	6,0	5,2	6,5	5,7	10,8	13,2	5,7	6,0	5,6	6,5	5,8	4,9	8,9	5,7	5,4	7,0	4,5	6,2	7,7
39.	Loss of job	13,4	13,1	14,0	13,5	13,2	12,9	15,4	14,2	13,4	13,5	13,4	14,1	13,5	13,0	14,6	13,9	12,9	13,2	13,9	11,3	14,9
40.	Retired from work	6,0	5,7	6,6	5,7	6,2	6,0	6,8	8,6	6,0	5,9	6,2	8,0	5,4	5,8	13,4	5,9	5,4	6,9	4,8	5,0	9,9
41.	Change of job	7,1	6,8	7,6	6,6	7,6	7,1	3,8	5,7	7,1	7,1	7,1	8,1	7,0	6,3	6,5	6,9	7,6	7,5	6,5	6,7	8,5
42.	Major change in work responsibilities	7,2	6,7	8,2	6,8	7,6	7,1	4,3	4,8	7,3	7,4	7,0	7,7	7,1	6,7	6,	6,9	8,1	7,9	6,8	6,9	7,4
43.	Troubles with boss	10,5	10,6	10,5	9,7	11,5	9,5	9,2	8,5	10,6	11,7	9,1	10,3	10,6	11,1	7,2	11,2	10,6	10,5	11,4	9,5	9,1
44.	Major change in hours or conditions of work	8,7	8,3	9,3	8,1	9,3	8,3	4,7	7,0	8,7	9,6	7,5	7,5	9,2	8,7	12,4	8,8	9,4	9,6	9,2	7,0	6,5
45.	Embarked on studies	6,4	6,2	6,8	5,6	7,5	5,9	8,4	10,2	6,4	6,7	6,0	6,1	6,5	6,5	7,9	6,3	6,9	7,9	5,3	6,8	6,1
46.	Divorce or separation	12,4	12,5	12,4	12,0	13,2	11,6	14,8	12,4	12,4	13,1	11,6	12,4	12,4	14,6	8,8	12,9	12,0	12,7	12,0	12,3	13,3
47.	Jail sentence	14,3	14,4	14,1	14,3	14,4	13,8	17,6	16,5	14,2	14,4	14,1	15,4	14,6	13,3	9,2	14,9	13,8	13,6	14,8	13,1	15,6
48.	Major change in financial state	13,8	13,3	14,6	13,9	13,6	13,0	11,8	9,1	13,9	14,1	13,4	14,7	14,2	12,2	15,0	14,2	14,2	14,4	13,8	12,5	13,5
49.	Mortgage or loan over R10 000	9,0	8,2	10,4	8,0	10,6	7,9	6,6	8,8	9,0	9,6	8,3	7,4	10,1	7,8	11,4	10,4	9,0	10,6	9,6	7,5	5,7

That high consensus had been reached by the 21 "sub-groups" in the present study confirms the hypothesis that sub-groups based on the variables of sex, marital status, occupational status, age, religion, educational level and income would be significantly concordant in their overall ratings of life events.

Although there was a statistically significant concordance in the overall ratings of the life events by the various "sub-groups", it was decided to explore further to detect any possible differences which might have prevailed in the mean ratings of some events. This was accomplished through item analyses of individual items, using the Kruskal-Wallis one-way analysis of variance by ranks (H). Of the 49 events, there were statistically significant differences in the ratings of five items which are listed in Table 6.3, with their computed H values (after correction for tied observations) and levels of statistical significance. Items 32, 34, 36, and 37 reached the 0,001 level and item 13 the 0,01 level of confidence. Thus these five events resulted in significantly different ratings when the variables of sex, marital status, occupational status, age, religion, educational level, and income were considered.

TABLE 6.3

Life Events Rated Differently by the 21 "Sub-Groups"

Item no.	Life event	H value(20df)
13	Death of a close family member	44,417 ** ¹
32	Change in religious convictions	47,324 ***
34	Unwanted pregnancy	50,832 ***
36	Menopause	57,316 ***
37	Miscarriage or stillbirth	48,935 ***

1. Throughout this study the following symbols are used to indicate the level of statistical significance :

* $p < 0,05$

** $p < 0,01$

*** $p < 0,001$

N.S. Not Significant.

Since significant differences were found to exist among the ratings of the 21 "sub-groups" on five of the events, a further examination became necessary to isolate those sub-groups which differed in their ratings of these five events. For this purpose the Mann-Whitney U test (for tied observations) was applied, the results of which appear in Table 6.4. The table also shows those "sub-groups" that rated the five items differently, as well as the direction of the differences between the various groups.

A study of Table 6.4 shows that the rating of the five life events was affected by at least one of the following variables :

- (a) Age. Subjects below the age of 30 years rated each of the following four items significantly higher than those subjects aged 30 years or older : item 13 - death of a close family member ($p < 0,01$); item 32 - change in religious convictions ($p < 0,01$); item 34 - unwanted pregnancy ($p < 0,01$); and item 37 - miscarriage or stillbirth ($p < 0,001$).
- (b) Marital status. Subjects who were never married rated each of the following four items significantly higher than married subjects : item 32 - change in religious convictions ($p < 0,05$); item 34 - unwanted pregnancy ($p < 0,001$); item 36 - menopause ($p < 0,01$); and item 37 - miscarriage or stillbirth ($p < 0,01$).
- (c) Sex. Females assigned significantly higher scores than males in the rating of item 34 - unwanted pregnancy ($p < 0,01$) and item 37 - miscarriage or stillbirth ($p < 0,01$).
- (d) Income. Item 13 (death of a close family member) was rated

significantly higher by those subjects who earned (i) below R200 per month than subjects who earned R1 000 and over per month ($p < 0,05$); (ii) between R200 and R599 per month than those who earned between R600 and R999 per month ($p < 0,05$); and (iii) between R200 and R599 per month than those who earned R1 000 and over per month ($p < 0,01$).

- (e) Religion. Moslem subjects rated item 32 (change in religious convictions) significantly higher ($p < 0,01$) than both the Hindu and Christian subjects.
- (f) Educational level. Subjects with an educational level of at least standard five rated item 34 (unwanted pregnancy) significantly higher ($p < 0,05$) than subjects whose educational levels were below standard five.
- (g) Occupational status. Subjects who were unemployed rated item 36 (menopause) significantly higher ($p < 0,01$) than those who were gainfully employed.

TABLE 6.4

Results of Mann-Whitney U Tests after Kruskal-Wallis Analysis of Variance

by Ranks

Item and direction of difference	U value	z value
<u>Item 13 - Death of a close family member</u>		
Age below 30 years > age 30 years and over	9 667	3,17 **
Earning less than R200 p.m. > earning R1 000 and over p.m.	1 648	2,10 *
Earning R200-R599 p.m. > earning R600-R999 p.m.	2 038	2,03 *
Earning R200-R599 p.m. > earning R1 000 and over p.m.	1 791	2,76 **
<u>Item 32 - Change in religious convictions</u>		
Never married > married	14 181	2,20 *
Age below 30 years > age 30 years and over	10 025	2,70 **
Moslem > Hindu	6 192	2,88 **
Moslem > Christian	1 988	2,81 **
<u>Item 34 - Unwanted pregnancy</u>		
Female > male	14 061	2,64 **
Never married > married	15 169	3,48 ***
Age below 30 years > age 30 years and over	9 832	2,99 **
Education std. 5-10 > education less than std. 5	84	2,54 *
Post matric degree/diploma > education less than std. 5	67	2,20 *
<u>Item 36 - Menopause</u>		
Never married > married	14 766	2,93 **
Unemployed > gainfully employed	13 185	2,67 **
<u>Item 37 - Miscarriage or stillbirth</u>		
Female > male	14 224	2,83 **
Never married > married	14 495	2,61 **
Age below 30 years > age 30 years and over	9 291	3,65 ***

6.2.1.1 Discussion

The fact that a large majority of life events were assigned different geometric means by the total sample of 317 subjects in the present study (Table 6.1) implies that there were major differences in the meaning attributed to the various life events. Such differences cannot be ignored (Miller et al, 1974), regardless of the specific reasons underlying such differences in perception. Hence Cochran and Robertson (1973); Masuda and Holmes (1978); and Dohrenwend and Dohrenwend (1978) recommend that the ratings of life events be derived from a sample similar to that of the population to be tested.

In discussing the effects of the seven variables on the ratings of five items, it must be borne in mind that more information is required to explain the effects more adequately. For instance, it is possible that there were significantly more females than males who were never married, and who rated item 36 (menopause) significantly higher than those who were married. If this were so, one would need more information about females who were never married — their incomes prior to being unemployed, their ages, etc. Nevertheless, the finding of a statistically significant concordance in the rank orderings of the 49 life events of the SRRQ-CA by the various "sub-groups" signifies high consensus.

If one considers further, that the total number of comparisons between groups is $N(N-1)/2$ (Downie and Heath, 1974, p. 206), which for the present study of 21 "sub-groups" is 210, then the number of statistically significant differences is a mere 18 out of 210, or 8,6 per cent. This further substantiates the high degree of consensus in the ratings of the life events by the various "sub-groups". This is not unexpected since

the various "sub-groups" were homogeneous, comprising only Indian adult subjects.

6.2.2 Direction of Events

A classification of events according to direction was carried out to explore further the implications of the results shown above. For the present study the direction of an event is defined in objective terms rather than in terms of the respondent's assessment. For example, some people might describe their divorce as a change for the better (i.e., desirable), although the author classified the event as undesirable. This classification system follows that of Dohrenwend (1973b).

The list of events was examined and grouped into two alternative but overlapping ways :

(a) In terms of social desirability (Table 6.5). Three classes of events were identified :

- (i) Desirable events, which included all those events which were clearly perceived as being socially desirable (e.g., marital reconciliation; marriage; vacation). These included 7 items.
- (ii) Undesirable events, which included those events which were clearly perceived as being socially undesirable (e.g., death of loved ones; loss of job; troubles with boss). These included 20 items.
- (iii) Ambiguous events, which included those events which were

perceived to be neither clearly desirable nor clearly undesirable (e.g., son or daughter leaving home; major business readjustment; pregnancy). These included 22 items.

(b) In terms of changes in the immediate social field of the respondents (Table 6.6). Two classes of events were identified :

(i) Entrance-related events, which included entrance of a new person into the social field of the respondent or someone close to the respondent (e.g., engagement; marriage; addition of new family member). These included 4 items.

(ii) Exit-related events, which included the exit of a person from the social field of the respondent or someone close to him (e.g., death of spouse; son or daughter leaving home; retired from work). These included 7 items.

The mean total LCU scores for those items categorized as Desirable, Undesirable, and Ambiguous were 5,44; 11,14; and 7,73 respectively; and the standard deviations 1,70; 2,48; and 2,17 respectively.

TABLE 6.5

Life Events According to Social Desirability

Item no.	A. Desirable events	LCU Score ¹	Rank ²
27	Building a house	8,3	27
31	Major revision of personal habits	7,4	30
4	Marital reconciliation	5,8	40,5
1	Marriage	5,2	44,5
23	Vacation	3,9	46
19	Outstanding personal achievement	3,8	47
9	Engaged to be married	3,7	48
	<u>B. Undesirable events</u>		
12	Death of spouse	15,7	1
13	Death of a close family member	14,3	2,5
47	Jail sentence	14,3	2,5
14	Major personal injury or illness	13,5	5
39	Loss of job	13,4	6
46	Divorce or separation	12,4	7
35	Academic/scholastic failure	12,2	8
5	Death of close friend	11,7	9
34	Unwanted pregnancy	11,6	10
24	Major violations of the law	11,3	11
37	Miscarriage or stillbirth	11,2	12
25	Extramarital affair (spouse)	11,1	13
16	Death of close relative	10,5	14,5
43	Troubles with boss	10,5	14,5
15	Sexual difficulties	10,2	17
33	Court appearance	9,8	18,5
11	Troubles with co-worker/s	8,6	25,5
7	Troubles with in-laws	7,7	28,5
36	Menopause	7,2	31,3
30	Minor violations of the law	5,6	42
	<u>C. Ambiguous events</u>		
48	Major change in financial state	13,8	4
3	Major change in health of family member	10,4	16
6	Major change in the number of arguments with spouse	9,8	18,5
8	Son or daughter leaving home	9,6	20,5
17	Major decisions regarding the future	9,6	20,5
32	Change in religious convictions	9,3	22
49	Mortgage or loan over R10 000	9,0	23
44	Major change in hours or conditions of work	8,7	24
18	Major change in living conditions	8,6	25,5
28	Major business readjustment	7,7	28,5
21	Major change in sleeping habits	7,2	31,3
42	Major change in work responsibilities	7,2	31,3
41	Change of job	7,1	34
27	Raising a child	6,6	35,5
29	Change in residence	6,6	35,5
22	Major change in eating habits	6,4	37,5
45	Embarked on studies	6,4	37,5
40	Retired from work	6,0	39
38	Major change in the number of family get-togethers	5,8	40,5
2	Pregnancy	5,5	43
20	Major change in recreation	5,2	44,5
10	Addition of new family member	3,6	49

1. Possible scale values ranged from 0-20

2. Events ranked in descending order of geometric mean.

TABLE 6.6

Life Events According to Exits from and Entrances to the Social Field

<u>Item no.</u>	<u>A. Exit-related events</u>	<u>LCU Score</u> ¹	<u>Rank</u> ²
12	Death of spouse	15,7	1
13	Death of a close family member	14,3	2,5
46	Divorce or separation	12,4	7
5	Death of close friend	11,7	9
16	Death of close relative	10,5	14,5
8	Son or daughter leaving home	9,6	20,5
40	Retired from work	6,0	39
	<u>B. Entrance-related events</u>		
4	Marital reconciliation	5,8	40,5
1	Marriage	5,2	44,5
9	Engaged to be married	3,7	48
10	Addition of new family member	3,6	49

1. Possible scale values ranged from 0-20

2. Ranks based on 49 items.

6.2.2.1 Discussion

When one examines the events classified according to Social Desirability (Table 6.5) and those classified according to Exits from and Entrances to the social field (Table 6.6), one notes a tendency for the undesirable and the exit-related events to be scaled higher than the desirable and the entrance-related events respectively. In fact, all the exit-related events were scaled higher than all the entrance-related events.

All the exit-related events, except two — son or daughter leaving home (item 8); and retired from work (item 40) — also happen to be undesirable events; and all the entrance-related events, except the addition of a new family member (item 10) also happen to be desirable events. Hence exit-related or undesirable events, such as death of spouse (item 12); death of a close family member (item 13); divorce or separation (item 46); death of close friend (item 5); and death of close relative (item 16) might be expected to be of a major consequence for an individual, whereas entrance-related or desirable events like marital reconciliation (item 4); marriage (item 1) or engaged to be married (item 9) are events which could not be expected to cause much upset.

In view of the above findings, it is clear that all the exit-related events and most socially undesirable events are perceived very differently from all the entrance-related events and most socially desirable events. The stressful implications of these life events are that the exit-related and undesirable life events tend to be perceived as being more stressful than the entrance-related and desirable life events. This finding supports the findings of Gersten et al (1974), Myers et al (1974), and Theorell (1974). Hence the finding can be interpreted both as providing validating evidence for the SRRQ-CA, and of supporting the importance of the social desirability - undesirability and of the exit-entrance distinction.

6.2.3 Cross-cultural Comparison of Life Event Rankings

Holmes and Rahe (1967) found high correlations between minority groups and the white population of the U.S.A. in the ranking of life events. These findings suggested the desirability of extending investigations into the use of the SRRQ with different cultures in other parts of the world.

Table 6.7 shows the rank orderings of life events based on 15 diverse samples, including that of the present study (column A). In studying the data in Table 6.7 the following must be borne in mind :

- (1) blank cells in the table denote life events which were not studied by other investigators; hence no rankings have been given;
- (2) if an item was investigated by one or more researchers, but was not included in the SRRQ-CA used in the present study, it was omitted. For this reason, some of the rank orders have been skipped;
- (3) in those studies where only the sample means were shown and not the ranks, these were ranked by the author;
- (4) the various investigators studied item 46 (divorce or separation) as two separate items; hence two rankings are indicated : the first is for divorce, and the second, for separation, is shown in parentheses;
- (5) not all authors indicated whether the arithmetic or the geometric means were considered in the ranking of the items; and

TABLE 6.7

Cross-Cultural Comparison of Rank Orderings of Life Events¹

Item no.	Life event	(A)	(B)	(C)	(D)	(E)	(F)	(G)	(H)	(I)	(J)	(K)	(L)	(M)	(N)	(O)
		South African Indians (N=317)	Caucasian American (N=168)	American (N=394)	Japanese (N=112)	American adolescent (N=211)	Rural North Carolina (N=96)	Finnish (N=149)	French (N=90)	Belgian (N=65)	Swiss (N=47)	Negro American (N=64)	Mexican American (N=78)	Danish (N=95)	Swedish (N=75)	Hawaiian (N=200)
12	Death of spouse	1	1	1	1	1	1	1	1	1	1	1	5	1	1	1
13	Death of a close family member	2,5	5	5	4	4	11	-	9	23	21	2	6	9	6	2,5
47	Jail sentence	2,5	4	-	-	8	-	-	-	-	-	8	19	2	2	10
48	Major change in financial state	4	-	-	-	-	-	-	-	-	-	-	-	-	-	-
14	Major personal injury or illness	5	6	7	5	6	4	4	6	9	14	4	3	3	3	2,5
39	Loss of job	6	8	9	8	7	15	6,3	13	7	8	16	9	7	10	6,5
46	Divorce (or separation)	7	2(3)	2(3)	3(7)	2(3)	3(2)	2(9)	3(5)	2(4)	3(4)	13(7)	10(2)	4(5)	4(7)	4(9)
35	Academic/scholastic failure	8	-	-	-	-	-	-	-	-	-	-	-	-	-	-
5	Death of close friend	9	17	17	16	12	18	18,5	12	16	11	24	29	13	9	13,5
34	Unwanted pregnancy	10	-	-	-	-	-	-	-	-	-	-	-	-	-	-
24	Major violations of the law	11	-	-	-	-	-	-	-	-	-	-	-	-	-	-
37	Miscarriage or stillbirth	12	-	-	-	-	-	-	-	-	-	-	-	-	-	-
25	Extramarital affair (partner)	13	-	-	-	-	-	-	-	-	-	-	-	-	-	-
16	Death of a close relative	14,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
43	Troubles with boss	14,5	30	26	27	33	28	-	26	26	29	35	42	31	26	19
3	Major change in health of family member	16	11	12	9	16	8	5	14	19	25	11	16	15	5	-
15	Sexual difficulties	17	13	11	10	5	20	10	18	10,5	15	6	13	16	8	17
6	Major change in the number of arguments with spouse	18,5	19	16	33	19	33	11,5	21	20,5	19	21	14	10	23	18
33	Court appearance	18,5	-	-	-	-	-	-	-	-	-	-	-	-	-	-
8	Son or daughter leaving home	20,5	23	22	18	25	-	24,5	22	20,5	24	27	30	23	20	11
17	Major decisions regarding the future	20,5	-	-	-	-	-	15,5	-	-	-	-	-	-	-	-
32	Change in religious convictions	22	-	-	-	-	-	30,5	-	-	-	-	-	-	-	-
49	Mortgage or loan over R10 000	23	20	28	17	18	6	26,3	19	17	10	3	4	30	21	5
44	Major change in hours or conditions of work	24	31	-	-	29	-	-	-	-	-	32	32	29	31	25

1. In studying this table the reader is referred to notes (1) to (6) on pages 154 and 157.

TABLE 6.7 (continued)

Item no.	Life event	(A) South African Indians (N=317)	(B) Caucasian American (N=168)	(C) American (N=394)	(D) Japanese (N=112)	(E) American adolescent (N=211)	(F) Rural North Carolina (N=96)	(G) Finnish (N=149)	(H) French (N=90)	(I) Belgian (N=65)	(J) Swiss (N=47) Negro American (N=64)	(K) Mexican American (N=78)	(L) Danish (N=95)	(M) Swedish (N=75)	(N) Hawaiian (N=200)
11	Troubles with co-worker(s)	25	-	-	-	-	-	-	-	-	-	-	-	-	-
18	Major change in living conditions	26	28	29	26	24	14	-	39	41,5	43	19	24	27	22
26	Extramarital affair (self)	27	-	-	-	-	-	-	-	-	-	-	-	-	-
7	Trouble with in-laws	28,5	24	23	20	22	26	26,3	29	27	28	29	35	26	24
28	Major business readjustment	28,5	15	14	12	15	7	-	11	10,5	16	18	7	17	13
31	Major revision of personal habits	30	29	32	29	35	31	38	32	35	36	30	20	35	28
21	Major change in sleeping habits	31,3	38	37	35	41	37	-	41	36	37	38	36	40	40
36	Menopause	31,3	-	-	-	-	-	-	-	-	-	-	-	-	-
42	Major change in work responsibilities	31,3	22	21	22	20	-	21	25	22	22	15	17	32	19
41	Change of job	34	18	18	13,5	21	29	17	16	12,5	12	26	31	18	17
27	Building a house	35,5	-	-	-	-	-	-	-	-	-	-	-	-	-
29	Change in residence	35,5	32	33	37	30	27	34,5	40	38	41	31	34	20	34
22	Major change in eating habits	37,5	40	38,5	36	40	35	-	36	32	32	33	27	39	41
45	Embarked on studies	37,5	27	24,5	32	26	17	-	20	15	13	23	21	11	27
40	Retired from work	39	10	8	11	11	16	11,5	17	18	18	17	18	21	11
4	Marital reconciliation	40,5	9	10	15	10	13	-	8	8	6	14	11	12	14
38	Major change in the number of family get-togethers	40,5	39	40	40	37	32	36,5	37	37	40	37	38	34	39
30	Minor violations of the law	42	43	43	28	43	25	42	38	41,5	32	42	40	42	37
2	Pregnancy	43	12	19	13,5	13	12	-	7	5	9	10	12	19	12
20	Major change in recreation	44,5	34	34	38	36	34	-	42	40	39	36	23	33	36
1	Marriage	44,5	7	4	6	9	21	6,3	4	3	5	5	1	6	15
23	Vacation	46	41	41	41	39	40	39,3	30	28	30	40	33	41	42
19	Outstanding personal achievement	47	25	27	24	28	22	-	24	25	27	9	26	25	33
9	Engaged to be married	48	-	-	-	-	-	-	-	-	-	-	-	-	-
10	Addition of new family member	49	14	13	23	17	10	13,5	10	14	17	22	22	8	16

(6) the references (A) to (O) for the various comparison samples are given in Table 6.8.

TABLE 6.8

References for the Various Samples in Table 6.7

Column	Reference
(A)	Present study
(B)	Holmes and Masuda (1974)
(C)	Holmes and Rahe (1967)
(D)	Holmes and Masuda (1974)
(E)	Ruch and Holmes (1971)
(F)	Miller et al (1974)
(G)	Rahe and Romo (1974)
(H)	Harmon et al (1970)
(I)	Harmon et al (1970)
(J)	Harmon et al (1970)
(K)	Rahe (1969a)
(L)	Rahe (1969a)
(M)	Rahe (1969a)
(N)	Rahe (1969a)
(O)	Rahe (1969a)

Due to variations in the statistical analyses performed by different investigators, and the lack of published raw data, no statistical analyses of the difference in rank orderings could be made. A reasonable attempt was made, however, to classify 34 of the items for which rankings were available, into three groups : (a) those items whose ranks appeared to be in agreement with those of the present study (Table 6.9); (b) those items that appeared to be ranked lower by the cross-cultural samples as compared with the sample of the present study (Table 6.10); and (c) those items which appeared to be ranked higher by the cross-cultural sample when compared with the sample of the present study (Table 6.11).

TABLE 6.9**Life Events for which Ranks of Cross-cultural samples appeared to be Concordant with those of the Present Study**

Item no.	Life event
12	Death of spouse
14	Major personal injury or illness
39	Loss of job
3	Major change in health of family member
6	Major change in the number of arguments with spouse
8	Son or daughter leaving home
29	Change in residence
22	Major change in eating habits
38	Major change in the number of family get-togethers
30	Minor violations of the law

Only ten (29 per cent) of the 34 items appeared to be ranked concordantly (Table 6.9). Another eight items (24 per cent) appeared to be ranked lower by the various cross-cultural samples than by the sample of the present study (Table 6.10), and 16 (47 per cent) items seemed to be ranked higher by the various cross-cultural samples than by the sample of the present study (Table 6.11).

TABLE 6.10**Life Events for which Ranks of Cross-cultural samples appeared to be Lower than those of the Present Study**

Item no.	Life event
13	Death of a close family member
47	Jail sentence
5	Death of close friend
43	Troubles with boss
44	Major change in hours or conditions of work
18	Major change in living conditions
31	Major revision of personal habits
21	Major change in sleeping habits

It would appear that the eight life events listed in Table 6.10 required more social readjustment for the South African Indians than for the cross-cultural samples listed in Table 6.7

TABLE 6.11

Life Events for which Ranks of Cross-cultural samples appeared to be Higher than those of the Present Study

Item no.	Life event
46	Divorce or separation
15	Sexual difficulties
49	Mortgage or loan over R10 000
7	Troubles with in-laws
28	Major business readjustment
42	Major change in work responsibilities
41	Changed job
45	Embarked on studies
40	Retired from work
4	Marital reconciliation
2	Pregnancy
20	Major change in recreation
1	Marriage
23	Vacation
19	Outstanding personal achievement
10	Addition of new family member

It would appear from Table 6.11 that the sixteen life events listed therein required more social readjustment for the cross-cultural samples than for the sample of the present study.

6.2.3.1 Discussion

All the cross-cultural samples referred to in Table 6.7, with the possible exception of the sample of the present study and the Japanese sample, reflect the western culture. Indians in South Africa, and the Japanese still have their roots in oriental philosophy and religion, although as a result of twentieth century

industrialization they have become westernized.

Various investigators have reported high correlations in the rank orderings between the various samples. Rahe (1969a), for example, applying the Spearman correlation coefficient, found the highest agreement between the Swedish and American samples ($r=0,94$); and lowest agreement between the Hawaiian and Danish samples ($r=0,63$). Rahe (1969a) found too, that the Caucasian American sample tended to agree more with the Japanese and Scandinavian groups than it did with any of the American sub-culture groups. Also, the Swedish sample agreed more closely with the Caucasian American and Japanese groups than it did with its Danish neighbours. Moreover, Negro Americans who agreed most closely with the Mexican American sample, were the furthest in agreement from a group of Danish students; the Japanese differed most from the Mexican American group, whereas their highest agreement was with the Caucasian American and Swedish groups; native Hawaiians were most in agreement with the Negro American sample; the Danish group agreed most closely with the Caucasian American sample.

Ruch and Holmes (1971) reported the Spearman rank order correlation coefficient between the American adult and adolescent groups to be very high ($r=0,97$). Adolescents placed about 25 per cent of the life events in exactly the same position as adults, and 80 per cent of the events within three places of their original position. Three events were ranked most differently by the two samples : the adolescent sample regarded sexual difficulties and mortgage loans as involving more readjustment than the adult group whereas they (the adolescents) gave less weight to the revision of personal habits.

The relative order of importance assigned to life events by Americans and Europeans has been reported by Harmon et al (1970) to be highly concordant ($r=0,89$). Studies by Rahe et al (1967) and Komaroff et al (1968) have also shown good agreement on the weights assigned to life events by sub-groups which varied on age, ethnicity and cultural backgrounds.

A close examination of the rank order of life events by various cross-cultural samples (Table 6.7) reveals certain striking differences. For instance, marital reconciliation (item 4) was ranked only 40,5 by the sample of the present study, as compared with ranks ranging from 6 to 15 by the cross-cultural samples, implying the need for greater readjustment for the cross-cultural samples as compared with the sample of the present study. A similar pattern was noted for other items, such as retired from work (item 40); pregnancy (item 2); marriage (item 1); outstanding personal achievement (item 19); and addition of new family member (item 10). On the other hand, certain items were perceived by the sample of the present study to require greater readjustment than by the cross-cultural samples. These included such items as troubles with boss (item 43); and major change in sleeping habits (item 21).

Fairly consistent rank orderings between the sample of the present study and the cross-cultural samples were noted for such items as death of spouse (item 12); major change in the number of family get-togethers (item 38); minor violations of the law (item 30); and vacation (item 23).

Marriage (item 1) which was ranked fifth from the bottom of the list by the sample of the present study, was ranked first by the Mexican

American sample (Rahe, 1969a), whereas death of spouse (item 12), ranked first by all the samples, including that of the present study, was ranked fifth by the Mexican American sample (Rahe, 1969a). In a South African study of the stressfulness of life events among pregnant white women, Chalmers (1979) also found marriage to be ranked fifth from the bottom of a list of over 80 items. Interestingly, the events in that study were generally perceived to be more stressful and requiring greater readjustment than by the sample of the present study.

To facilitate a further examination of the rank order of life events by various cross-cultural samples, those samples recording the highest and those recording the lowest rank orderings of each event are presented in Table 6.12.

From Table 6.12 it would appear that five of the 34 life events were perceived by the sample of the present study as being most stressful and requiring the greatest amount of readjustment when compared with other cross-cultural samples. These five events were :

- Item 39 - loss of job
- Item 5 - death of close friend
- Item 43 - troubles with boss
- Item 44 - major change in hours or conditions of work
- Item 21 - major change in sleeping habits.

Another twelve life events seemed to be perceived by the sample of the present study as requiring the least amount of readjustment when compared with the other cross-cultural samples. These were :

- Item 28 - major business readjustment
- Item 41 - change of job
- Item 45 - embarked on studies

- Item 40 - retired from work
- Item 4 - marital reconciliation
- Item 38 - major change in the number of family get-togethers
- Item 2 - pregnancy
- Item 20 - major change in recreation
- Item 1 - marriage
- Item 23 - vacation
- Item 19 - outstanding personal achievement
- Item 10 - addition of new family member.

The one single life event that appeared to have the greatest range in rank orderings was marriage (item 1), which received the highest ranking (1) from the Mexican American sample, and lowest (44,5) from the sample of the present study. Other major differences in rank orderings were noted for

- Item 43 - troubles with boss
- Item 3 - major change in health of family member
- Item 6 - change in number of arguments with spouse
- Item 49 - mortgage or loan over R10 000
- Item 18 - major change in living conditions
- Item 28 - major business readjustment
- Item 41 - change of job
- Item 29 - change in residence
- Item 22 - major change in eating habits
- Item 45 - embarked on studies
- Item 40 - retired from work
- Item 30 - minor violations of the law
- Item 2 - pregnancy
- Item 20 - major change in recreation
- Item 19 - outstanding personal achievement
- Item 10 - addition of new family member.

Of the 17 items listed above (including marriage), 13 are regarded as ambiguous according to the classification in Table 6.5. Hence, when

major differences appeared in the rank orderings of life events, one might assume that there are major differences in the perception of these events. After all, even similarities in the rank orderings of events do not necessarily mean that different groups perceive life events as requiring the same amount of readjustment.

An important factor responsible for major differences in the ranking of life events discussed above is that an individual's perception of life events is a function of his social, cultural, and religious background (e.g., Bowers and Kelly, 1979). The sample of the present study was, in this respect, different from the cross-cultural samples.

Yet another important factor which could have contributed to some of the differences in the rank ordering of life events in the various studies is differences in procedure. For instance, the Holmes-Rahe procedure (Holmes and Rahe, 1967) involved questionnaire presentation of events with a request that each item be evaluated against a given module item on a scale from zero to infinity. The North Carolina procedure (Miller et al, 1974) involved an arbitrary cut-off at 1 000 and a verbal presentation of items. The verbal presentation was accompanied by a visual presentation of a histogram in units of 50 with a module event and its weight clearly delineated. The visual aid was presented for each event and the subject was asked whether the item required more or less readjustment than getting married, and how much.

From the evidence produced in this section it is clear that there were several differences in the rank ordering of life events, among the various cross-cultural samples referred to and the sample of the present study. Hence the derivation of separate norms for South African Indian adults is justified.

TABLE 6.12

Cross-Cultural Comparison of Highest and Lowest Ranks¹ on 34 Items of the SRRQ²

Item no.	Life event	Rank based on present study	Cross-cultural sample	
			Highest rank	Lowest rank
12	Death of spouse	1	All samples(1), except Mexican American	Mexican American(5)
13	Death of a close family member	2,5	Negro American(2)	Belgian(23)
47	Jail sentence	2,5	Danish; Swedish(2)	Mexican(19)
14	Major personal injury or illness	5	Hawaiian(2,5)	Swiss(14)
39	Loss of job	6	Study sample(6)	Negro American(16)
46	Divorce (or separation)	7	All Americans; Finnish; Belgian(2); (Rural N.Carolina, Mexican American(2))	Negro American(13) (Finnish; Hawaiian(9))
5	Death of close friend	9	Study sample; Swedish(9)	Mexican American(29)
43	Troubles with boss	14,5	Study sample(14,5)	Mexican American(42)
3	Major change in health of family member	16	Finnish; Swedish(5)	Swiss(25)
15	Sexual difficulties	17	American adolescent(5)	Rural N.Carolina(20)
6	Change in number of arguments with spouse	18,5	Danish(10)	Japanese; Rural N.Carolina(33)
8	Son or daughter leaving home	20,5	Hawaiian(11)	Mexican American(30)
49	Mortgage or loan over R10 000	23	Negro American(3)	Danish(30)
44	Major change in hours or conditions of work	24	Study sample(24)	Negro American; Mexican American(32)
18	Major change in living conditions	26	Rural N.Carolina(14)	Swiss(43)
7	Trouble with in-laws	28,5	Japanese(20)	Mexican American(35)

1. These are shown in parentheses

2. Based on ranks in Table 6.7

TABLE 6.12 (continued)

Item no.	Life event	Rank based on present study	Cross-cultural sample	
			Highest rank	Lowest rank
28	Major business readjustment	28,5	Rural N.Carolina; Mexican American(7)	Study sample(28,5)
31	Major revision of personal habits	30	Mexican American(20)	Finnish(38)
21	Major change in sleeping habits	31,3	Study sample(31,3)	American adolescent; French(41)
42	Major change in work responsibilities	31,3	Negro American(15)	Danish(32)
41	Change of job	34	Swiss(12)	Study sample(34)
29	Change in residence	35,5	Danish(20)	Swiss(41)
22	Major change in eating habits	37,5	Mexican American; Hawaiian(27)	Swedish(41)
45	Embarked on studies	37,5	Danish(11)	Study sample(37,5)
40	Retired from work	39	American(8)	Study sample(39)
4	Marital reconciliation	40,5	Swiss(6)	Study sample(40,5)
38	Major change in the number of family get-togethers	40,5	Rural N.Carolina(32)	Study sample(40,5)
30	Minor violations of the laws	42	Hawaiian(22)	Caucasian American; American adolescent(43)
2	Pregnancy	43	Belgian(5)	Study sample(43)
20	Major change in recreation	44,5	Mexican American(23)	Study sample(44,5)
1	Marriage	44,5	Mexican American(1)	Study sample(44,5)
23	Vacation	46	Belgian(28)	Study sample(46)
19	Outstanding personal achievement	47	Negro American(9)	Study sample(47)
10	Addition of new family member	49	Danish(8)	Study sample(49)

6.3 The Schedule of Recent Experience - Chohan's Adaptation (SRE-CA)

The principal aims of the analysis of data pertaining to the SRE-CA were :

- (1) to examine inter- and intra-group differences in the total frequency of life events experienced over the two-year period under study, according to the areas of stress, six-monthly time periods, social desirability, and exits from and entrances to the social field;
- (2) to determine and compare the mean six-month LCU total scores, as well the overall mean six-month LCU total scores (based on the two-year period under study) for the three groups of subjects; and
- (3) to determine whether the experience of life events preceded or followed the onset of cardiac illness for the subjects in Group A.

Data derived from the SRE-CA included the total frequency of life events (LE) and the total life change unit (LCU) scores, according to the areas of stress and time period. The frequency of life events refers to the number of life events experienced, regardless of their seriousness in terms of the social readjustment required. Such frequency is unweighted, as opposed to the LCU scores which are weighted according to the geometric means derived from the SRRQ-CA of the present study. The LCU score indicates the magnitude of social readjustment required. Thus, a subject experiencing only two life events (LE), such as death of spouse; and retirement from work, during a given period of time, is assigned a life change unit (LCU)

score of 15,7 for the first life event, and 6,0 for the second, giving the subject a total LCU score of 21,7 for the two events for that period. Consequently, it is not the frequency of life events experienced that determines the amount of social readjustment required by an individual, but rather the magnitude of the LCU.

6.3.1 Frequency of life events

6.3.1.1 Life events according to areas of stress

The 44 life events in the SRE-CA were categorized into four areas of stress (Appendix I) :

- (a) Work (7 items)
- (b) Home and Family (20 items)
- (c) Personal and Social (14 items)
- (d) Financial (3 items).

The total number of life events experienced by each of the three groups in the different areas of stress over the two-year period under study is shown in Table 6.13 and is graphically presented in Figure 6.1.

TABLE 6.13

Distribution of Frequency of Life Events over Two Years According to Area of Stress (Percentages are shown in Parentheses)

Group	Work	Home and Family	Personal and Social	Financial	Total LE
A (N=60)	178 (16,44)	383 (35,33)	282 (26,00)	241 (22,23)	1 084
B (N=60)	118 (16,64)	204 (28,77)	221 (31,17)	166 (23,41)	709
C (N=60)	89 (13,55)	218 (33,18)	188 (28,61)	162 (24,66)	657
Total LE	385	805	691	569	2 450

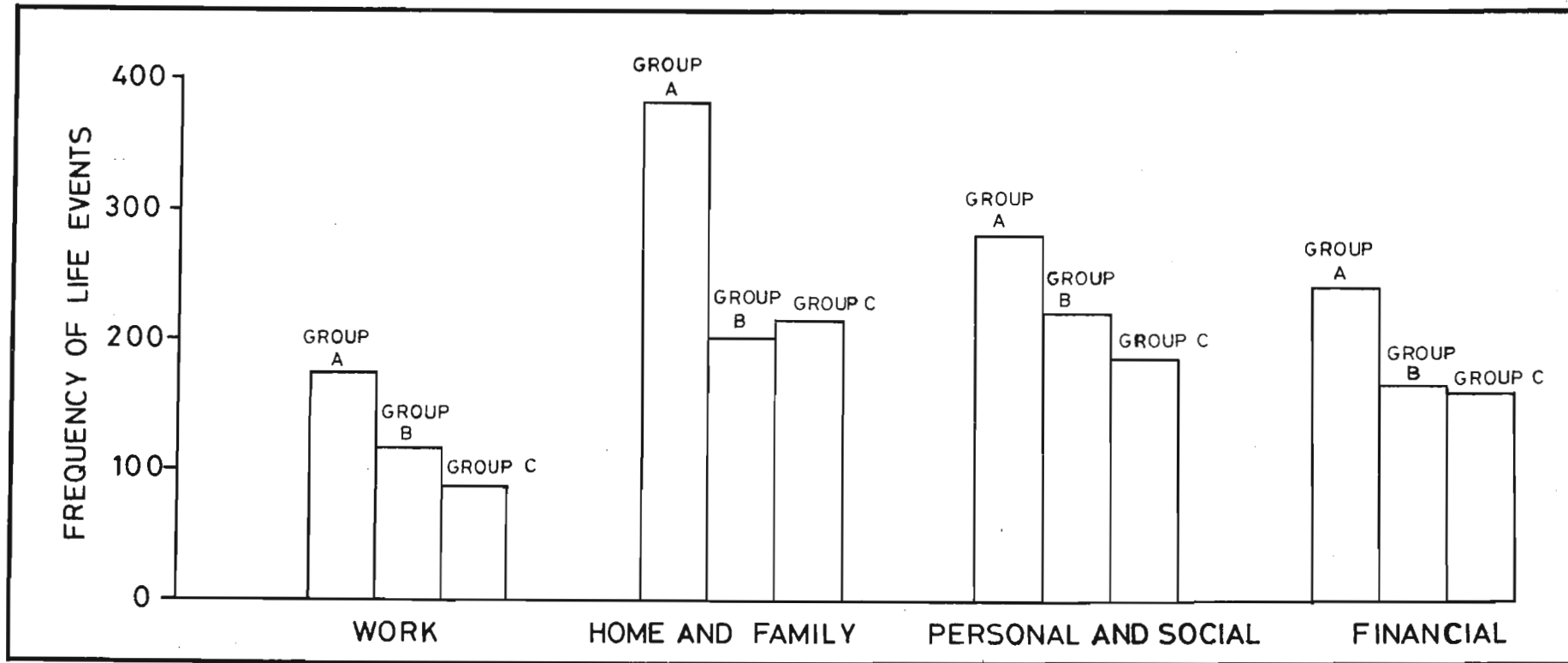


Figure 6.1: ACCUMULATION OF LIFE EVENTS OVER TWO YEARS ACCORDING TO AREA OF STRESS

For the two-year period under study, Group A experienced the highest number of life events, followed by Groups B and C. Thus over a two-year period immediately preceding the investigation, cardiac patients had experienced more life events than presumably normal, healthy subjects.

For both Groups A and C, the highest and the lowest frequency of life events experienced was in the category "Home and Family" and "Work" respectively; whereas for Group B the categories were "Personal and Social", and "Work" respectively. When all three groups were combined, the highest frequency of life events experienced over the two-year period was in the category "Home and Family", and the lowest in the category "Work".

It must be pointed out that the data in the above table is dependent within each group. For instance, the total of 1 084 life events for Group A is based on the responses of the same 60 subjects to items in each of the four areas of stress. Consequently the chi square statistic could not be applied to the data in Table 6.13. As Siegel (1956, p. 44) says :

"The total number of observations.... must be independent of every other; thus one may not make several observations on the same person and count each as independent. To do so produces an 'inflated N'".

Further,

"Inflated N's invalidate the test".

(Siegel 1956, p. 109).

In order to make the data in Table 6.13 amenable to a chi square test of statistical significance, subjects in each group were assigned to one of four areas of stress, according to the area in which most of their life events were experienced. This is shown in Table 6.14.

TABLE 6.14

Distribution of Subjects According to Area of Stress in which most Life Events were Experienced over the two years (Percentages are shown in Parentheses)

Group	Work	Home and Family	Personal and Social	Financial
A (N=60)	9 (15,00)	23 (38,33)	15 (25,00)	13 (21,67)
B (N=60)	13 (21,67)	16 (26,67)	18 (30,00)	13 (21,67)
C (N=60)	8 (13,33)	22 (36,67)	16 (26,67)	14 (23,33)
Total (N=180)	30 (16,67)	61 (33,89)	49 (27,22)	40 (22,22)

$$\chi^2 (6df) = 3,15 \text{ N.S.}$$

The three groups did not differ significantly in the distribution of subjects according to the area of stress in which most of their life events were experienced over the two-year period. Further one-sample tests of chi square to examine intra-group differences revealed no statistically significant differences. That is, there were no statistically significant differences within groups, in the distribution of subjects according to the area of stress in which most of their life events were experienced over the two-year period.

In the next analysis, the items within each area of stress were examined for possible differences between groups for the two-year period under study. For this purpose, those items for which the actual observed frequencies were rather small (below 5), were not subjected to any statistical test of significance. The results of these analyses for "Work" (Table 6.15); "Home and Family" (Table 6.16); "Personal and Social" (Table 6.17); and "Financial" (Table 6.18) are presented below.

TABLE 6.15**Analysis of Data Related to Work (Two-Year Period)**

Item no.	Life event	Direction of difference between groups	χ^2 (1df)
39	Loss of job	A > B	5,44 *
		B = C	N.S.
		A > C	4,57 *
41	Change of job	A > B	4,24 *
		B = C	N.S.
		A = C	N.S.
42	Major change in work responsibilities	A > B	4,24 *
		B = C	N.S.
		A = C	N.S.
44	Major change in hours or conditions of work	A > B	11,57 ***
		B = C	N.S.
		A > C	7,12 **

It is evident from Table 6.15 that each of the four life events related to "Work" was experienced by significantly more subjects in Group A than in Group B, over the two-year period. Also, significantly more subjects from Group A than from Group C experienced items 39 and 44 over the same period. No statistically significant differences were observed between Groups B and C.

TABLE 6.16**Analysis of Data Related to Home and Family (Two-Year Period)**

Item no.	Life event	Direction of difference between groups	χ^2 (1df)
1	Marriage	A > B	4,84 *
		C > B	5,54 *
		A = C	N.S.
8	Son or daughter leaving home	A > B	4,50 *
		B = C	N.S.
		A = C	N.S.
13	Death of a close family member	A > B	3,95 *
		B = C	N.S.
		A > C	10,08 **
29	Change in residence	A > B	4,50 *
		B = C	N.S.
		A = C	N.S.

Over the two-year period there were significantly more subjects in Group A than in Group B who had experienced the four life events listed in Table 6.16. Also, item 1 (marriage) was experienced by significantly more of Group C subjects than Group B subjects; and item 13 (death of a close family member) was experienced significantly more by Group A subjects than Group C subjects, for the same two-year period. No statistically significant differences were observed between Groups A and C for items 1,8 and 29; and between Groups B and C for items 8,13, and 29.

TABLE 6.17**Analysis of Data Related to Personal and Social (Two-Year Period)**

Item no.	Life event	Direction of difference between groups	χ^2 (1df)
17	Major decisions regarding the future	A > B	4,50 *
		B = C	N.S.
		A = C	N.S.
23	Vacation	A = B	N.S.
		B > C	3,80 *
		A > C	4,17 *
30	Minor violations of the law	A = B	N.S.
		B = C	N.S.
		A > C	4,50 *

Over the two-year period there were significantly more subjects in Group A than in Group B who had experienced item 17 (major decisions regarding the future), for which the differences between Groups B and C, and between Groups A and C were not statistically significant. During the same period, there were significantly more subjects both in Groups A and B who had experienced item 23 (vacation) than in Group C. Differences between Groups A and B were not statistically significant.

Item 30 (minor violations of the law) was experienced by significantly more of Group A subjects than Group C subjects during the same two-year period. Differences between Groups A and B and between Groups B and C were not statistically significant.

TABLE 6.18**Analysis of Data Related to Finance (Two-Year Period)**

Item no.	Life event	Direction of difference between groups	χ^2 (1df)
48	Major change in financial state	A > B	7,00 **
		B = C	N.S.
		A > C	5,82 *
49	Mortgage or loan over R10 000	A > B	4,54 *
		B = C	N.S.
		A = C	N.S.

During the two-year period, significantly more subjects in Group A than in Groups B or C experienced item 48 (major change in financial state), while the differences between Groups B and C were statistically not significant. Also, significantly more subjects in Group A than in Group B experienced item 49 (mortgage or loan over R10 000), for which there were no statistically significant differences between Groups B and C and between Groups A and C.

From the analyses of data related to the four areas of stress, three observations emerge :

- (a) only one item (item 1 - marriage) was experienced significantly more by Group C subjects than by subjects in Group B.,
- (b) only one item (item 23 - vacation) was experienced significantly more by subjects in Group B than by subjects in Group C. Both items 1 and 23 have been categorized as socially desirable life events., and

- (c) none of the 49 life events was experienced significantly more frequently by either Group B or C, than by Group A.

6.3.1.2 Life events according to time periods

The total number of life events experienced according to the four six-month periods is shown for the three groups in Table 6.19 and is graphically presented in Figure 6.2.

TABLE 6.19

Frequency of Life Events According to Time Periods
(Percentages are shown in Parentheses)

Group	19-24 month	13-18 month	7-12 month	0-6 month	Total LE
A (N=60)	346 (31,92)	215 (19,83)	254 (23,43)	269 (24,82)	1 084
B (N=60)	226 (31,88)	165 (23,27)	166 (23,41)	152 (21,44)	709
C (N=60)	213 (32,42)	147 (22,37)	145 (22,07)	152 (23,14)	657
Total LE	785	527	565	573	2 450

For the two-year period under study, each group experienced the highest frequency of life events in the period 19 - 24 months, whereas the temporal occurrence of the lowest frequencies varied from group to group — Group A : 13 - 18 months; Group B : 0 - 6 months; and Group C : 7 - 12 months.

Next, subjects in each group were assigned to one of four six-month periods according to the period in which most of their life events were experienced. This is reflected in Table 6.20.

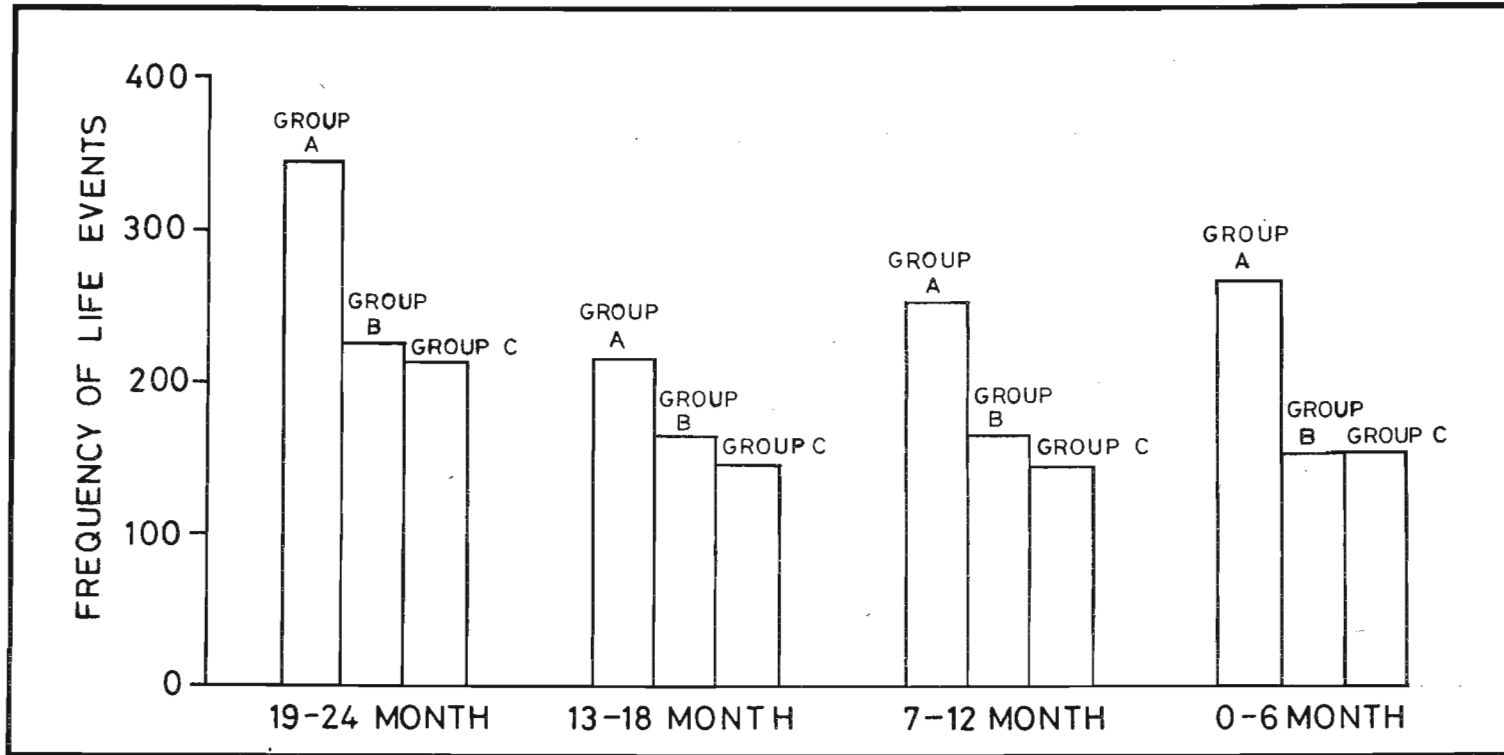


Figure 6.2: SIX-MONTHLY ACCUMULATION OF LIFE EVENTS OVER THE TWO-YEAR PERIOD

TABLE 6.20

Distribution of Subjects According to the Period in which most Life Events were Experienced over the Two Years (Percentages are shown in Parentheses)

Group	19-24 month	13-18 month	7-12 month	0-6 month
A (N=60)	24 (40,00)	11 (18,33)	10 (16,67)	15 (25,00)
B (N=60)	20 (33,33)	14 (23,33)	9 (15,00)	17 (28,33)
C (N=60)	17 (28,33)	21 (35,00)	13 (21,67)	9 (15,00)
Total (N=180)	61 (33,89)	46 (25,56)	32 (17,78)	41 (22,78)

$$\chi^2 (6df) = 7,996 \text{ N.S.}$$

The three groups did not differ significantly in the distribution of subjects according to the period in which most of their life events were experienced over the two-year period under study. However, further tests showed that whereas there were no intra-group differences of statistical significance for Groups B and C, there was, for Group A, a statistically significant difference in the distribution of subjects according to the period in which most of their life events were experienced over the two-year period. ($\chi^2 = 8,14$; $df = 3$; $p < 0,05$). In this respect the highest distribution of subjects was in the 19 - 24 month period.

6.3.1.3 Life events according to areas of stress and time periods

The total number of life events according to the area of stress and time period for the entire sample (N=180) is shown in Table 6.21.

TABLE 6.21

Frequency of Life Events According to Area of Stress and Time Period for the Entire Sample (N = 180) (Percentages are shown in Parentheses)

Area of Stress	19-24 month	13-18 month	7-12 month	0-6 month	Total LE
Work	146 (5,96)	75 (3,06)	59 (2,41)	105 (4,29)	385 (15,72)
Home and Family	283 (11,55)	193 (7,88)	168 (6,86)	161 (6,57)	805 (32,86)
Personal and Social	206 (8,41)	139 (5,67)	188 (7,67)	158 (6,45)	691 (28,20)
Financial	150 (6,12)	120 (4,90)	150 (6,12)	149 (6,08)	569 (23,22)
Total LE	785 (32,04)	527 (21,51)	565 (23,06)	573 (23,39)	2 450

From the data in Table 6.21 it is clear that for every area of stress the highest total frequency of life events experienced by the entire sample was during the period 19 - 24 months. Moreover, the highest frequency of life events experienced during the 7 - 12 month period was in the area "Personal and Social", whereas during each of the remaining six-month periods the highest frequencies were observed in the area "Home and Family". In each of the six-month periods, the lowest total frequency of life events was recorded in the category "Work".

6.3.1.4 Life Events According to Social Desirability

The distribution of the two-year total frequency of life events according to social desirability is shown in Table 6.22 below.

TABLE 6.22

Distribution of Two-Year Frequency of Life Events According to Social Desirability (Percentages are shown in Parentheses)

Group	Socially desirable events	Socially undesirable events	Ambiguous events	Total LE
A(N=60)	285(26,29)	427(39,39)	372(34,32)	1 084
B(N=60)	216(30,46)	287(40,48)	206(29,06)	709
C(N=60)	210(30,59)	267(40,64)	189(28,77)	767
Total LE	702	981	767	2 450

Over the two-year period each group consistently experienced more socially undesirable life events than either socially desirable or ambiguous life events.

Next, every subject in each of the three groups was assigned to one of three categories of events — socially desirable, socially undesirable, and ambiguous events — according to the category in which most of the subject's life events were experienced during the two-year period. This is shown in Table 6.23 below.

TABLE 6.23

Distribution of Subjects into Social Desirability Categories According to the Category in which most of the Two-Year Total Frequency of Life Events were Experienced (Percentages are shown in Parentheses)

Group	Socially desirable events	Socially undesirable events	Ambiguous events
A(N=60)	12(20,00)	41(68,33)	7(11,67)
B(N=60)	24(40,00)	30(50,00)	6(10,00)
C(N=60)	21(35,00)	29(48,33)	10(16,67)
Total(N=180)	57	100	23

$$\chi^2 (4df) = 7,89 \text{ N.S.}$$

The three groups did not differ significantly in the distribution of subjects according to the three categories (Table 6.23) in which most of the life events were experienced during the two-year period.

However, when the observations within each group were examined by the chi square one-sample test, there was a statistically significant difference in the distribution of subjects in each group according to social desirability :

$$\text{Group A : } \chi^2 (2df) = 33,70 \text{ ***}$$

$$\text{Group B : } \chi^2 (2df) = 15,60 \text{ ***}$$

$$\text{Group C : } \chi^2 (2df) = 9,10 \text{ *}$$

Further analyses with the chi square one-sample test revealed the following : In Group A there were significantly more subjects characterized by socially undesirable life events than either by socially desirable life events ($\chi^2 = 15,87$; $df = 1$; $p < 0,001$) or by ambiguous life events ($\chi^2 = 24,08$; $df = 1$; $p < 0,001$). No statistically significant difference was observed between the number of subjects in Group A characterized by socially desirable and

ambiguous life events.

In Group B there were significantly more subjects characterized by socially desirable than by ambiguous life events ($\chi^2 = 10,80$; $df = 1$; $p < 0,01$) and more subjects characterized by undesirable than by ambiguous life events ($\chi^2 = 16,00$; $df = 1$; $p < 0,001$). No statistically significant difference was observed between the number of subjects in Group B characterized by desirable and undesirable life events.

In Group C the pattern of differences was the same as for Group B : there were significantly more subjects characterized by socially desirable than by ambiguous life events ($\chi^2 = 3,90$; $df = 1$; $p < 0,05$) and more subjects characterized by undesirable than by ambiguous life events ($\chi^2 = 9,26$; $df = 1$; $p < 0,01$). There was no statistically significant difference between the number of subjects in Group C characterized by desirable and undesirable life events.

Thus, when subjects in the three groups were classified according to social desirability, there were no statistically significant inter-group differences, but significant intra-group differences were observed.

6.3.1.5 Life Events According to Exits from and Entrances to the Social Field

The two-year total frequency of life events according to exits from and entrances to the social field is shown in Table 6.24 below.

TABLE 6.24

Distribution of Two-Year Total Frequency of Life Events According to Exits from and Entrances to the Social Field (Percentages are shown in Parentheses)

Group	Exits	Entrances	Total LE
A(N=60)	157(70,72)	65(29,28)	222
B(N=60)	87(60,00)	58(40,00)	145
C(N=60)	74(56,92)	56(43,08)	130
Total LE	318	179	497

Over the two-year period under study each group experienced more life events related to exit from, than entrance to, the social field.

Subjects in each group were next assigned to one of two categories — "exits" or "entrances" — according to the one by which their life events over the two-year period were characterized. This is shown in Table 6.25 below.

TABLE 6.25

Number of Subjects Characterized as Exits from and Entrances to the Social Field, Based on Total Frequency of Life Events over the Two-Year Period (Percentages are shown in Parentheses)

Group	Exits	Entrances
A(N=60)	41(68,33)	19(31,67)
B(N=60)	32(53,33)	28(46,67)
C(N=60)	29(48,33)	31(51,67)
Total(N=180)	102	78

$$\chi^2 (2df) = 5,29 \text{ N.S.}$$

Based on the two-year total frequency of life events, there was no statistically significant difference between groups in the number of subjects characterized as exits from and entrances to the social field. However, the chi square one-sample test to examine differences within groups revealed only one statistically significant difference : Group A had significantly more subjects characterized by exits from than entrances to the social field ($\chi^2 = 8,06$; $df = 1$; $p < 0,01$).

6.3.2 Life Change Unit (LCU) Scores

It was stated in Section 6.3 that the frequency of life events merely referred to the number of life events which were experienced over a given period of time, and such frequency is unweighted. The life change unit (LCU) score, on the other hand, is the sum of the frequencies weighted with the geometric means applicable to different life events and is thus a weighted score. Hence it is not the frequency of life events experienced that determines the amount of social readjustment required by an individual, but rather, the magnitude of the LCU score. With this in mind, the mean LCU scores of each group on two factors (area of stress and time period) were calculated. These are shown in Table 6.26 below.

TABLE 6.26

Mean Six-Monthly LCU Scores for the Three Groups Over the Two-Year Period

Area of Stress	19-24 month			13-18 month			7-12 month			0-6 month		
	Group A (N=60)	Group B (N=60)	Group C (N=60)	Group A (N=60)	Group B (N=60)	Group C (N=60)	Group A (N=60)	Group B (N=60)	Group C (N=60)	Group A (N=60)	Group B (N=60)	Group C (N=60)
Work	6,49	5,90	4,33	4,18	2,94	3,46	4,03	2,70	1,04	5,52	3,59	3,88
Home and Family	14,47	9,17	8,33	9,58	6,24	7,59	9,68	4,82	5,00	11,75	4,39	5,32
Personal and Social	11,40	7,87	7,78	7,42	5,45	3,50	9,57	5,96	4,30	9,76	5,82	5,15
Financial	5,43	2,44	2,23	4,34	2,65	2,20	5,02	4,12	3,81	4,50	3,19	3,63
Mean Total six-monthly LCU score	37,79	25,38	22,67	25,52	17,28	16,75	28,30	17,60	14,15	31,53	16,99	17,98

The mean total six-monthly LCU scores of the three groups for the two-year period under study are graphically presented in Figure 6.3.

In order to examine the differences in the mean six-monthly LCU scores between groups, areas of stress, and time periods, a three-way classification analysis of variance (Table 6.27) involving three factors (group, area of stress, and time period) was carried out.

The results showed a highly significant difference in the mean six-monthly LCU scores among

- (a) the three groups ($F = 19,11; p < 0,01$);
- (b) the four areas of stress ($F = 19,20; p < 0,01$); and
- (c) the four time periods ($F = 4,84; p < 0,01$).

There was also a highly significant difference in the effects produced by the interactions between

- (a) groups and areas of stress ($F = 4,13; p < 0,01$);
- (b) groups and time periods ($F = 11,31; p < 0,01$); and
- (c) areas of stress and time periods ($F = 5,39; p < 0,01$).

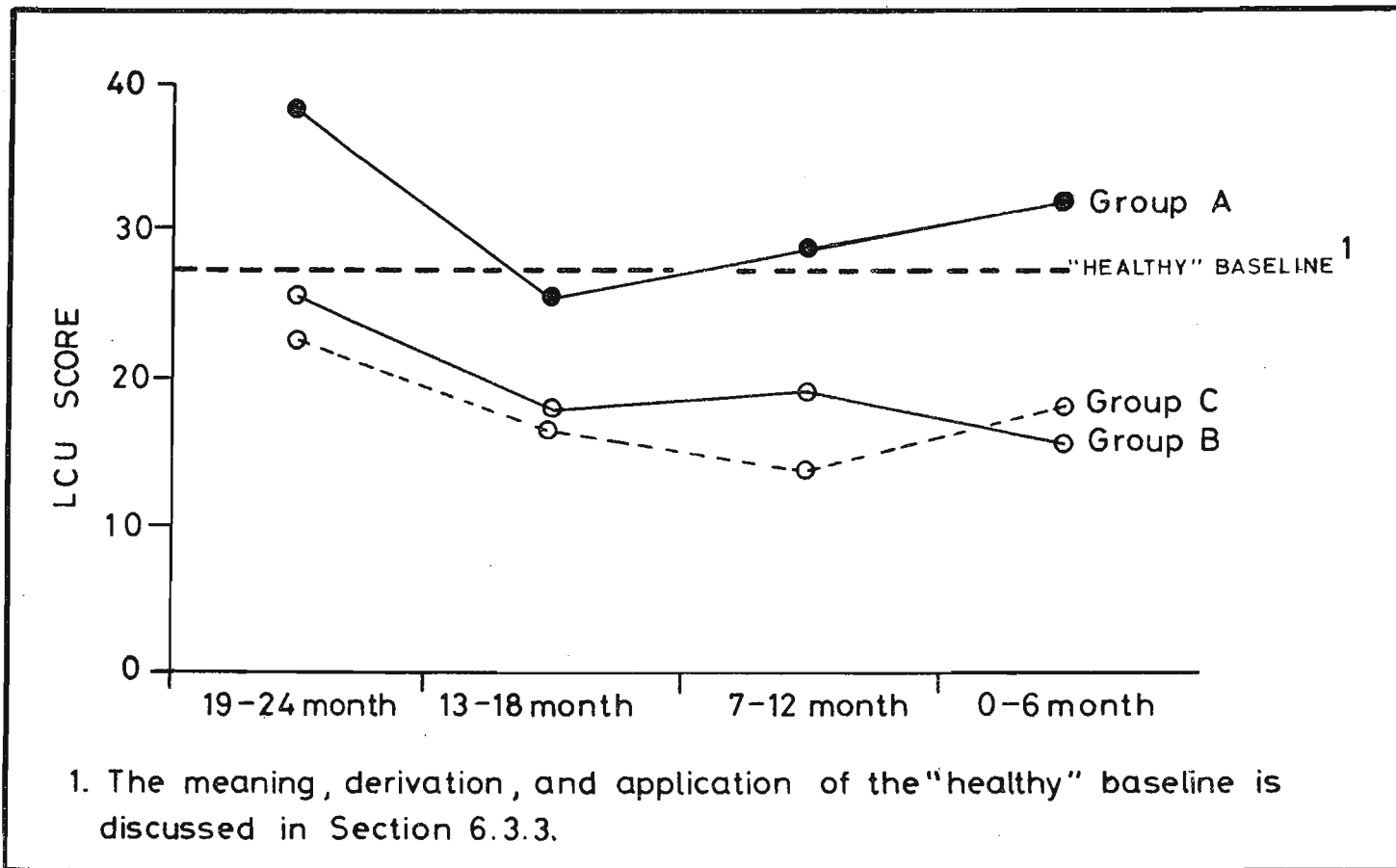


Figure 6.3: MEAN TOTAL SIX-MONTHLY LCU SCORES FOR THE THREE GROUPS OVER THE TWO-YEAR PERIOD

TABLE 6.27

Three-Way Analysis of Variance Computational Table for Mean Six-Monthly LCU Scores for Groups, Areas of Stress and Time Periods

Source of variation	df	Sum of squares	Variance estimate	F
Between groups	2	6 009,70	3 004,85	19,11**
Between areas of stress	3	9 057,14	3 019,05	19,20**
Between time periods	3	2 285,80	761,93	4,84**
Interactions :				
Groups x areas of stress	6	3 899,38	649,90	4,13**
Groups x time periods	6	10 670,72	1 778,45	11,31**
Areas of stress x time periods	9	7 623,28	847,03	5,39**
Groups x areas of stress x time periods	18	1 613,58	89,64	0,57 N.S.
Within groups	2832	445 360,32	157,26	
Total	2879	486 519,92		

Following the statistical significance of the F ratios, Scheffé tests were applied to locate the significance of differences between mean LCU scores. The Scheffé test results of inter-group and intra-group comparisons are presented in Tables 6.28 and 6.29 respectively.

Of a total of 48 possible inter-group comparisons between the mean six-monthly LCU scores for the four areas of stress, five reached statistical significance. These will be discussed in categories :

- (a) Home and Family. The mean six-monthly LCU scores of Group A were consistently higher than those of Groups B and C, with four inter-group comparisons — two in the 19-24 month period, and two in the 0-6 month period — attaining statistical significance : for the 19-24 month period the mean of Group A subjects' LCU scores for the category "Home and Family" was significantly higher ($F = 5,36$; $p < 0,05$) than that of Group B, as well as that of Group C ($F = 7,19$; $p < 0,05$).

TABLE 6.28

Scheffé Test Results of Inter-Group Comparisons of Mean Six-Monthly LCU Scores, and Direction of Inter-Group Difference

Area of stress	Direction of inter-group difference			
	19-24 month	13-18 month	7-12 month	0-6 month
Work	N.S.	N.S.	N.S.	N.S.
Home and Family	A > B (F= 5,36*) A > C (F= 7,19*)	N.S.	N.S.	A > B (F=10,33**) A > C (F= 7,89**)
Personal and Social	N.S.	N.S.	A > C (F= 5,30*)	N.S.
Financial	N.S.	N.S.	N.S.	N.S.
Direction of inter-group difference in mean total six-monthly LCU scores	A > B (F=29,38**) A > C (F=41,22**)	A > B (F=12,95**) A > C (F=14,67**)	A > B (F=21,84**) A > C (F=38,20**)	A > B (F=40,33**) A > C (F=35,02**)

A similar pattern was noted for the period 0-6 months, when the mean LCU score of Group A was significantly higher ($F=10,33$; $p < 0,01$) than that of Group B and that of Group C ($F = 7,89$; $p < 0,01$).

The remaining mean six-monthly LCU scores of Group A were also higher than those of Groups B and C, although the differences failed to reach statistical significance.

- (b) Personal and Social. In this category, the mean LCU score of Group A subjects during the 7-12 month period was significantly higher ($F = 5,30$; $p < 0,05$) than that of Group C subjects. Again, the mean LCU scores of Group A during the remaining three six-month periods were consistently higher than those of Groups B and C, but the differences were of no statistical significance.

In the "Work" as well as in the "Financial" categories, the mean six-monthly LCU scores of Group A for the two-year period were also higher than those of Groups B and C, although no statistically significant differences were noted.

Of the five statistically significant differences mentioned above, four were related to life events in the category "Home and Family", during two six-month periods : 19-24 months, and 0-6 months.

Moreover, in none of the comparisons between any two periods and involving each of the four areas of stress was the mean LCU score of a group significantly higher than its mean for any other period. This pattern was consistent throughout the four six-month periods. Thus it is reasonable to conclude that a group's mean LCU score for each area of stress remained significantly unchanged throughout the four six-month periods.

Of the twelve possible inter-group comparisons between the mean total six-monthly LCU scores (Table 6.28), eight attained statistical significance : in every one of the four six-month periods, the mean total LCU score of Group A was significantly higher than that of Group B as well as that of Group C ($p < 0,01$ in every comparison).

Of a possible total of 72 intra-group comparisons of mean LCU scores between the different areas of stress, 15 attained statistical significance — four at the 0,01 level and eleven at the 0,05 level of confidence (Table 6.29). These will be discussed according to the four time periods :

TABLE 6.29

Scheffé Test Results of Intra-Group Comparisons of Mean Six-Monthly LCU Scores, and Direction of Intra-Group Difference

Group	Direction of intra-group difference			
	19-24 month	13-18 month	7-12 month	0-6 month
A (N=60)	Home and Family > Work (F=12,15**)	Home and Family > Work (F=5,56*)	Home and Family > Work (F=6,09*)	Home and Family > Work (F=7,40*)
	Home and Family > Financial (F=15,59**)	Home and Family > Financial (F=5,23*)	Personal and Social > Work (F=5,85*)	Personal and Social > Financial (F=5,28*)
	Personal and Social > Financial (F=6,80*)			Home and Family > Financial (F=10,03**)
B (N=60)	Home and Family > Financial (F=8,64**)	N.S.	N.S.	N.S.
	Personal and Social > Financial (F=5,62*)			
C (N=60)	Home and Family > Financial (F=7,10*)	Home and Family > Financial (F=5,54*)	N.S.	N.S.
	Personal and Social > Financial (F=5,88*)			

(a) 19-24 month period. During this period subjects in Group A attained significantly higher mean LCU scores for the categories "Home and Family" than for "Work" (F=12,15; $p < 0,01$) or for "Financial" (F=15,59; $p < 0,01$). Also, their mean "Personal and Social" LCU score for this period was significantly higher (F=6,80; $p < 0,05$) than their mean "Financial" score.

For both Groups B and C, the mean LCU scores for "Home and Family" for this period were significantly higher (Group B :

F=8,64; $p < 0,01$; Group C : F=7,10; $p < 0,05$) than their mean "Financial" scores; and their mean "Personal and Social" scores were significantly higher than their mean "Financial" scores (Group B : F=5,62; $p < 0,05$; Group C : F=5,88; $p < 0,05$);

- (b) 13-18 month period. While there was no significant difference in the mean LCU scores between any of the areas of stress for Group B during the 13-18 month period, the mean LCU score for "Home and Family" for Group A was significantly higher than the mean LCU score for the category "Work" (F=5,56; $p < 0,05$) or for "Finance" (F=5,23; $p < 0,05$).

The only statistically significant difference for Group C during this period was the higher mean LCU score for "Home and Family" than for "Finance" (F=5,54; $p < 0,05$);

- (c) 7-12 month period. During this period, Group A attained significantly higher mean LCU scores for both the categories "Home and Family" and "Personal and Social" than for "Work" (F=6,09 and F=5,85 respectively, $p < 0,05$ in both comparisons). No statistically significant differences were noted for Groups B and C; and

- (d) 0-6 month period. During the final six-month period Group A subjects had significantly higher mean LCU scores for "Home and Family" than for "Financial" (F=10,03; $p < 0,01$) or for "Work" (F=7,40; $p < 0,05$). Their mean LCU score for "Personal and Social" too, was significantly higher (F=5,28; $p < 0,05$) than their mean LCU "Financial" score.

No statistically significant differences in mean LCU scores were noted for Groups B and C.

The results of the Scheffé tests for the mean total six-monthly LCU scores (Table 6.26) showed that of a possible total of 18 intra-group comparisons involving the three groups, nine reached statistical significance — six at the 0,01 level and three at the 0,05 level of confidence : for Group A subjects the mean total LCU score for the 19-24 month period was significantly higher than their mean total for the :

- (i) 13-18 month period ($F = 28,72; p < 0,01$);
- (ii) 7-12 month period ($F = 17,18; p < 0,01$); and
- (iii) 0-6 month period ($F = 7,48; p < 0,05$).

In addition, the mean total LCU score for Group A for the 0-6 month period was significantly higher ($F = 6,89; p < 0,05$) than that for the 13-18 month period.

For the subjects in Group B the mean total LCU score for the 19-24 month period was significantly higher than the mean total LCU score for the :

- (i) 13-18 month period ($F = 12,52; p < 0,01$);
- (ii) 7-12 month period ($F = 11,55; p < 0,01$); and
- (iii) 0-6 month period ($F = 13,43; p < 0,01$).

For the Group C subjects the mean total LCU score for the 19-24 month period was significantly higher than their mean total for the :

- (i) 13-18 month period ($F = 6,68; p < 0,05$); and
- (ii) 7-12 month period ($F = 13,85; p < 0,01$).

In the next analysis of the LCU scores, the overall mean six-month LCU score in respect of each area of stress, taken over the two-year period was calculated for each group. The sum of these overall mean LCU scores for each area of stress for a group yielded the overall mean total six-month LCU score for the two-year period for that group. These LCU scores are shown in Table 6.30 below.

TABLE 6.30

Overall Mean Six-Month LCU Scores taken over the Two-Year Period

Area of stress	Overall six-month mean LCU Scores		
	Group A (N=60)	Group B (N=60)	Group C (N=60)
Work	5,06	3,78	3,18
Home and Family	11,37	6,15	6,56
Personal and Social	9,54	6,28	5,18
Financial	4,82	3,10	2,97
Overall mean total six-month LCU score	30,78	19,31	17,89

In order to examine the differences in LCU scores between groups and areas of stress, a two-way classification analysis of variance (Table 6.31) involving two factors (group and area of stress) was carried out.

The results revealed a highly significant difference in the overall mean total six-month LCU scores taken over the two-year period among :

- (a) the three groups ($F = 4,66$; $p < 0,01$); and among
- (b) the four areas of stress ($F = 4,68$; $p < 0,01$).

TABLE 6.31

Two-Way Analysis of Variance Computational Table for Overall Mean Total Six-Month LCU Scores taken over the Two-Year Period for Groups and Area of Stress

Source of variation	df	Sum of squares	Variance estimate	F
Between Groups	2	1 490,00	745,00	4,66**
Between Areas of Stress	3	2 246,50	748,83	4,68**
Interaction				
Groups x Areas of Stress	6	354,90	59,15	0,37 N.S.
Within Groups	708	113 218,30	159,91	
Total	719	117 309,70		

The interaction effect was not significant.

The Scheffé tests were next applied to locate the significance of differences between the overall mean total six-month LCU scores which were taken over the two-year period. These results showed that

- (a) for the cardiac group (Group A) the overall mean total six-month LCU score was significantly higher ($F = 24,68; p < 0,01$) than that for Group B or that for Group C ($F = 31,17; p < 0,01$). This finding confirms the hypothesis that for cardiac subjects the overall mean total six-month life change unit (LCU) score taken over a period of two years immediately preceding the investigation would be significantly higher than that of presumably normal, healthy subjects.

No statistically significant difference was noted between the scores of Groups B and C; and

- (b) for the cardiac group (Group A) the overall mean six-month LCU score for the "Home and Family" category was significantly higher ($F = 7,47$; $p < 0,05$) than for the "Work" category or the "Financial" category ($F = 8,05$; $p < 0,01$). No significant difference was noted between the scores of Groups B and C.

6.3.3 Life Change Unit (LCU) Accumulation and the Onset of Illness

In order to examine the association between the accumulation of life change units and the temporal occurrence of cardiac illness, the following questions were posed :

- (a) In a given six-month period, what were the mean total LCU scores of those subjects whose illnesses began during that period? How do these mean total LCU scores compare with their mean total LCU scores for the six-month period immediately preceding the illness period, as well as the six-month period immediately following the illness period?
- (b) How do the mean total six-monthly LCU scores of those subjects falling ill in a given period compare with those of subjects who did not fall ill during that period?

An attempt to answer these questions necessitated an analysis and interpretation of the data which has been set out hereunder.

TABLE 6.32

Number of Subjects in Group A whose Cardiac Problems began in the Different Periods, and their Mean Total Six-Monthly LCU Scores

	19-24 month	13-18 month	7-12 month	0-6 month
Number of subjects falling ill (N=48)	7	24	3	14
Mean total LCU score (a)	40,82	31,59	31,27	30,28
Mean total LCU score for : preceding six-month period (b)	Not known	40,73	33,56	37,27
subsequent six-month period (c)	30,62	33,28	30,78	Not known
Significance of Difference :				
Between (a) and (b)	not applicable	t=2,930; df=23;**	N.S.	t=3,801; df=13;***
Between (a) and (c)	t=2,688; df=6;*	N.S.	N.S.	not applicable

From Table 6.32 the following is evident :

- (a) the seven subjects whose illnesses began during the 19-24 month period had a mean total LCU score of 40,82 for that period, as compared with 30,62 for the subsequent six-month period. Thus, there was a statistically significant drop ($t = 2,688$; $df = 6$; $p < 0,05$) in the mean LCU points for these seven subjects from the illness period to the six-month period immediately following the illness period;
- (b) the mean LCU total score of the 24 subjects falling ill during the 13-18 month period was 31,59, as compared with 40,73 for the six-month period immediately prior to their illnesses — a statistically significant difference ($t = 2,930$; $df = 23$; $p < 0,01$) in LCU points.

1. Whereas the illnesses of 48 of the 60 subjects in Group A began during the two-year period under study, those of the remaining 12 began prior to the two-year period.

Thus the mean LCU total score of these subjects during the six-month period immediately preceding the illness period was significantly higher than their mean score for the illness period. Their mean LCU scores for the 13-18 month and 7-12 month periods were not significantly different;

- (c) for the three subjects who fell ill during the 7-12 month period, the mean total LCU score for that period was 31,27 whereas those for the six months prior to, and six months subsequent to their illnesses, were 33,56 and 30,78 respectively. These differences failed to reach any statistical significance;
- (d) the mean total LCU score for the 14 subjects who fell ill during the final six-month period was 30,28, as compared with 37,27 for the 7-12 month period. This difference was statistically significant ($t = 3,801$; $df = 13$; $p < 0,001$). Thus, their mean total LCU score for the six-month period immediately preceding the illness period was significantly higher than that for the illness period.

It can be seen from Table 6.33 that when the mean total six-monthly LCU scores for those subjects whose illnesses did not begin in a given period were compared with their mean total LCU scores for the six-month periods immediately preceding and immediately following the illness period, no statistically significant differences emerged. That is, for subjects whose illnesses did not begin in a given six-month period, the mean total LCU score for that period was not significantly different from the mean LCU score for the six-month period preceding or following the illness period.

TABLE 6.33

Number of Subjects in Group A whose Cardiac Problems did not begin in the Different Periods, and their Mean Total Six-Monthly LCU Scores

	19-24 month	13-18 month	7-12 month	0-6 month
Number of subjects not falling ill ¹	41	24	45	34
Mean total LCU score (a)	38,21	31,26	23,39	24,48
Mean total LCU score for :				
preceding 6-month period (b)	Not known	32,47	25,56	27,11
subsequent 6-month period(c)	35,15	30,29	27,18	Not known
Significance of Difference :				
Between (a) and (b)	not applicable	N.S.	N.S.	N.S.
Between (a) and (c)	N.S.	N.S.	N.S.	not applicable

The general findings above confirm the hypothesis that for the cardiac group the mean total LCU score for the six-month period immediately preceding their illness period is significantly higher than that recorded for the six-month period in which their illnesses began.

In the following analysis, a systematic attempt was made to establish a "healthy" baseline against which subjects' mean total six-monthly LCU scores could be compared. In order to establish such a cut-off point, the first step was to determine the number of subjects in Groups B and C who had been healthy for at least 23 months of the two-year period under study.

1. To permit a more accurate comparison, the 12 subjects whose illnesses began prior to the two-year period were not considered.

It is reasonable to assume that an approximately 95 per cent (or 23 months) of the 24 month period would provide a substantially high differentiation between the mean six-monthly LCU scores of persons who are ill and those who are relatively healthy. This yielded a total of 108 subjects — 48 from Group B and 60 from Group C. The twelve subjects from Group A whose illnesses began prior to the two-year period under study were not included in the count, just in case their mean LCU values might affect the reliability of the "healthy" baseline.

The next step was to determine the overall mean total six-month LCU score and the standard deviation for the 108 subjects, based on the two-year period. This resulted in a fairly normal distribution of scores with an overall mean total six-month LCU score of 18,62 and a standard deviation of 8,92. This value of 18,62 is only slightly higher than the overall mean total six-month LCU score of 17,89 and a standard deviation of 8,61 for Group C, based on the two-year period. One standard deviation taken above this derived value of 18,62 resulted in a value of 27,54.

In a normal distribution curve approximately 16 per cent of all scores will be above +1,0 standard deviation, and approximately 84 per cent below +1,0 standard deviation. Consequently, approximately 84 per cent of all mean six-monthly LCU scores will be below and 16 per cent above a mean six-monthly LCU score of 27,54.

A rounded mean total six-monthly LCU score of 28, which is only fractionally higher than the derived value of 27,54 was fixed as the cut-off point which served as the "healthy" baseline. It is reasonable to state that such a "healthy" baseline value would serve to differentiate those subjects with severe stress from those with

mild to moderate stress.

Although the utility of such a derived value depends upon its reliability, there are certain factors which suggest that this is not a capricious cut-off point. Firstly, Holmes and Masuda (1974, p. 59) defined a "life crisis" as

".... any clustering of life-change events whose individual values summed to 150 LCU or more in 1 year".¹

In the same study, they found that eighty-nine of the 96 (i.e., 93 per cent) major health changes reported by their sample of subjects were associated temporally with a clustering of life changes whose values summed to at least 150 LCU per year.

In another study, Rahe (1969b) defined "mild life crisis" as LCU scores from 150 - 199; "moderate" as 200 - 299; and "major" as 300 and over per year.¹

Secondly, in the present study, the range of the overall mean total six-month LCU scores for Group A was 14,20 - 72,56; for Group B : 11,26 - 62,41; for Group C : 11,60 - 57,14; and for the entire sample (N=180) : 11,26 - 72,56. The range of scores for the 108 subjects mentioned above was 11,26 - 61,04. Thus, any cut-off point could vary greatly within these bounds.

Having established the "healthy" baseline, subjects in each group were further categorized : (1) according to those whose mean total LCU scores for each of the six-month periods were above and below 28 LCU points; and (2) according to those whose overall mean total six-

1. The scaling techniques differed from that of the present study, with the item "marriage" being assigned an arbitrary value of 50 against which other life events were compared.

month LCU scores were above and below 28 LCU points. This is shown in Table 6.34.

TABLE 6.34

Distribution of Subjects According to those whose Mean Total and Overall Mean Total LCU Scores were Above and Below the "Healthy" Baseline

Group	19-24 month		13-18 month		7-12 month		0-6 month		Overall six-month period	
	LCU 28 and over	LCU below 28	LCU 28 and over	LCU below 28	LCU 28 and over	LCU below 28	LCU 28 and over	LCU below 28	LCU 28 and over	LCU below 28
A(N=60)	37	23	24	36	31	29	34	26	32	28
B(N=60)	19	41	12	48	14	46	16	44	19	41
C(N=60)	17	43	6	54	6	54	9	51	10	50
χ^2 (2df)	16,79 ***		15,64 ***		26,76 ***		25,16 ***		18,20 ***	

There was a statistically significant difference ($p < 0,001$ for each six-month period) in the distribution of the subjects in the three groups according to the "healthy" baseline.

Further statistical analyses were required to locate the differences between groups. The results of these are presented in Table 6.35.

During each of the six-month periods, there were significantly more subjects in Group A than in either Groups B or C with a mean total six-monthly LCU score of 28 or higher. No statistically significant differences were noted between Groups B and C.

TABLE 6.35**Results of Further Chi Square Tests (df=1) to Isolate Significant Differences shown in Table 6.34**

Time Period	A > B	B = C	A > C
19 - 24 month	10,84 ***	N.S.	13,46 ***
13 - 18 month	5,70 *	N.S.	14,40 ***
7 - 12 month	10,28 **	N.S.	24,40 ***
0 - 6 month	11,10 ***	N.S.	22,68 ***
Overall six-month	5,76 *	N.S.	17,72 ***

In the next analysis the subjects in Group A were distributed according to the period in which their illnesses began. These subjects were further distributed according to the number of subjects whose mean total six-monthly LCU scores were above and below the "healthy" baseline. This is shown in Table 6.36. Similarly, those subjects whose illnesses did not begin in a given period were also distributed according to these criteria (Table 6.37).

TABLE 6.36**Distribution of Group A Subjects According to the Period in which their Illnesses began and According to those whose Mean Total Six-Monthly LCU Scores were Above and Below the "Healthy" Baseline**

Time Period	Number of subjects falling ill	Number of subjects with mean total LCU 28 and over	Number of subjects with mean total LCU below 28
19 - 24 month	7	6	1
13 - 18 month	24	8	16
7 - 12 month	3	1	2
0 - 6 month	14	4	10
N	48	19	29

$$\chi^2 (3df) = 5,08 \text{ N.S.}$$

Although there was no statistically significant difference in the distribution of the subjects in Group A according to the period in which their illnesses began, and according to those whose mean total six-monthly LCU scores were above and below the "healthy" baseline, there was a tendency for more subjects to have mean total six-monthly LCU scores below, rather than above, the "healthy" baseline during the illness periods.

TABLE 6.37

Distribution of Group A Subjects According to the Period in which their Illnesses did not begin, and According to those whose Mean Total Six-Monthly LCU Scores were Above and Below the "Healthy" Baseline

Time Period	Number of subjects not falling ill	Number of subjects with mean total LCU 28 and over	Number of subjects with mean total LCU below 28	χ^2 (1df)
19 - 24 month	41	25	16	N.S.
13 - 18 month	24	23	1	20,17 ***
7 - 12 month	45	33	12	9,80 *
0 - 6 month	34	22	12	N.S.

When the subjects in Group A were distributed according to the period in which their illnesses did not begin, and according to those whose mean total six-monthly LCU scores were above and below the "healthy" baseline, two statistically significant differences were noted :

- (a) of the 24 subjects whose illnesses did not begin during the 13-18 month period, 23 subjects had mean six-monthly LCU totals above the "healthy" baseline as compared with only one subject with a mean total below the "healthy" baseline. This finding was highly significant ($\chi^2 = 20,17; df = 1; p < 0,001$); and

(b) of the 45 subjects whose illnesses did not begin during the 7-12 month period, 33 subjects had mean six-monthly LCU totals above the "healthy" baseline, as compared with only 12 subjects with a mean total below the "healthy" baseline. This represented a significant difference ($\chi^2 = 9,80$; $df = 1$; $p < 0,05$).

In the next two tables, subjects in Group A were distributed in the same way as for Tables 6.36 and 6.37, except that they were distributed according to the number of subjects whose mean total six-monthly LCU scores were above and below the "healthy" baseline during the six-month period (a) immediately preceding the illness period (Tables 6.38 and 6.39); and (b) immediately following the illness period (Tables 6.40 and 6.41).

TABLE 6.38

Distribution of Group A Subjects According to the Time Period in which their Illnesses Began, and According to those whose Mean Total LCU Scores were Above and Below the "Healthy" Baseline during the Six-Month Period Immediately Preceding their Illness Period

Time Period	Number of subjects falling ill (N=48)	Number of subjects with mean total LCU 28 and over in preceding 6-month period	Number of subjects with mean total LCU below 28 in preceding 6-month period	χ^2 (1df)
19 - 24 month	7	Not known	Not known	Not applicable
13 - 18 month	24	19	5	8,17 **
7 - 12 month	3	3	0	— 1
0 - 6 month	14	10	4	N.S.

1. The number of observations in each cell were too small to permit a chi square test of significance.

TABLE 6.39

Distribution of Group A Subjects According to the Time Period in which their Illnesses did not Begin, and According to those whose Mean Total LCU Scores were Above and Below the "Healthy" Baseline during the Six-Month Period Immediately Preceding the Non-Illness Period

Time Period	Number of subjects not falling ill	Number of subjects with mean total LCU 28 and over in preceding 6-month period	Number of subjects with mean total LCU below 28 in preceding 6-month period	χ^2 (1df)
19 - 24 month	41	Not known	Not known	Not applicable
13 - 18 month	24	12	12	N.S.
7 - 12 month	45	17	28	N.S.
0 - 6 month	34	11	23	4,24 *

When the subjects in Group A were distributed according to the time periods in which their illnesses began, and according to those whose mean total LCU scores for the six-month period immediately preceding their illness periods were above and below the "healthy" baseline (Table 6.38), there was a tendency for more subjects to have mean total LCU scores above, rather than below, the "healthy" baseline. In this regard, the observed frequencies for the 13-18 month period were significantly different ($\chi^2 = 8,17$; $df = 1$; $p < 0,01$) from the expected frequencies.

The distribution of subjects in Group A according to the periods in which their illnesses did not begin, and according to those whose mean total LCU scores for the six-month period immediately preceding the non-illness period were above and below the "healthy" baseline, shows a tendency towards more subjects with means below, rather than above, the "healthy" baseline (Table 6.39).

In this respect, there were significantly more subjects ($\chi^2 = 4,24$; $df = 1$; $p < 0,05$) whose mean LCU totals were below the "healthy" baseline in the six-month period preceding the 7-12 month period.

TABLE 6.40

Distribution of Group A Subjects According to the Period in which their Illnesses Began, and According to those whose Mean Total LCU Scores were Above and Below the "Healthy" Baseline during the Six-Month Period Immediately Following their Illness Period

Time Period	Number of subjects falling ill (N=48)	Number of subjects with mean total LCU 28 and over in subsequent 6-month period	Number of subjects with mean total LCU below 28 in subsequent 6-month period
19 - 24 month	7	3	4
13 - 18 month	24	14	10
7 - 12 month	3	0	3
0 - 6 month	14	Not known	Not known

$$\chi^2 (2df) = 1,50 \text{ N.S.}$$

There was no statistically significant difference in the distribution of Group A subjects according to the period in which their illnesses began, and according to those with mean total six-monthly LCU scores above and below the "healthy" baseline during the six-month period immediately following the illness period (Table 6.40).

The distribution of subjects in Group A according to the period in which their illnesses did not begin, and according to those whose mean total six-monthly LCU scores were above and below the "healthy" baseline during the six-month period immediately following the non-illness period, showed a tendency towards more subjects with mean six-monthly totals below, rather than above, the "healthy" baseline

TABLE 6.41

Distribution of Group A Subjects According to the Period in which their Illnesses did not Begin, and According to those whose Mean Total LCU Scores were Above and Below the "Healthy" Baseline during the Six-Month Period Immediately Following the Non-Illness Period

Time Period	Number of subjects not falling ill	Number of subjects with mean total LCU 28 and over in subsequent 6-month period	Number of subjects with mean total LCU below 28 in subsequent 6-month period	χ^2 (1df)
19 - 24 month	41	14	27	4,12 *
13 - 18 month	24	11	13	N.S.
7 - 12 month	45	18	27	N.S.
0 - 6 month	34	Not known	Not known	Not applicable

during the six-month period immediately following the non-illness period, with the observations in one period (19-24 month) reaching statistical significance ($\chi^2 = 4,12$; $df = 1$; $p < 0,05$).

6.3.4 Discussion

The finding of the present study that an accumulation of life events preceded the onset of cardiac disease supports those of a large number of earlier studies (e.g., Reiser et al, 1954; Weiss et al, 1957; Pearson and Joseph, 1963 ; Rahe et al, 1964, 1967, 1970; Rahe, 1968, 1969 b; Rahe and Arthur, 1968; Dreyfuss et al, 1959, 1971, 1972; Edwards, 1971).

Two retrospective studies (Rahe and Paasikivi, 1971; Theorell and Rahe, 1971) employing the SRE showed that survivors of myocardial infarction frequently reported a significant life-change buildup during the last half-year before disease onset compared to the

corresponding half-year one or two years before and one year after. The magnitude of this increase measured by life change units (LCU) was about twice baseline levels. In a similar study (Rahe and Lind, 1971) of subjects who had died suddenly of heart attacks outside hospital, the life-change buildup — according to reports of close relatives — had a magnitude of four times baseline levels. These findings were replicated in Finland (Rahe et al, 1973), and more recently, similar findings have been produced by Pesznecker and Mc Nell (1975), Bell (1977), Siltanen (1978), and Sheehan et al (1978/79).

It was shown in Section 6.3.2 of the present study that for the cardiac group the overall mean six-month LCU score in the category "Home and Family" taken over a two-year period was significantly higher than in the "Work" and "Financial" categories. The argument that since the SRE-CA has an uneven distribution of life events in the different areas of stress, with 20 items listed under "Home and Family", as compared with only 7 items under "Work" and 3 under "Financial" (Appendix I), there might be a propensity for subjects to report the experience of more life events under "Home and Family" than under "Work" or "Financial" does not seem to hold ground. The total frequency of life events experienced in the "Financial" category by each group over the two-year period was in fact higher than in the "Work" category, with Group C subjects reporting almost twice the number of life events in the "Financial" as in the "Work" category (Table 6.13). This is further supported by the data in Table 6.14, although the differences did not reach statistical significance. An examination of the 20 life events in the "Home and Family" category (Appendix I) reveals that only three items are

of a type that may be regarded as unavoidable by an individual. These are : death of spouse (item 12); death of a close family member (item 13); and death of a close relative (item 16). Another three items may be regarded as a type that may or may not be avoidable. These are : major change in living conditions (item 18); change in residence (item 29); and miscarriage or stillbirth (item 37). The remaining 13 items are clearly avoidable in nature. Brown et al (1973) have shown that life events over which an individual had no control were perceived to be less stressful than those over which he had control. Consequently, it may be explained that the accumulation of life events of an avoidable nature in the category "Home and Family" was responsible for the significantly higher overall mean six-month LCU scores than in the "Work" and "Financial" categories, for the cardiac subjects.

In the present study the general findings relating to life events and social desirability (Section 6.3.1.4) and to life events and exits from and entrances to the social field (Section 6.3.1.5) are consistent with those of Paykel (1974).

The ways in which an accumulation of life events can herald the onset of an illness are many.

A number of researchers (e.g., Hinkle et al, 1958; Thurlow, 1967; Engel and Adler, 1967) have shown that susceptibility to illness or disease is not evenly distributed in a population, but rather falls "disproportionately hard" on people who have undergone psychological stress and who have responded to it in a particular way. This response syndrome, which has been difficult to operationalize for predictive purposes has variously been called the "giving up", "helplessness", or

"hopelessness" complex, when the individual feels unable to cope. Neurally regulated biological emergency patterns become activated by the temporary failure of coping mechanisms, evoking changes in body economy which may then alter the individual's capability of dealing with concurrent pathogenic processes, thus permitting diseases to develop (Kaplan, 1979). According to Schmale and Engel (1967) the experience of "helplessness" or "hopelessness" (the "giving up-given up" complex) may be responded to in a variety of ways. New and effective styles of adaptation may be developed, psychiatric distress may eventuate, or somatic disease may occur. The complex by itself, is neither necessary nor sufficient for a physical illness to develop but is seen as contributing to the emergence of such disease in individuals with vulnerable predispositions.

According to a nonspecificity view of stress, adaptation to stressful conditions may in a long-term perspective accentuate the wear and tear of the organism and may increase illness susceptibility in general. This view has been expressed by Levi (1972) and is based on Selye's General Adaptation Syndrome.

The body of data derived from a variety of psychophysiologic investigations (e.g., Holmes et al, 1950; Grace and Graham, 1952; Graham and Wolf, 1953; Engel et al, 1956; Stern et al, 1961) indicates that naturally occurring and experimentally induced life situations which threaten the security of an individual and evoke attempts at adaptive behaviour, also evoke significant alterations in the function of most bodily tissues, organs and systems. When sustained, these changes, in addition to engendering disturbing symptoms and tissue damage, often enhance the body's vulnerability or susceptibility to the noxious effects of a wide spectrum of

aetiologic agents. Thus, any set of environmental factors which significantly alter the steady state of the individual increases the probability that bodily resistance to disease will be lowered. This view has also been shared by Dorpat and Holmes (1955) and Dudley et al (1969).

Rahe (1974b) has outlined several intervening variables which exist between subjects' recent life events and their subsequent illness reports. First, there is the individual's perception of his recent life events — which may be strongly influenced by his past experience with these life changes. Second, people employ a variety of ego defense mechanisms in dealing with recent life changes. When an individual is "well defended" against his recent life change, he may not show a physiological "strain" response. If a person does show physiological activation presumably secondary to his recent life events, he is still capable of either augmenting or diminishing this activated physiology. If augmented and/or prolonged, this physiological arousal is likely to lead to body dysfunction. Even with signs and symptoms of body dysfunction, it remains for the individual to recognize these as disease and to seek medical attention. For Jacobs et al (1969) acute somatic illness may be seen as a "first line" breakdown, which may prove beneficial in allowing the person time to recoup and plan new and more appropriate forms of adjustment. If his personal life situation remains distressing and unresolved, other symptoms may develop. As Schmale and Engel (1967) have stated, if the sense of failure is conceived of as final and enduring, further decompensation may be expected. This probably explains why the mean total LCU score of the cardiac group began to rise steadily from the 13-18 month period to the 0-6 month period (Table 6.26).

Contrary to most of the findings, those of Wardwell and Bahnson (1973) did not support their hypothesis that stress, conceptualized as situational pressure, maladjustment, or anxiety, played a significant role in the aetiology of cardiac disease among white American males between the ages of 35 and 64.

There can be no doubt that there is some relationship between difficult and demanding life situations and the occurrence of illness. The clue to this relationship lies not so much in the nature of the life situations themselves as in the way that these situations are perceived by those who experience them. For instance it has been shown in a study of the ratings of the seriousness of illness (Wyler et al, 1968), that the male's perception of "painful" menstruation in the female was perceived to be a more serious disorder than it was considered by the females themselves. Thus Hudgens (1974, p. 131) says,

"What is stressful for one person may be of little consequence to another".

According to Wolff (1953), it is likely that those subjects who perceive their life situations as threatening, demanding, and unsatisfactory may become more susceptible to illness because of the physiological changes evoked during attempts to adapt to threats which they perceive.

Hinkle et al (1958) refer to several studies which support the observation that those who have the highest illness episode rates, and who show the highest susceptibility to illness in general, are those who perceive their total environment to be most unsatisfactory, and who experience the greatest difficulty in adapting to it; and

this feature seems to be independent of sex, age, race, and cultural or social background.

Some individuals seem to be better defended and more able to cope with threatening circumstances (e.g., Lazarus et al, 1974) in a way that minimizes the physiological stress reaction (Mason, 1972). One particularly important defense against stress reactions involves the availability of social support systems (Matsumoto, 1970; Cassell, 1976; Harris, 1980). Thus, the fact that certain events may be threatening does not preclude wide - ranging individual differences in response to events. Bowers and Kelly (1979, p. 491) have made the point that

".... stress is not only a psychological phenomenon; it is also a distinctly personal one".

In the present study, there were subjects in both Groups B and C who had high magnitudes of LCU scores within a six-month period, but who did not report any subsequent major change in health. Such subjects might be thought to have greater adaptability or ability to cope with life changes, although the possibility of a major change in their health in the near future still exists. For example, there were 17 subjects in Group C whose mean LCU scores for the 19-24 month period were above the "healthy" baseline (Table 6.34), yet none developed any major illness during the two-year period under study.

It must be mentioned too, that the diagnosis of a cardiac illness in a given six-month period does not necessarily imply its onset in that period. The illness could have begun much earlier with the emergence of definite "pre-cardiac" symptoms which the patient

neglected to report to the physician.

As far as the significant differences in the effects produced by the interactions between (a) groups and areas of stress; (b) groups and time periods; and (c) areas of stress and time periods are concerned (Table 6.27), it can be said that the magnitude of LCU scores was affected by the effects of these interactions. Kerlinger (1965, p. 239) cautions that interactions must be interpreted with care. He makes reference to Lindquist who has pointed out that interaction is not always the result of "true" interaction of experimental treatments. A significant interaction may be the result of extraneous factors. For instance, in the present study there might have been more subjects in one group who had prior experience of a particular life event (e.g., trouble with in-laws) than in another group. Lewis (1967) mentions that an interaction can be either intrinsic or extrinsic, or (most probably), a mixture of both.

The door for the interpretation of the results of the present study is left open on several grounds. One of the criticisms of retrospective studies like the present one, is inherent in the retrospective interview situation. It may be suspected that patients are more aware of events which have a temporal association with the onset of illness than of other events. The bias created by patients' own knowledge about their illness cannot be ruled out without a prospective study. On the one hand, Myers et al (1972) have pointed out that the more impaired an individual, the more likely he is to report events because he feels they are stressful. On the other hand, Theorell and Rahe (1971) showed in their study of myocardial infarction that the severity of the patients' infarcts did not influence their recent LCU reporting.

It must be pointed out that life events listed in the present study are discrete and of a factual nature. Consequently, it is unlikely that such events were over-reported or were unreported. Furthermore, what was recorded was the occurrence of an event, and not the individual's perception of its stressfulness. Also, in view of the anonymity of the questionnaires, it is not likely that subjects could gain anything from malingering or over-reporting — at least in terms of social desirability.

Certain events (e.g., troubles with in-laws) are susceptible to the influence of the propensity to report personal problems. Such influence of bias is less likely where the required information is obtained from other sources such as spouses and doctors. However, even these "objective" sources are open to the potential biasing influences of the subject. For example, a wife depends on her husband for information about his relationships with his boss, as does the doctor. Moreover, it is well known that subjects reporting their own experiences respond more fully than those by proxy; and there are suggestions that respondents reporting only for themselves respond more completely than those who must report for others (Feldman, 1960).

Another important factor in the reporting of life events is memory. Recall of recent events is usually more accurate than that of events which had occurred earlier, say two years ago (biased recall). It is not likely that in the present study the life events which occurred in the 19-24 month period were under-reported due to poor memory. In fact, all three groups reported the highest number of life events in the 19-24 month period; and the subjects in Groups A and C reported their second highest number of life events in the final six-month

period (Table 6.19). This is in contrast to several studies (e.g., Rahe et al, 1964; de Faire and Theorell, 1977) which have shown a greater number of life events to be reported for the period immediately preceding the onset of an illness. In these studies the subjects were interviewed about the time of onset of their illnesses.

Another important issue dealing with the life events questionnaire is the amount of information that should be collected. For Brown (1974) this is best settled by experience. He says :

"In one sense we can never be said to have enough. It is a matter of establishing how much must be collected to make our analysis reasonably convincing. There is here another practical issue. It is unreasonable to expect to cram into the event rating all the contextual material". (Brown, 1974 p. 239).

Considering that in the present study the subjects in Group A were cardiac patients, it was felt that they should not be disturbed from their rest by the administration of lengthy questionnaires. Besides, provision had been made on both the SRRQ-CA and the SRE-CA for subjects to add any event that did not appear in these instruments.

It is common knowledge that different individuals react differently to any given stimulus or group of stimuli. Moreover, an individual reacts differently on different occasions, even if the stimulus conditions were kept reasonably constant (Levi, 1974). The reasons for such inter - and intra - individual variability are manifold — processes like habituation, adaptation, learning and coping,

constitutional factors, genetic as well as acquired group interaction, interaction effects with other stimuli — just to mention a few. As Linford Rees (1979, p. 16), for example, has stated,

"Multifactorial causation is the rule in psychosomatic disorders with interaction and interplay between many forces rather than the operation of a single specific cause".

The many important intervening variables such as diet, lack of exercise, smoking, and the prevalence of hypertension further complicate the picture.

Since the bias inherent in retrospective studies may contribute in part to the results, it may be said that the findings in the present study are only suggestive of the precipitating role of life event stress in cardiac disease. This is supported primarily by the findings of the present study, that

- (a) for the cardiac group the mean total LCU score for the six months immediately preceding the illness period was significantly higher than their mean score for the illness period;
- (b) for each of the six-month periods there were significantly more subjects in Group A than in either Groups B or C with a mean total LCU score of 28 or higher. No statistically significant differences were noted between Groups B and C; and
- (c) there was a tendency for the cardiac subjects to have mean LCU totals above the "healthy" baseline for the six-month period immediately preceding the illness periods, and below

the "healthy" baseline for the six-month period immediately following the illness periods.

6.4 The Sixteen Personality Factor (16 PF) Questionnaire (Form E)

The primary aim of the analysis of data of the 16 PF was to see whether or not there were any differences in personality characteristics among the three groups of subjects.

6.4.1 Mean Sten Scores on the 16 PF

The 16 PF profiles as well as the means and standard deviations in sten units for the three groups are presented in Figure 6.4.

In order to examine the significance of the differences in the mean sten scores of the three groups, a one-way analysis of variance (Table 6.42) was carried out. The results of the analysis of variance showed statistically significant differences on nine factors. These are listed in Table 6.43.

Scheffé tests were next applied to locate the differences between groups. The results of these tests are presented at the bottom of Table 6.42, and are described as follows :

Factor A. Subjects in Group A were significantly more reserved, detached, critical, and aloof than subjects in Group B ($F = 33,33$; $p < 0,01$) and Group C ($F = 48,00$; $p < 0,01$). No significant differences were noted between the mean sten scores of Groups B and C. However, the mean sten scores of all three groups were

TABLE 6.42

One-Way Analysis of Variance Computational Table Based on the 16 PF Mean Sten Scores of the Three Groups

Source Trait	A	B	C	E	F	G	H	I	L	M	N	O	Q ₁	Q ₂	Q ₃	Q ₄
Total Sum of Squares(179df)	225,8	245,2	297	224,2	504,2	482,8	285,8	261,2	282,0	247,2	427,2	206,2	324,2	217,2	366,8	289,0
Between Sum of Squares (2 df)	49,6	4,8	1,2	7,6	0,4	25,2	17,2	0,4	36,4	31,6	25,2	64,7	1,2	2,8	1,6	36,4
Within Sum of Squares(177df)	176,2	240,4	295,8	216,6	503,8	457,6	268,6	260,8	245,6	215,6	402,0	141,5	323,0	214,4	365,2	252,6
Mean Square of Between Sum of Squares.	24,8	2,4	0,6	3,8	0,2	12,6	8,6	0,2	18,2	15,8	12,6	32,35	0,6	1,4	0,8	18,2
Mean Square of Within Sum of Squares.	1,00	1,36	1,67	1,22	2,85	2,58	1,52	1,47	1,37	1,22	2,27	0,80	1,82	1,21	2,06	1,43
F Ratio.	24,80	1,76	0,36	3,11	0,07	4,88	5,66	0,14	13,28	12,95	5,55	40,44	0,33	1,16	0,39	12,73
Level of significance	**	N.S.	N.S.	*	N.S.	**	**	N.S.	**	**	**	**	N.S.	N.S.	N.S.	**
Scheffé F Ratio:Groups																
A - B	33,33**			6,25*		4,00	7,20*		20,25**	12,25**	5,14	56,33**				16,20**
B > A				A > B		N.S.	B > A		B > A	A > B	N.S.	A > B				B > A
Groups		Not applicable	Not applicable		Not applicable			Not applicable					Not applicable	Not applicable	Not applicable	
B - C	1,33			1,00		1,00	0,20		0,25	2,25	1,28	0,33				0,20
	N.S.			N.S.		N.S.	N.S.		N.S.	N.S.	N.S.	N.S.				N.S.
Groups		Not applicable	Not applicable		Not applicable			Not applicable					Not applicable	Not applicable	Not applicable	
A - C	48,00**			2,25		9,00*	9,80**		25,00**	25,00**	11,57**	48,00**				20,00**
C > A				N.S.		A > C	C > A		C > A	A > C	C > A	A > C				C > A

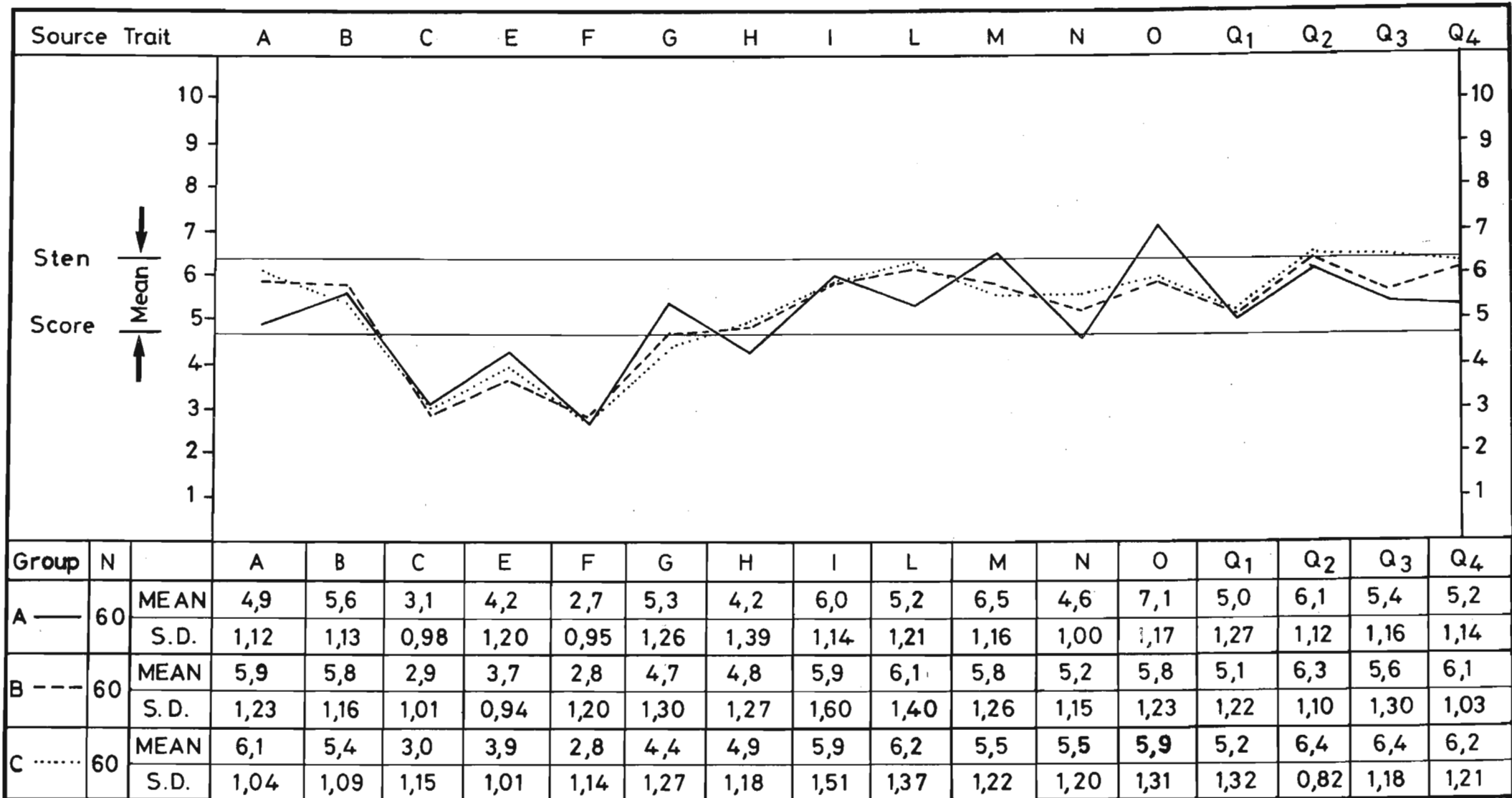


Figure 6.4: 16 PF MEANS AND STANDARD DEVIATIONS IN STEN UNITS FOR THE THREE GROUPS

TABLE 6.43

Factors Reaching Statistically Significant Differences in the Mean Sten Scores of the Three Groups on the 16 PF

Factor	Bipolar description			F Ratio
A	Reserved	vs.	Outgoing	24,80 **
E	Humble	vs.	Assertive	3,11 *
G	Expedient	vs.	Conscientious	4,88 **
H	Shy	vs.	Venturesome	5,66 **
L	Trusting	vs.	Suspicious	13,28 **
M	Practical	vs.	Imaginative	12,95 **
N	Forthright	vs.	Astute	5,55 **
O	Self-assured	vs.	Apprehensive	40,44 **
Q ₄	Relaxed	vs.	Tense	12,73 **

within the mean values when compared with the published norms based on more than 3 000 White Americans (Eber and Cattell, 1976).

Factor E. Subjects in Group A were significantly less humble or submissive and more assertive, aggressive, stubborn, and competitive than those in Group B ($F = 6,25; p < 0,05$). No significant differences were noted between Groups A and C or between Groups B and C on this factor. The mean sten scores of all three groups were clearly below the range of the mean.

Factor G. Subjects in Group A were significantly more conscientious, persevering, responsible, emotionally disciplined, and concerned about moral standards and rules than subjects in Group C ($F = 9,00; p < 0,05$). No significant differences were noted between Groups A and B or between Groups B and C. The mean sten scores of Groups A and B were within the mean range, whereas that of Group C was only slightly below the mean range.

Factor H. Subjects in Group A were significantly more shy, withdrawn, and threat-sensitive than those in Groups B ($F = 7,20; p < 0,05$) and C ($F = 9,80; p < 0,01$). No significant difference was noted between Groups B and C. The mean sten scores of Groups B and C were within the range of the mean, whereas the mean score of Group A was below the mean.

Factor L. Subjects in Group A were significantly more trusting and tolerant than those in Groups B ($F = 20,25; p < 0,01$) or C ($F = 25,00; p < 0,01$). No significant difference was noted between Groups B and C. The mean scores of all three groups were within the mean range.

Factor M. Subjects in Group A were significantly more imaginative and careless of practical matters than those in Groups B ($F = 12,25; p < 0,01$) or C ($F = 25,00; p < 0,01$). No significant differences were noted between Groups B and C. The mean scores of Groups B and C were within the mean range, whereas that of Group A was only slightly above the mean.

Factor N. Subjects in Group A were significantly more forthright, unpretentious, and genuine but socially clumsy than those in Group C ($F = 11,57; p < 0,01$). The mean sten scores of Groups B and C, and Groups A and B were not significantly different.

Factor O. Subjects in Group A were significantly more apprehensive, self-reproaching, insecure, worrying, and troubled than subjects in Groups B ($F = 56,33; p < 0,01$) or C ($F = 48,00; p < 0,01$). No significant differences were noted between the mean sten scores of Groups B and C, whose mean scores were within the mean range, whereas that of Group A

was well above the mean range.

Factor Q₄. Subjects in Group A were significantly less tense and frustrated than those in Groups B ($F = 16,20$; $p < 0,01$) or C ($F = 20,00$; $p < 0,01$). The mean scores of Groups B and C were not significantly different. The mean scores of all three groups were within the mean range.

The remaining seven factors revealed no statistically significant differences in the mean sten scores between any two groups. These were factors B, C, F, I, Q₁, Q₂, and Q₃. Of these, the mean sten scores on factors B, I, Q₁, Q₂ and Q₃ were within the range of the mean for each of the three groups, whereas the scores on factors C and F were clearly below the range of the mean for each of the three groups.

The findings based on the 16 PF confirm the hypothesis that there are significant differences in personality between hospitalized cardiac patients and the presumably normal, healthy subjects.

6.4.2 Discussion

When compared with the non-cardiac subjects (Group B and/or C) the cardiac subjects (Group A) were described in the present study as being more reserved, detached, critical and aloof (Factor A); more assertive, aggressive, competitive and stubborn (dominance) (Factor E); more conscientious, persevering, responsible, emotionally disciplined, and concerned about moral standards and rules (Factor G); more shy, timid and threat-sensitive (Factor H); more trusting and tolerant (Factor L); more imaginative and careless of practical

matters (Factor M); more forthright, unpretentious, genuine, but socially clumsy (Factor N); more apprehensive, self-reproaching, insecure, worrying, and troubled (guilt-proneness) (Factor O); and less tense and frustrated (low ergic tension) (Factor Q₄). There are some investigators who have found the prevalence of some of these personality characteristics among cardiac subjects, whereas others have not. For example, administering the 16 PF to a group of 36 coronary patients and 42 control subjects, Miles et al (1954) found the patient group to be significantly higher than the control group on Factors A, F, O, and Q₄, and significantly lower than the control group on Factors B, C, and M. Also using the 16 PF, Ostfeld et al (1964) found significantly higher scores on Factors L and Q₂ among a group of coronary subjects than among a group of controls. Ibrahim et al (1966) found that coronary patients suppressed hostility, displayed manifest anxiety and utilized repression to a greater degree than controls. Bruhn et al (1968) found coronary subjects to be shy, sensitive, socially withdrawn and introverted, and lacking in self-confidence and self-esteem. Wolf (1969) found young coronary patients to be aggressive, showing great ambition and a lack of satisfaction with their own progress. These traits among coronary patients were also shown by Rosenman (1971). Adler et al (1971) described coronary persons by extremes of aggressiveness, ambition and driving for achievement. Such behaviour was often associated with perfectionistic striving and competitive activity, usually accompanied by vocational deadlines. In addition these persons had a strong sense of responsibility and time urgency, and they viewed themselves as active, hard-working, determined, and strong-willed. These findings were replicated by Gianturco et al (1974).

Finn et al (1974) administered the 16 PF to three groups : 40 patients with coronary disease, 40 cancer patients, and 40 controls. They found the coronary group to be higher on Factors L, O, and Q₄, and lower on Factors C, H, and Q₃, than the other two groups. Haynes et al (1978) also found higher anxiety in coronary than in control subjects, this being confirmed by the findings of the present study.

Friedman (1969) has referred to the coronary-prone behaviour pattern or Type A behaviour. A person with such a pattern is described as being aggressive, competitive, and in a hurry, all of which are acted out as a struggle to overcome barriers in the environment. This behaviour pattern has been shown in coronary subjects by various investigators (e.g., Zyzanski and Jenkins, 1970; Wardwell and Bahnson, 1973; Jenkins et al, 1974), whereas others (e.g., Cooper and Crump, 1978) failed to show this association.

In a study by Matthews et al (1977) two factors proved to predict actual heart disease : competitive drive and impatience., and suggested that the aggressiveness component of Type A behaviour may be critical in the eventual development of coronary disease.

In explaining how certain personality characteristics are related to certain psychosomatic illnesses, the point made by Gibson (1971, p. 174) is pertinent here. He mentions that such an association is not difficult to appreciate, as the aggressive, over-anxious individual makes more demands on his autonomic nervous system than do others, "*.... and that his arteries are bound to suffer*".

Wardwell (1973) adds that although the cardiovascular system is exceedingly responsive to emotions through well-known hormonal pathways; the specific relation between psychological factors and

the pathological mechanisms of atherosclerosis and thrombosis are not clearly understood. Miles et al (1954) have made the point that although it is difficult to see how personality is related to illness, certain personality characteristics undoubtedly lead to compulsive striving and hard work, which in turn bring about physiological wear and tear on the individual. Stevenson and Duncan (1950) had shown that anxiety (or other strong emotion) can produce an increase in heart rate, cardiac output, and an elevation of blood pressure. Schneider (1950) showed that in some subjects emotional stress resulted in a shortened clotting time and increased viscosity of the blood.

"Thus in a person whose coronary circulation is already impaired, one can trace the sequence from emotional upset to acute coronary occlusion". (Miles et al, 1954 p. 467).

In the present study, the one single factor which showed the greatest difference between the coronary and non-coronary groups was Factor 0. The coronary subjects (Group A) were clearly differentiated from the non-coronary subjects (Groups B and C) by being significantly more insecure, worrying and troubled (guilt proneness). Such characteristics may be found in persons afflicted by any life-threatening illness such as cardiac disease; thus these characteristics may be the result of the cardiac disease. This view is supported by Miles et al (1954), Lebovits et al (1967), and Bruhn et al (1969) who say that patients with cardiac disease usually respond with an intensification of anxiety-related symptomatology after the disease has been clinically manifest. The view that certain personality characteristics such as anxiety, ambitiousness and aggression precede the onset of certain cardiac disorders has been held by various researchers (e.g., Dunbar, 1943;

Brozek et al, 1966; Wolf, 1969; Rosenman, 1971; Medalie, 1972). Theorell (1974) is of the opinion that such personality characteristics may make individuals more vulnerable to cardiac disorders following stressful life events. Cleveland and Johnson (1962), Ibrahim et al (1966), Mordkoff and Parsons (1967), and Finn et al (1974) on the other hand feel that these personality characteristics are the result of the illness.

Theorell (1974) has reviewed a number of studies that indicated an association between various personality characteristics and heart disease, with the implication that these characteristics may make individuals more vulnerable to heart disease.

In using the 16 PF, it must be mentioned that test scores or norms for a comparable group of Indian adults do not appear to be available. Moreover, comparison of the present findings with those of other investigators was somewhat difficult because authors seldom cite clearly, in relation to the 16 PF, the form and edition of the test, or the nature of the norms used.

There is also the problem of overlap of personality characteristics, so that some of the same personality characteristics observed in coronary subjects have been observed in patients with hypertension as well (e.g., Rudolf, 1955; Gampel et al, 1962; Davies, 1970; Ishikawa et al, 1971; Chohan, 1978). Furthermore, cardiac disease is frequently associated with hypertension in the same individual (e.g., Cady et al, 1961).

6.5 Summary and Conclusion

An analysis of the data indicated a statistically significant overall concordance in the relative rank orderings of the 49 life events of the SRRQ-CA by subjects in the various sub-groups based on such variables as sex, marital status, occupational status, age, religion, educational level and income.

Those life events which were considered to be undesirable and exit-related tended to be scaled higher than the desirable and entrance-related life events by cardiac as well as non-cardiac subjects.

Since there were several differences in the rank ordering of life events among the cross-cultural samples and the sample of the present study, the derivation of norms for the South African Indian adults was justified.

Applying the life change unit (LCU) scores derived in Part I of the investigation, it was shown in Part II that over the two-year period under study both cardiac and non-cardiac subjects experienced more socially undesirable life events than either socially desirable or ambiguous life events. Further, there was a clustering of life events in the category "Home and Family" for each of the three groups.

For the cardiac subjects the overall mean total six-month LCU score taken over the two-year period immediately preceding the investigation was significantly higher than that of presumably normal, healthy subjects. Moreover, for the cardiac group the mean total LCU score for the six-month period immediately preceding their illness period was significantly higher than that observed for the six-month period in which their illnesses began.

Significant differences were also observed in the personality characteristics of cardiac patients and the presumably normal, healthy subjects. However, it must be emphasized that the data relating to personality do not by themselves demonstrate the existence of an aetiological relationship between personality and cardiac illness. The fact that the administration of the 16 PF — as well as the SRE-CA — followed the clinical manifestation of cardiac illness does not eliminate the possibility that responses to the questionnaire were influenced by the subjects' experiences of their illnesses. For this reason, the findings should not be taken as descriptions of coronary-prone personality. Rather, the results showed that groups characterized by the presence of cardiac problems in this study were also characterized by certain attributes of personality. Further research is necessary to determine whether mechanisms exist which relate personality in an aetiological way to the development of cardiac problems.

Insofar as evaluation of the analysis of variance and the *t* test employed in the present study is concerned, it has been said that these statistical techniques are robust in their application (Pagano, 1981), and the assumptions of normality of the population distribution, as well as the homogeneity of variance

*"have both been examined rather thoroughly by empirical methods. Artificial populations have been set up, samples drawn from them, and *t* and *F* tests performed. The evidence to date is that the importance of normality and homogeneity is overrated, a view that is shared by the author".*
(Kerlinger, 1965, p. 258).

This view is shared by Mc Nemar (1959), Hays (1963), and Downie and Heath (1974). Hays (1963) adds that the assumption of homogeneous variances can be violated without serious risk, provided that the number of cases in each sample is the same.

Mc Nemar (1959) has mentioned that one can guard against erroneously rejecting the null hypothesis by choosing a more stringent level for judging the significance of differences. Although the alpha level in the present study was set at the five per cent level of confidence, it must be mentioned that several findings reached the 0,01 and 0,001 levels of confidence.

CHAPTER SEVEN

7. GENERAL CONCLUSIONS AND RECOMMENDATIONS

7.1 General Conclusions

The main conclusions from the survey of the relevant literature revealed, inter alia, the following :

- (1) the human organism is subjected to stress from three systems — the physical environment, the social environment, and the "person system". Humans, as well as animals, react to stressful events or situations with behavioural and/or physiological changes;
- (2) risk factors (e.g., cigarette smoking and hypertension) account for only about one-half of all cardiac diseases in the population. Life events stress is being increasingly recognized as an important risk factor in cardiac disease. Regardless of whether such stress is pleasant or unpleasant, it requires adjustment on the part of the individual experiencing the stress. Hence, in conceptualizations of life events, the emphasis is on change in the usual activities of individuals experiencing such life events;
- (3) the method of quantifying life event stress was due largely to the pioneering work of Holmes and Rahe (1967). Their technique

is aimed at deriving a "life change unit" (LCU) score for a life event. Such a score, based on the average perception of a large number of subjects, represents the magnitude of change in adjustment required by a life event. The Social Readjustment Rating Questionnaire (SRRQ) which documents the life events (Holmes and Rahe, 1967) and the Schedule of Recent Experience (SRE) (Rahe et al, 1964) which documents the life events and requires subjects to indicate the temporal occurrence of life events, have been utilized by numerous researchers in various parts of the world, either in a modified or in their original form;

- (4) employing the SRE technique, numerous investigators have shown an association between life events and the onset of illness. Some investigators have shown a clustering of life events just prior to the onset of illness. Three major mechanisms have been linked to explain the procedure which intervenes between stressful life events and illness : neurophysiological, neuroendocrine, and immune mechanisms; and
- (5) a few researchers have identified specific personality characteristics which are associated with cardiac disease.

From the findings of the present investigation the conclusion is inescapable that there is an association between stressful life events, personality characteristics, and cardiac disease. Moreover, this study showed an accumulation of life events during the six-month period prior to the onset of cardiac disease. It was shown too, that cardiac patients differed from non-cardiac subjects on some of the factors assessed by the 16 PF. However, since the study covered only a

particular group of subjects — namely, South African Indian adults — the results cannot be considered as having universal applicability.

Although the present study was not designed to examine the standard risk factors (e.g., hypertension and tobacco consumption), these cannot be overlooked as aetiological factors in cardiac disease. Moreover, while this study is not supportive of a direct aetiological role for stressful life events in cardiac disease, the possibility of an indirect role remains an open question. Such an indirect role could take the form of either an interactive or a moderator relationship with stressful life events. Hence it must be acknowledged that stressful life events may be necessary to initiate a condition such as cardiac disease, but may not necessarily be sufficient in themselves to cause their expression in illness.

A strength of the findings of the study lies in the real-life setting in which data were obtained. This is tempered, however, by the fact that data for the study were obtained retrospectively. Although it was pointed out in Section 6.3.4 that the life events covered in the SRE-CA were of a factual nature so that subjects were not likely to distort information, the bias inherent in the retrospective design may nevertheless have contributed in part to the findings. A prospective research design is not only difficult to implement, but also time-consuming and necessitates high costs for the measurement of relevant variables. As Hopkins (1980, p. 195) has observed :

*"All studies are limited in some way,
since the perfectly reliable and
valid study is yet to be developed".*

It may be concluded, therefore, that the findings of this study are suggestive of the precipitating role of stressful life events in cardiac disorders.

7.2 Contribution and Recommendations

The main contributions of the investigation are as follows :

- (1) the derivation of mean life change unit (LCU) scores for the 49 life events studied, based on South African Indian adult subjects;
- (2) the derivation of norms for these subjects, based on Form E of the Sixteen Personality Factor (16 PF) Questionnaire; and
- (3) the evidence produced, which showed a strong association between stressful life events, certain personality characteristics, and the onset of cardiac disease.

The mean LCU scores derived in the study have applicability in at least three areas :

- (1) in future research dealing particularly with South African Indian adults as subjects;
- (2) in general hospitals as well as in general medical practice, for the purpose of a mass screening of patients to determine their recent LCU scores. Such information provides a method of documenting and measuring the risk of illness. Moreover, patients with LCU scores above the "healthy" baseline (conceptualized in Section 6.3.3) may be referred to an appropriate health professional (e.g., psychiatrist, clinical psychologist) for counselling or psychotherapy. As the SRE-CA would require only an indication by patients whether or not each of the life events had been experienced in the preceding six-month period, it is estimated that the question=

naire could be completed and scored in about 40 minutes. Furthermore, the administration and scoring of the questionnaire could be accomplished with a minimum of training even by non-medical staff; and

- (3) in industry, for the early detection of stress associated with recent experience of stressful life events.

Thus the concept of life change associated with stressful life events appears to have relevance to the areas of disease aetiology and the temporal occurrence of disease.

In addition to its use in research and preventive medicine, the SRE-CA could be implemented as a useful tool in predicting times of illness susceptibility. It is hoped that awareness of the SRE-CA and concepts related to it will prove to be valuable to teachers, practitioners, and researchers in the field of preventive medicine. The results of this study have implications not only for a better understanding of the relationship between stressful life events and illness, but also for understanding the personality characteristics of cardiac patients.

The notion that stress must be met with effective coping strategies is now trite. Contemporary life is inherently and unavoidably stressful. Further, increasing levels of stress tend to coincide with increasing opportunities and potential resources for human needs (e.g., for promotion at work and improvement in living conditions). Thus, instead of merely warning people to avoid stressful lives, social scientists should be able to illuminate ways of leading productive and healthy lives, as well as ways of coping with the complexity of modern living.

In a survey of the literature it was shown that the role of social support is of crucial importance in the occurrence and management of illness. Clearly, social support is a type of preventive condition which can be afforded greater attention. Strengthening the social support and affiliative networks of individuals — particularly those who may be exposed to a greater risk of disease — would appear to be a positive step in preventive medicine.

Keyes et al (1975) have reported on the recommendations made by the Council of Deans representing 115 medical schools in the United States. Among the recommendations for undergraduate study, almost 90 per cent of the deans indicated support for a new emphasis in the curriculum on "... behavioural sciences, social sciences, and the humanities"; and

"There is little likelihood of a return to a more traditional approach to basic science teaching". (Keyes et al, 1975, p. 321).

Further, Kuch et al (1977, pp. 652-3) have said :

".... if we, the physicians, 'organify' the patient's complaints, we reinforce the feeling that his or her body is sick and perpetuate the patient's sick role. In so doing, we may well miss a significant behavioural problem underlying the symptom. We must begin teaching our patients while they are young that behaviour can and does affect health".

From the above discussion it is clear that the prevention and control of psychosomatic illness needs to be attacked "on all fronts".

Arising from the investigation, several recommendations for future studies in the field of life event stress and illness are made :

- (1) in order to improve the discriminating power of life event questionnaires, attention might be given to the following :
the situational context in which life events occur; the extent to which an individual has control over life events, whether anticipated or not; and whether the individual had previous experience of these events;
- (2) since the study showed that not all individuals who had experienced an accumulation of life events had experienced a major change in health, the question which needs investigation is that which examines the assets individuals possess to enable them to withstand high amounts of life changes without the development of subsequent health change;
- (3) even if strong associations exist between stressful life events and illness, they do not necessarily explain the mechanisms and pathways for such associations. Furthermore, in order to reach a clearer understanding of the stress, personality, and health (or illness) connection, one needs to know the physiological mechanisms which underlie stress reaction, and the relationship between these mechanisms and personality;
- (4) the findings of this study should be compared with those of a prospective study of subjects actually experiencing life events. Although many life events (e.g., death of spouse, and loss of job) are infrequent, prospective studies would be time-consuming; and
- (5) studies taking into consideration the effect of moderator variables such as diet, need to be conducted to yield a better

understanding of the relation between life stress and cardiac disease.

CHAPTER EIGHT

8. SUMMARY

The principal aim of the investigation was to examine the relation between life events, personality, and onset of cardiac disease among South African Indian adults.

Life event stress is being increasingly recognized as an important risk factor in cardiac disease. In conceptualizations of life events, the emphasis is on change in the usual activities of individuals experiencing such life events which may be pleasant or unpleasant.

In Part I of the investigation, the SRRQ-CA was administered to a random sample of 317 South African Indian adult subjects. These subjects were required to rate (on a 20-point scale) each of the 49 life events on the SRRQ-CA. The average rating of each life event, based on the 317 subjects, yielded the life change unit (LCU) score. There was a highly significant concordance in the rating of the life events by various sub-groups based on such demographic variables as age, sex, marital status, educational level, occupational status, and income.

In Part II of the investigation the SRE-CA, together with the 16 PF (Form E) was administered to three groups, each comprising 60 South African Indian adult subjects. Group A comprised hospitalized patients with cardiac disease; Group B comprised hospitalized patients with non-cardiovascular problems, and included, in the main, patients hospitalized for minor surgical treatment; and Group C comprised

presumably normal, healthy subjects who were not under any psychiatric or medical treatment at the time of the investigation. Subjects in each group were matched as closely as was practicable, on the demographic variables mentioned above. Life change unit (LCU) scores derived in Part I of the investigation were applied to life events experienced by subjects in the three groups. In this way, a subject's total LCU score (for each of four six-month periods prior to the time of the investigation) was obtained.

Analyses of data revealed, inter alia, the following :

- (1) the overall mean total six-month LCU score taken over the two-year period immediately preceding the investigation was significantly higher for cardiac patients than for the presumably normal, healthy subjects;
- (2) for the cardiac group the mean LCU total score for the six-month period immediately preceding the illness period was significantly higher than that recorded for the six-month period in which their illnesses began; and
- (3) there were significant differences in personality between cardiac patients and the presumably normal, healthy subjects.

On the basis of these findings, all the hypotheses stated in Section 1.3 were accepted.

The principal contributions of the investigation have been listed in Section 7.2. Briefly, these are :

- (1) the derivation of mean life change unit (LCU) scores which may be applied : in future studies of stressful life events;

and in hospitals, general medical practice, and industry, for an early detection of stress; and

- (2) the derivation of norms for South African Indian adults, based on Form E of the 16 Personality Factor (16 PF) Questionnaire.

In the light of the findings, several recommendations were made. These were discussed in Section 7.2.

APPENDIX ABIOGRAPHICAL INVENTORY - IC O N F I D E N T I A LPART A : PERSONAL

Col.	Leave blank			
1-4				1

Please make a cross (X) in the appropriate columns.

1. Age (in years)

Col.	Under 20	20-29	30-39	40-49	50-59	60-69
5						
	1	2	3	4	5	6

2. Sex

Col.	Male	Female
6		
	1	2

3. Marital Status

Col.	Married	Never Married	Divorced	Separated
7				
	1	2	3	4

4. Religion

Col.	Christian	Hindu	Moslem	Other (Specify)
8				

1

2

3

4

5. Highest educational level attained

Col.	Up to Std.1	Std.2-4	Std.5-7	Std.8-10
9				

1

2

3

4

Post-matric degree or diploma	Post-graduate degree or diploma

5

6

6. Occupational status

Col.	Administrative	Clerical	Housewife	Manual Labour	Professional
10-11					

01

02

03

04

05

Retired.	Student (Full-time)	Technical	Unemployed	Other (Specify)

06

07

08

09

10

7. Approximate monthly income (nett)

Col.	Under R200	R200-299	R300-399	R400-499	R500-599
12-13					

01

02

03

04

05

R600-699	R700-799	R800-899	R900-999	R1 000 and over

06

07

08

09

10

APPENDIX BC O N F I D E N T I A LPART BSOCIAL READJUSTMENT RATING QUESTIONNAIRE (SRRQ-CA)

Below is a list of desirable and undesirable life events that require some adjustment on the part of individuals.

In the column marked "Value", please write a number from 0 (least upsetting) to 20 (most upsetting). For instance, if you decide the event to be only a little upsetting and therefore requiring only a little adjustment write a low number; if it is very upsetting, write a high number.

In giving a value (0 to 20) use all of your experience. This means personal experience where it applies, as well as what you have learned to be the case for others. Some people accommodate to change more readily than others. Therefore, try to give your opinion of the average degree of adjustment necessary for each event rather than the extreme.

Please be sure to give an answer for every event.

CONFIDENTIAL

Col. 14-73

SOCIAL READJUSTMENT RATING QUESTIONNAIRE-CA

Item no.	Life event	Value	No.
1.	Marriage		1
2.	Pregnancy		2
<u>3.</u>	Major change in health of family member		<u>3</u>
4.	Marital reconciliation		4
5.	Death of close friend		5
<u>6.</u>	Major change in the number of arguments with spouse		<u>6</u>
7.	Trouble with in-laws		7
8.	Son or daughter leaving home		8
<u>9.</u>	Engaged to be married		<u>9</u>
10.	Addition of new family member		10
11.	Troubles with co-worker/s		11
<u>12.</u>	Death of spouse		<u>12</u>
13.	Death of a close family member		13
14.	Major personal injury or illness		14
<u>15.</u>	Sexual difficulties		<u>15</u>
16.	Death of a close relative		16
17.	Major decisions regarding the future		17
<u>18.</u>	Major change in living conditions		<u>18</u>
19.	Outstanding personal achievement		19
20.	Major change in recreation		20
<u>21.</u>	Major change in sleeping habits		<u>21</u>
22.	Major change in eating habits		22
23.	Vacation		23
<u>24.</u>	Major violations of the law		<u>24</u>
25.	Extramarital affair (spouse)		25
26.	Extramarital affair (self)		26
<u>27.</u>	Building a house		<u>27</u>
28.	Major business readjustment		28
29.	Change in residence		29
<u>30.</u>	Minor violations of the law		<u>30</u>

Col.	Leave blank		
1-4			2

Item no.	Life event	Value	No.
31.	Major revision of personal habits		31
32.	Change in religious convictions		32
33.	Court appearance		33
34.	Unwanted pregnancy		34
35.	Academic/scholastic failure		35
36.	Menopause		36
37.	Miscarriage or stillbirth		37
38.	Major change in the number of family get-togethers		38
39.	Loss of job		39
40.	Retired from work		40
41.	Change of job		41
42.	Major change in work responsibilities		42
43.	Troubles with boss		43
44.	Major change in hours or conditions of work		44
45.	Embarked on studies		45
46.	Divorce or separation		46
47.	Jail sentence		47
48.	Major change in financial state		48
49.	Mortgage or loan over R10 000		49
	<u>OTHER</u> (Please specify)		
50.	_____		50
51.	_____		51
52.	_____		52
53.	_____		53
54.	_____		54
55.	_____		55
56.	_____		56

THANK YOU FOR YOUR PARTICIPATION

APPENDIX C

SOCIAL READJUSTMENT RATING QUESTIONNAIRE¹

Events	Values
1. Marriage	500
2. Troubles with the boss	-
3. Detention in jail or other institution	-
4. Death of spouse	-
5. Major change in sleeping habits (a lot more or a lot less sleep, or change in part of day when asleep)	-
6. Death of a close family member	-
7. Major change in eating habits (a lot more or a lot less food intake, or very different meal hours or surroundings)	-
8. Foreclosure on a mortgage or loan	-
9. Revision of personal habits (dress, manners, associations, etc.)	-
10. Death of a close friend	-
11. Minor violations of the law (e.g., traffic tickets, jay walking, disturbing the peace, etc.)	-
12. Outstanding personal achievement	-
13. Pregnancy	-
14. Major change in the health or behaviour of a family member	-
15. Sexual difficulties	-
16. In-law troubles	-
17. Major change in number of family get-togethers (e.g., a lot more or a lot less than usual)	-
18. Major change in financial state (e.g., a lot worse off or a lot better off than usual)	-
19. Gaining a new family member (e.g., through birth, adoption, oldster moving in etc.)	-
20. Change in residence	-
21. Son or daughter leaving home (e.g., marriage, attending college, etc.)	-
22. Marital separation from mate	-
23. Major change in church activities (e.g., a lot more or a lot less than usual)	-
24. Marital reconciliation with mate	-
25. Being fired from work	-
26. Divorce	-
27. Changing to a different line of work	-
28. Major change in the number of arguments with spouse (e.g., either a lot more or a lot less than usual regarding childrearing, personal habits, etc.)	-
29. Major change in responsibilities at work (e.g., promotion, demotion, lateral transfer)	-
30. Wife beginning or ceasing work outside the home	-
31. Major change in working hours or conditions	-
32. Major change in usual type and/or amount of recreation	-
33. Taking on a mortgage greater than \$10 000 (e.g., purchasing a home, business, etc.)	-
34. Taking on a mortgage or loan less than \$10 000 (e.g., purchasing a car, TV, freezer, etc.)	-
35. Major personal injury or illness	-
36. Major business readjustment (e.g., merger, reorganization, bankruptcy, etc.)	-
37. Major change in social activities (e.g., clubs, dancing, movies, visiting, etc.)	-
38. Major change in living conditions (e.g., building a home, remodelling, deterioration of home or neighbourhood)	-
39. Retirement from work	-
40. Vacation	-
41. Christmas	-
42. Changing to a new school	-
43. Beginning or ceasing formal schooling	-

1. From Holmes and Rahe (1967)

APPENDIX DBIOGRAPHICAL INVENTORY - IIC O N F I D E N T I A LPART A : PERSONAL

Col.	Leave blank			
1-4				1

Please make a cross (X) in the appropriate columns.

1. Age (in years)

Col.	Under 20	20-29	30-39	40-49	50-59	60-69
5						
	1	2	3	4	5	6

2. Sex

Col.	Male	Female
6		
	1	2

3. Marital Status

Col.	Married	Never Married	Divorced	Separated
7				
	1	2	3	4

4. Religion

Col.	Christian	Hindu	Moslem	Other (Specify)
8				
	1	2	3	4

5. Highest educational level attained

Col.	Up to Std.1	Std.2-4	Std.5-7	Std.8-10
9				
	1	2	3	4

Post-matric degree or diploma	Post-graduate degree or diploma
5	6

6. Occupational status

Col.	Administrative	Clerical	Housewife	Manual Labour	Professional
10-11					
	01	02	03	04	05

Retired	Student (Full-time)	Technical	Unemployed	Other (Specify)
06	07	08	09	10

7. Approximate monthly income (nett)

Col.	Under R200	R200-299	R300-399	R400-499	R500-599
12-13					
	01	02	03	04	05

R600-699	R700-799	R800-899	R900-999	R1 000 and over
06	07	08	09	10

8. Diagnostic category

Col.	
14	
	1

9. When did the illness begin?

Col.	19-24 months ago	13-18 months ago	7-12 months ago	6 or less than 6 months ago
15				
	1	2	3	4

APPENDIX EC O N F I D E N T I A LSRE-CAINSTRUCTIONS FOR MARKING YOUR RECENT LIFE CHANGES

To complete the questionnaire, mark an "X" in one or more of the columns to the right of each item. If you have experienced the event in question within the past two years, indicate when it occurred by marking the appropriate column: 0-6 months ago, 7-12 months ago, etc. Sometimes you may have experienced an event over more than one of the time periods listed for the past two years. If so, mark all the appropriate columns. If you did not experience the event during the last two years, leave all the columns blank.

Item no.	Life event	19-24 months ago	13-18 months ago	7-12 months ago	6 or less than 6 months ago
1.	Marriage				
2.	Pregnancy				
3.	Major change in health of family member				
4.	Marital reconciliation				
5.	Death of a close friend				
6.	Major change in the number of arguments with spouse				
7.	Trouble with in-laws				
8.	Son or daughter leaving home				
9.	Engaged to be married				
10.	Addition of new family member				
11.	Troubles with co-worker/s				
12.	Death of spouse				
13.	Death of a close family member				
15.	Sexual difficulties				
16.	Death of a close relative				
17.	Major decisions regarding the future				
18.	Major change in living conditions				
19.	Outstanding personal achievement				
23.	Vacation				
24.	Major violations of the law				
25.	Extramarital affair (spouse)				
26.	Extramarital affair (self)				
27.	Building a house				
28.	Major business readjustment				
29.	Change in residence				
30.	Minor violations of the law				
32.	Change in religious convictions				
33.	Court appearance				
34.	Unwanted pregnancy				
35.	Academic/scholastic failure				

Col.	Leave blank		
1-4			2

Item no.	Life event	19-24 months ago	13-18 months ago	7-12 months ago	6 or less than 6 months ago
36.	Menopause				
37.	Miscarriage or stillbirth				
38.	Major change in the number of family get-togethers				
39.	Loss of job				
40.	Retired from work				
41.	Change of job				
42.	Major change in work responsibilities				
43.	Troubles with boss				
44.	Major change in hours or conditions of work				
45.	Embarked on studies				
46.	Divorce or separation				
47.	Jail sentence				
48.	Major change in financial state				
49.	Mortgage or loan over R10 000				

OTHER (Please specify)

50. _____
 51. _____
 52. _____
 53. _____
 54. _____
 55. _____
 56. _____

THANK YOU FOR YOUR PARTICIPATION

St. Aidan's Indian Mission Hospital.

(REGISTERED UNDER THE WELFARE ORGANISATIONS ACT, 1947)

(W.O. 1100)

TELEPHONES: 67962, 67901, 61729
 P.O. BOX 547
 DURBAN
 4000

IN YOUR REPLY
 PLEASE QUOTE

No.....

33 CENTENARY ROAD
 DURBAN
 4001

7th April 1981

Mr. E.A. Chohan, B.Sc. (Hons); M.Sc; U.E.D,
 Faculty of Education,
 University of Durban-Westville,
 Private Bag X54001,
 Durban
 4000

Dear Mr. Chohan,

I am in receipt of your letter of March 20th, asking for permission to interview a sample of hospital in-patients in your research project towards the D.Sc degree in Psychology.

I am pleased to state that the Board of Management have agreed, subject to the following conditions:-

- (a) in view of the fact that there are very few hospital in-patients, it would mean converging on private doctors' patients; in which case, permission must be obtained from the private doctors concerned.
- (b) permission forms must bear the signature of the respective private doctor granting approval.
- (c) permission forms must be signed by the patient.

Should you agree to abide by the above-mentioned conditions, kindly arrange an appointment with me to discuss this matter further.

Yours sincerely
 St. Aidan's Hospital



E.K. Seedat
 Honorary Medical Superintendent

EKS/HES

APPENDIX G

Dear Mr/Dr

I am in the process of gathering material for a research project which deals with the association between certain life events and personality characteristics on the one hand, and illness on the other. This necessitates interviews with patients for whom questionnaires have to be completed. Hence, I am seeking your kind permission to interview some of your patients. If you are willing to grant me this permission, please complete the declaration form below.

Your permission will be very much appreciated.

Thank you

Yours sincerely

.....

Ebrahim Chohan
University of Durban-Westville

.....

DECLARATION

I, Dr hereby grant permission to Mr E A Chohan or his assistant interviewer to interview my patients at the St Aidan's Indian Mission Hospital and/or R.K. Khan Hospital.

.....

SIGNATURE

.....

DATE

APPENDIX H

D E C L A R A T I O N

I, patient hereby grant permission
to Mr E A Chohan to interview me for the purpose of his research.

.....
SIGNATURE

.....
DATE

.....

APPENDIX I**LIFE EVENT ITEMS ON SRE-CA ACCORDING TO AREA OF STRESS**

Item no.	Life event
	(a) <u>Work</u>
11	Troubles with co-worker/s
39	Loss of job
40	Retired from work
41	Change of job
42	Major change in work responsibilities
43	Troubles with boss
44	Major change in hours or conditions of work
	(b) <u>Home and Family</u>
1	Marriage
2	Pregnancy
3	Major change in health of family member
4	Marital reconciliation
6	Major change in the number of arguments with spouse
7	Troubles with in-laws
8	Son or daughter leaving home
9	Engaged to be married
10	Addition of new family member
12	Death of spouse
13	Death of a close family member
16	Death of a close relative
18	Major change in living conditions
25	Extramarital affair (partner)
26	Extramarital affair (self)
27	Building a house
34	Unwanted pregnancy
36	Menopause
37	Miscarriage or stillbirth
46	Divorce or separation
	(c) <u>Personal and Social</u>
5	Death of close friend
15	Sexual difficulties
17	Major decisions regarding the future
19	Outstanding personal achievement
23	Vacation
24	Major violations of the law
29	Change in residence
30	Minor violations of the law
32	Change in religious convictions
33	Court appearance
35	Academic/scholastic failure
38	Change in number of family get-togethers
45	Embarked on studies
47	Jail sentence
	(d) <u>Financial</u>
28	Major business readjustment
48	Major financial difficulties
49	Mortgage or loan over R10 000

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