INTRODUCTION

The idea that behaviour and mental states especially those of intense or persisting emotions are linked to heart function and dysfunction is as old as medicine. While its distant roots can be found in the Hippocratic tradition, clinical insights of the great physicians of more recent periods of scientific medicine strike a surprisingly familiar note. Thus William Harvey attributed coronary heart disease in a patient to "anger and indignation which he yet communicated to no one," and according to Marmot (1980) Osler was the first to describe the typical coronary prone person as the "keen and ambitious man, the indicator of whose engine is always at full speed ahead." In all languages and cultures, metaphors depict the heart as the somatic locus of emotions ("brokenheart", 'heart sore' or heart rending) an ethnomedical counterpart of the early formulations of psychosomatic medicine postulating an "irreparable mutilation of the self image as part of the causation of Coronary Heart Disease (Jablensky, 1982)."

The link between mental health and cardiovascular morbidity is further reinforced by the extensive evidence that mood regulation disorders such as depression and anxiety affect heart function. Conversely cardiac events and disease almost invariably have mental health sequelae ranging from subtle and transient cognitive or emotional changes to severe and chronic organic brain syndromes. Backed up by experimental evidence, these facts point to the existence of a significant and consistent association
between subjective and objective psychological or behavioural phenomena, on one hand and the cardiovascular system in health or disease on the other hand.

In the past 30 years substantial progress has been made in identifying risk factors for coronary heart disease such as elevated serum cholesterol, hypertension and smoking. Although links between Coronary Heart Disease and these risk factors have been demonstrated the etiology of coronary heart disease has not been fully clarified. Even the best combination of the traditional risk factors may not predict all new cases of Coronary Heart Disease. Epidemiological studies indicate that the association between traditional risk factors and Coronary Heart Disease does not seem to be the same across populations. Residents of Framingham, Massachusetts, for example have about twice the rate of Coronary Heart Disease as Europeans having a similar distribution of traditional risk factors. Thus it is not surprising that some critical reviews of epidemiologic data linking traditional risk factors with Coronary Heart Disease have concluded that much of the variance in Coronary Heart Disease remains unexplained. (Kringlen, 1983)

The failure of risk factors to account completely for Coronary Heart Disease incidence has prompted some investigators to broaden their search to include psycho social factors that might lead to an improved understanding and control of Coronary Heart Disease. What is relatively new is that stress and personality characteristics have become objects of
scientific investigation (Beamish 1984). The concept relating emotional stress to heart disease probably goes much before recorded history. Social and emotional causes were and still are prominently considered by practitioners of tribal medicine. In societies we call primitive, local rules and taboos are enforced by literally death dealing words and gestures, (Dhalla, 1984).

Francis Cambell of Edinburgh in 1768 proposed a psychosomatic explanation and pointed out that "many of the recorded cases of angina proved fatal while the patient was in a violent transport of anger" Huchard in his book "Maladies du Coruret des Vaisseaux published in 1889 attributed angina pectoris to ischaemia of the myocardium from emotionally induced coronary spasm.

The behavioural features associated with susceptibility to myocardial infarction also have a long past history of substantial consensus among observers beginning with Van Dusch in 1868 who identified loud speech and excessive work habits in his coronary patients. It remained for Friedman and Rosenman in the 1950s to document the pathogenic significance of these aggressive personal characteristics in a large and well controlled prospective study. A study much smaller than Friedman and Rosenmen but carried out at about the same time revealed that coronary patients were characterised more by their strong lack of sense of fulfilment and not so much by the characteristics of intensity, drive and impatience. Because of what appeared to be their joyless striving their behaviour
pattern was referred to as the Sysiphus Reaction after the mythical king of Corinth named Sysiphus who, when condemned to Hades was required endlessly to push a rock up the side of a mountain. (Beamish, 1984).

Differences in risk for cardiovascular diseases among populations and individuals are largely social and behavioural. The great rise in incidence of mortality from Coronary Heart Disease and hypertension is not due to genetics but is due to the changes in the ways in which people eat and sleep, work and play, relate to one another and react emotionally as well as to the socio-cultural circumstances under which they live.

There are certain Psychosocial and Behavioural factors whose mechanisms are known. Cigarette smoking is a prime example of a behaviour that has been directly established as a risk factor for Coronary Heart Disease. Dietary patterns have been repeatedly observed to be risk factors for Coronary Heart Disease and hypertension. Cultural and Psychosocial factors influence what is eaten and what is drunk. Patterns of physical activity are also socially and psychologically determined. All of these risk factors are heavily determined by behaviours that follow from cultural and social group norms and form individual's psychological propensities.

Thus the keys to the control of risk factors rest in the ability to successfully change those societal forces (and inertias) that condition both
the behaviour of the public and its health care providers, and, then to effectively induce and reinforce more hygienic individual life styles.

The Psychosocial and Behavioural factors whose mechanisms are unknown are the other class of risk factors. To date it is not clearly established as to how they influence the cardiovascular system. There are extensive research reports identifying the major families of social and behavioural risk factors for Coronary Heart Disease within this other class: chronic troubling emotions and intense behavioural activities as exemplified by the Type A behaviour pattern (TAP).

Within this general category chronic troubling emotions, the following specific variables have repeatedly been found to be associated with the presence of one or more forms of Coronary Heart Disease: anxiety, neuroticism, depression, hypochondriasis or somaticizing (i.e. expressing complaints) emotional drain, interference with sleep, interpersonal discord and life dissatisfaction. The sheer number of such positive findings from many research teams is all the more surprising because a wide variety of psychological measurements and clinical ratings have been used.

The suggested mechanisms by which social environmental factors might elevate blood pressure or exacerbate its end points have not really been proved. It has been shown that the prevalence of obesity and dietary habits differ in the United States by the same social indices. It is also quite
likely that levels of social stress like loss of control, fear and sustained vigilance are associated with these social indicators.

Costa and McCrae (1985) have recently produced some intriguing results, however using neuroticism as a predictor of Coronary Heart Disease. Results show that neuroticism is a very strong predictor of complaints about chest pains (i.e. angina). Neuroticism however does not predict death from Coronary Heart Disease or Myocardial Infarction which obviously involves actual damage to the heart. It seems however that Type A behaviour relates quite strongly to self reports of variables which directly or indirectly measure trait neuroticism. Indeed Costa & McCrae quote several studies showing that Type A relates to measures of neuroticism-anxiety and conclude, "further evidence that Framingham Type A scale is more a measure of neuroticism than coronary prone behaviour is given by Smith's findings that Framingham Type A scales scores correlated 0.50 & 0.41, with Smith Type Anxiety Scale and Eysenck Personality Inventory - neuroticism scores respectively. These are measures of trait anxiety and neuroticism respectively. Any predictions that Type A does relate to poorer mental health, then does need to discount the effects of trait neuroticism which appears to have a common relationship with Type A and negative psychological symptoms (Roy Payne, 1988).

The confounding role of trait neuroticism appears again in the attempts to relate locus of control to symptoms of psychological strain. Spector (1982) review studies using locus of control as a variable in organizational
settings. In discussing the validity of the construct Spector notes that locus of control is negatively related to trait anxiety (Joe 1971, Archer 1979) i.e. externals are more anxious. Gemmill and Heisler (1972) reported a correlation between locus of control and a measure of job tension.

The effect of our emotions on the force and speed of cardiac contractions is common knowledge to all. However the role of psychological factors in the development of chronic heart disease is still a matter of debate. Since traditional risk factors together account for only a proportion of coronary heart disease, there would seem to be room for the influence of other factors. This point was made when a risk equation developed from United States data, based on age, systolic blood pressure, serum cholestrol, smoking habits and body mass index, was applied to a European population (Keys et al 1972). Stress has to do with the environment but it also involves perception. A stressful environment to one person may not be perceived as such by another. Stress measurement may involve a subjective element, asking the individual his or her perception of an environmental stress. Alternatively a questionnaire may try to measure the environment in a more objective fashion as by enumerating deaths or serious illness in the family, changes in marital relationship, changes in employment or salary in the recent past. With personality type the focus shifts from the environment to the individuals' psychological makeup. Their Personality may be measured by behaviour or by the persons feelings about self. Various aspects of neuroticism such
as anxiety, depression and hyperchondriasis have been most commonly used (Fraser 1986).

In this study it is intended to see whether the psychosocial variable cause the disease or the disease produce the value of the psychosocial variable? When a serious disorder such as ischaemic heart disease is diagnosed, it has clearly the potential for changing a person's psychological state. This proposed study plans to measure the psychological state before the cardiac order was manifested and to study the psychological state in ischaemic heart disease patients.

In the field of cardiovascular disorders, the most widely known and studied relationship is between this type of disorder and Type A - Type B behaviour. Dunbar (1959) originally described coronary prone types as straining, ambitious and authority seeking. Friedman and Rosenman (1959) reported in their coronary patients competitive and intense striving for achievement. They also found an over commitment to work corresponding to Dunbar's description of the coronary personality as hard working. Friedman and Rosenman additionally described in such people a sense of time urgency, impatience and hostility. Dunbar's description also refers to these more aggressive social characteristics, but sees them as being suppressed or diverted into a socially acceptable competitiveness.

The concept of the coronary prone type A behaviour which grew from these sources is characterised by aggressiveness, ambition,
competitiveness, time urgency, impatience, behavioural alertness and intense commitment to vocational goals (Roseman & Chesney 1981; Steptoe 1981).

Actually many aspects of type A behaviour seem to be related to major dimensions of personality recognised by psychologists since long, particularly extraversion and neuroticism. Lovallo and Pishkin (1980) and Rim (1981) have shown that Bortner's (1969) rating scale correlates significantly with both extraversion and neuroticism and Kornitzer et al (1975 personal communication) found quite high correlations with neuroticism but not with extraversion.

Eysenck and Fulker (1982) have shown by means of a factor analysis of their own questionnaire of type A, type B behaviour that there are three major factors to be found which they labelled tenseness, ambition and activity. These three factors appeared equally for males and females and extraversion was found to correlate quite highly with both ambition and activity, while neuroticism correlated even more highly with tenseness. Extraversion and neuroticism are of course uncorrelated and so were the type A behaviour patterns correlating with these two major dimensions of personality respectively, as Eysenck and Fulker, (1982) conclude. It is clear that the factors emerging from our study of type A behaviour can be largely accounted for in terms of the major dimensions of personality, neuroticism and extraversion, with total type A score lying in the high neuroticism - high extraversion quadrant (Eysenck, 1982).
In our culture there is a general tendency for people to distort their perceptions of themselves slightly by exaggerating their own socially desirable qualities and minimising their undesirable attributes. (Mc David, 1986). It is rather unusual for a person to regard himself less favourably than his friends associates regarding him. Consequently both unusually low levels of self-esteem as well as over-inflated levels of self esteem, suggest pathological conditions with the personality.

The locus of control as a relatively stable characteristic (Rotter 1966) is identified as an internal moderator of response to stress. The concept is based on a social learning theory, the interactionist view of the person that the individual learns from the environment through modelling and past experience. Reinforcement of certain behaviours affect expectancy, and so eventually expectancy leads to behavioural change. Locus of control refers to the degree of perceived control over a given situation. The internal oriented person believes that personal decisions and actions influence the outcome. The 'control' as a factor in the expectation of coping with a stressful situation; and so less threat is experienced by the internal compared to the external oriented individual who tends to believe, in luck or fate. However internals may display more anxiety in situations perceived to be not within their control (Mark Sherman, 1979).

Style of behaviour in response to a stress also varies, internals tend to seek information and engage the problem whereas externals are more likely to react with helplessness. Lefcourt and Ludwig (1965) and Griffin
(1962) cited in Fisher (1985) report a tendency for association between high externality scores and underprivilege and poverty.

Recent research suggests that locus of control is not a unidimensional scale. There may be different domains of control e.g. personal and social, political control. Also internality and externality distinctions are more readily manifest in situations where the outcome is likely to be negative (Lefcourt 1983).

Data from the United States for the period 1870-1975 show that the general mortality increases in periods of economic growth and declines during periods of economic stagnation, (Eyer 1977). The increasing mortality of coronary heart disease in the 1950s and 60s correlated with this economic development. In the 70s the economic growth in the western world has stagnated and several countries have experienced increasing unemployment. Parallel with this development, one has observed in several countries a decline on coronary heart mortality. The economic boom creates stress by over time work, increasing work pressure and high mobility among the work force. Extreme mobility, overtime work as well as increased income with high consumption of alcohol and tobacco are most likely predisposing to stress and coronary heart disease (Kringlen 1983).

Although the relationships between coronary heart disease and psychosocial functions is a complex one, this disease group is obviously related to man's adaptation to modern life. Coronary Heart Disease occurs
most frequently in the industrialised countries and within groups which have frequently been exposed to the most rapid social change. Thus the incidence of Coronary Heart Disease was highest in the upper social classes in 1940-50s. Gradually these groups have adjusted themselves to the new technological life. In turn the incidence of Ischaemic heart disease has increased in the lower social classes (Kringlen, 1983).

To discuss the psycho-social correlates, one must first understand what is Ischaemic Heart Disease. The most acceptable definition of this disease comes from the WHO study group on Atherosclerosis and Ischaemic Heart Disease (IHD) as the cardiac disability, acute and chronic, arising from the reduction or arrest of blood supply to the myocardium in association with disease process in the coronary arterial system. However, in the year 1979, International society and federation of Cardiology of WHO has redefined the definition, Ischaemic heart disease as "impairment of heart function due to inadequate blood flow to the heart compared to its needs caused by obstructive changes in the coronary circulation to heart." Myocardial Ischaemia has traditionally been defined as an imbalance between oxygen supply and demand. However, Ischaemia is a combination of deprivation of oxygen accumulation of ions and metabolites such as hydrogen potassium, lactate and reduction in substrate which result from inadequate coronary blood flow (Parameshwar, 1988).

Like all other muscle tissue, the myocardium (the muscle that comprises virtually all of the functioning pumping heart) requires oxygen, in amounts
that vary with the effort (rate and contractile force) with which the heart is pumping. The coronary arteries (which take their name from the crown shaped arrangement that they form around the upper portion of the heart) branch out to provide the heart itself with oxygenated blood. When the supply of oxygen is insufficient for the momentary level of demand, ischaemia is said to occur. Often though not always such ischaemia is experienced as chest pain. When the ischaemia is sufficiently prolonged or severe Myocardial tissue dies (infarcts) and the patient is said to have suffered a myocardial infarction or heart attack.

The amount and location of infarcted tissue determine the severity of the Myocardial Infarction. A massive Myocardial Infarction, including large portions of the left ventricle (the primary pumping chamber for the entire body) may kill its victim, while a mild Myocardial Infarction, involving only a small area of (hemodynamically and electrically) less significant tissue might leave its victim able to resume a fully active long life. Because the conductive (electrical) activity of the heart typically changes in characteristic ways during and after Myocardial Infarction, electrocardiogram (ECG) will usually be diagnostic. In addition, with the death of muscle tissue, certain enzymes are liberated from within muscle cells to the blood stream; these cardiac enzymes will therefore appear in increased concentration in the blood and such signs are also diagnostic of Myocardial Infarction.
There are several reasons for which the coronary arteries may not permit sufficient flow of blood. Most commonly, as we age, lipids such as cholesterol deposit themselves as plaques (or atheromata) on the inner walls of these and other arteries, progressively reducing the inner cross-sectional area (lumen) of the artery and thus reducing blood flow. In addition to reducing luminal size, these plaques also eventually "harden" the arteries, that is, they reduce the arteries' elastic ability to distend on demand in order to allow increased blood flow. This hardening process is called arteriosclerosis or atherosclerosis and is accepted as the most common cause of Coronary Artery disease and Myocardial Infarction. Additionally, a blood clot or thrombus may form in, or find its way into, the coronary arteries. Either alone or, more especially in combination with atherosclerosis, such a clot may occlude an artery or its branches, forming a coronary occlusion or thrombosis, which term has often loosely been used synonymously with Myocardial Infarction. Finally, the rings of smooth muscle, which comprise a significant part of the coronary artery walls may spasm, thereby constricting the arteries and reducing blood flow. Thus coronary spasm may alone or in combination with the above mechanisms also cause Ischaemia. If the Ischaemia remits promptly enough no permanent myocardial damage results, although the victim feels transient chest pain. Such transient non-infarcting, ischaemia caused by atherosclerosis is recognised as angina pectoris - a characteristic syndrome of chest pain usually precipitated by physical exertion and/or psychological stress and relieved by rest and/or medication that dilate the coronary arteries (for example nitroglycerin). Angina resulting from arterial
spasm is designated Prinzmetal's or a typical angina. Patients may have angina that remains stable and possibly never worsens to become a frank Myocardial Infarction or they may have progressively worsening crescendo angina or they may suffer Myocardial Infarction without any antecedent angina, or they may suffer a silent asymptomatic Myocardial Infarction that is recognised only subsequently (Razin 1985).

Over the past few decades literally dozens of factors - physiological, anatomical, behavioral, social, metabolic have been proposed as risk factors; of these, a handful have been found by careful research to contribute in some causative way to increased Coronary Artery Disease risk. Hypertension, cigarette smoking and serum cholesterol seem to be the big three; in magnitude of risk increase, sex, age, family history of Coronary Artery Disease, presence of diabetes mellitus, sedentary lifestyle and obesity pose additional risk.

For many centuries both practising physicians and lay person have believed that in addition to the 'biologic risk factors' a variety of psychological factors such as stress, anxiety and depression could also predispose to or precipitate Coronary Artery Disease events. But until the 1960s there was very little rigorously derived empirical evidence to support this widespread belief. Since that time research evidence of acceptable quality has clearly indicated associations, some of which appear to be causal between several psychosocial factors and coronary artery disease. An examination of the excellent review by Jenkins (1971, 1976) and others
(Blackburn, 1974, Russek and Russek, 1976; Roskies, 1980) yields the following conclusions. There are definitive positive associations of some kind between several psychosocial factors and Coronary Artery Disease development. The strength of these associations however varies across different psychosocial factors. Thus life-stress events, anxiety, depression and type A behaviour show relatively consistent associations, while demographic indicators, socio-economic status, socio-economic mobility and socio-economic incongruity show weak or inconsistent associations. The Type A Behaviour pattern (TABP) has clearly been the single most extensively studied psychosocial and probably the one most strongly associated with Coronary Artery Disease. In our view, research on the Type A Behaviour Pattern over the past two decades has been largely responsible for the increased interest in and acceptance of psychosocial Coronary Artery Disease risk factors. The specificity of the above association varies; life-stress events and neuroticism, for example, seem linked to general morbidity, while anxiety, depression and life dissatisfaction may be more specifically linked to angina. The precise causal nature or mechanisms of these associations have not been clearly demonstrated, even among the strongest of these associations. The highly complex interplay of social, economic, cultural, psychosocial, psychobiological, genetic, physiological, endocrinological and other factors will undoubtedly continue to make research in this area extraordinarily difficult. A definitive understanding of the relationships between psychosocial factors and Coronary Artery Disease development although brought closer by recent research still eludes us.
Several psychosocial factors have gained credibility as "risk factors" over the past two decades. Some of these risk factors such as neuroticism or delay in seeking medical help could in our current state of knowledge and methodological sophistication, be assessed for Coronary Artery Disease - preventive effects. To date however only one has been the focus of prevention research the Type A behaviour pattern.

Much remains problematic about the Type A pattern. We still do not know, for example, whether Type A behaviour is identical with "true" coronary prone behaviour or how it is related to stress. There are also problems with measurements, meaning and specificity. Nonetheless, the basic conclusion seem relatively sound and incontrovertible. Whatever the association with other risk factors (such as serum cholesterol levels, smoking and hypertension) the Type A pattern does seem to be clearly and independently associated with increased Coronary Artery Disease risk. This has been shown prospectively in the eight and a half year Western Collaborative group study of multiple risk factors (Rosenman and others 1975, the Framingham study, Haynes and others 1978) and at least seven smaller prospective studies, as well as 12 retrospective studies in the past decade alone (Jenkin 1976). The relationship has not been proven to be causal, though, and it does not account for a major proportion of the variance in producing new Coronary Artery Disease. But the relationship does clearly seem to exist. Type A men under 50 (and perhaps under 60) have about twice the Coronary Artery Disease risk of Type Bs; their risk of recurrent myocardial infarction or fatal myocardial
infarction is at least as elevated. Furthermore arteriography and autopsy studies tend to confirm correlations between degree of atherosclerosis and the presence of Type A Behaviour Personality (Jenkins 1975).

In this type of research one should also be open to the possibility that different types of cardiovascular diseases may be related to different types of personality. Thus Floderus (1974) suggests, and provides some evidence for the suggestion, that angina pectoris, hypertension, and tachycardia may be related to high neuroticism and introversion, while myocardial infarction and hyperlipidemia may be related to high neuroticism and extraversion. The relationship, between extraversion and myocardial infarction has been demonstrated by Bendine & Groen (1963). Many other studies (e.g. Baer et al 1979: Frankenhauser, Lundbert and Forsman, 1980, Inness 1980, Jenkin et al 1977 and Novak and Sassenrath, 1980) clearly indicate the relevance of neuroticism and extraversion to the assessment of different types of coronary prone behaviour. What probably cannot be doubted any longer is the relevance of both personality and stress in the causation and maintenance of cardiovascular disease. A beginning has been made in making more precise the relationship that may exist in this field, and the hypothesis advanced, whether right or wrong, at least fulfil the minimum requirement of a scientific hypothesis, namely that of being testable. What is unlikely to happen, however, is a disproof of the hypothesis that personality and stress in combination are relevant to the development of Ischaemic Heart Disease. (Eysenck 1981).
Studies examining public beliefs about Coronary Heart disease (Farrant and Russel 1987; Calnan, 1987) clearly show that the public feels that stress is one of the major causes of coronary Heart Disease. Certainly as Pollock (1988) argues, stress has increasingly come to be regarded as an integral part of everyday experiences. The stress theory also carries with it a significant sociological component, which can serve as a means of organising and expressing a variety of ideas about the social order, relating, for example, to the issues of individual autonomy and responsibility. It must be emphasized that there is still considerable uncertainty about the causes of coronary heart disease and there is some doubt about the part that even the major risk factors such as blood pressure play in the development of the disease. A large number of patients with coronary heart disease do not have risk factors and the great majority of people with risk factors do not develop coronary heart disease. In summary the relationship between stress and coronary heart disease is potentially an important area of investigation, although at present there is a lack of empirical evidence to assess its validity. It had been observed from self-evaluation by the patients and investigator that lack of self esteem and high stress were frequent in individuals with manifest Coronary Heart Disease in the professional and business community. Therefore, we have undertaken in our present research to study individuals with manifest coronary heart disease and individuals without manifest disease but with risk factors.
The psycho-social correlates we are studying are stress, self esteem, locus of control, neuroticism and extraversion. Stress is closely linked to certain behaviour patterns. Similar situations may be varyingly stressful in different individuals. Thus stress can only be defined in terms of strain experienced by an individual. Self esteem is positive regard for oneself; the capacity for self-acceptance is an important aspect for adjustment; Interpersonal satisfactions are enhanced when self esteem exists. Studies have shown that the ability to be acceptable to other people in general is significantly influenced by the degree of self-acceptance (Berger, 1952, Omwake, 1954, Scheerer, 1949). Level of self-esteem has quite naturally been examined as an index of maladjustment; common feature of neurotics is the low regard they have for themselves (Richard Suinn, 1970). Locus of control refers to differences in people's beliefs that what happens to them is the result of their own behaviour and attitudes (internal control) versus the result of luck, fate, chance or powerful others / external control (Dembroski 1978). According to the dictionary the definition of neurosis is the unconscious schema, the pattern of character traits, sentiments and neurotic symptoms - which serves to hold the patient within the limits of a life span set by early experience and by the striving for superiority. Neuroticism is an abstract quality characterising a mild condition of neurosis. Roberts (1939) has pointed out "general intelligence -- is a graded characteristic and displays continuous variation from one extreme to the other." Similarly it might be argued that we find a curve of distribution of multifunctional origin, determining the personal adjustment level of the various members of the population, superimposed on this
possibly normal curve there are psychological variants - psychotics and in the opinion of some writers, also the so-called neurotics. The trait neuroticism is clearly similar in conception to the general trait of "intelligence," pathological variants may or may not be present in the population on which results are based but it is only in so far as these variants find a position on the general scale (H. J. Eysenck, 1947). Jung's definition of an extraverted attitude is when orientation to the object and the objective facts are so predominant that the most frequent and essential decisions and actions are determined not by subjective values but by objective relations.

Our research is the study of the social, psychological correlates of prospective patients of Ischaemic heart disease and patients already having this disease. No definite hypotheses have been formulated in this study. Moreover, many questions raised, like, is the psychosocial profile of the two groups similar? and if it is, then, it is possible to help in identification of subjects at risk of Ischaemic heart disease, have been answered.