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COPING WITH THREAT: SOME ASPECTS OF PSYCHOLOGICAL FUNCTIONING IN MALE CARDIAC PATIENTS

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A Thesis submitted for the Degree of Doctor of Philosophy

of the University of Keele

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ABSTRACT

The general aim of the study was to provide an analysis of certain psychological characteristics and processes exhibited by male coronary patients during their recovery from a heart attack in a Coronary Care Unit. This analysis was conducted within the theoretical framework provided by Richard Lazarus' psychological stress model. The central construct of the model is that of threat, defined as the anticipation of future harm. This definition leads to a concern with: the appraisal of threat stimuli, threat reactions, coping processes, and the multiple determinants of these various phenomena. Using these theoretical categories, a review of the psychological literature on the recovering coronary patient was carried out.

A pilot study of 40 patients' appraisals of and reactions to their Coronary Care Unit was first conducted. The qualitative data obtained indicated that social contact was of prime importance to patients. Adverse reactions to various aspects of the Unit, such as the monitoring equipment, witnessing cardiac arrests and transfer from the Unit, were strikingly infrequent.

In the main investigation, variables from each of the theoretical categories listed above were assessed in a group of 50 male patients who had suffered a heart attack four to eight days previously. The particular variables measured were: appraisals of the Coronary Care Unit, the future, the patient's job and a heart attack; the threat reactions of anxiety, depression and hostility; the coping processes of denial, inaction and anxiety; and possible determinants including: the Type A Behaviour Pattern, trait denial, recent life changes, medical history and psychosocial characteristics. To obtain comparable data from a group of healthy subjects, a stratified random sample of 50 miners was also assessed on most of the above variables.

The data obtained allowed the investigation of three types of question or hypothesis: questions as to the prevalence of the study variables in the two groups; hypotheses concerning expected differences between the groups; and hypotheses concerning the relationships between the variables measured in the coronary group, derived from the theoretical model.

The coronary patients saw both the Unit and their future in a very positive light, but displayed a very negative appraisal of a heart attack. In comparison to the miners, they found their jobs significantly more boring, and generally less attractive. The patients were significantly more anxious and depressed than either the miners or US normative groups, exhibiting levels of affect of psychiatric significance. Hostility scores in the coronary group were also significantly higher than in US samples, again approaching psychiatric significance.

Type A behaviour was significantly less prevalent and intense in both groups, compared to US data. No difference was found between the coronary and miners groups. Trait denial was significantly more intense in the coronary sample than in a US normative group.

On the psychosocial variables the coronary and miners groups differed in only two respects. The coronary patients were significantly older and included significantly more affiliates of the Church of England. Patients reported significantly more recent life changes than did comparison subjects, especially concerning their work.

There was some very limited evidence of a positive correlation between patients' view of their CCU and that of the future and a heart attack. The coping processes of denial, inaction and anxiety were all detected. With the exception of the cognitive repudiation component of denial, which was strikingly rare, the prevalence rates of the coping processes were similar to those found in other studies. Anxiety was less prevalent than denial, but occurred as frequently as inaction.

Anxiety levels did not appear to vary significantly between the fourth and eighth days after admission, but depression scores declined significantly over time.

Type A behaviour was not a determinant of threat behaviour, nor did trait denial or a psychiatric history correlate with the use of state denial. With the exception of a positive association between social class and being reassured by the Coronary Care Unit, no psychosocial variables appeared to influence threat behaviour. There was a slight tendency for patients with a coronary history to be more depressed and hostile than were patients without such a history, but no clear conclusion could be drawn. Recent life changes and depression were not significantly associated, but there was some indication of a negative correlation between life changes and appraisal of the future, and a positive correlation between life changes and appraisal of a heart attack.

These results were compared with those from other studies, and discussed in the context of the Lazarus model. In general the data were found to be either supportive of Lazarus' theoretical principles, or insufficiently precise to warrant a conclusion. Finally, doubts were expressed as to whether the analytic power and precision which the model seems to promise, are in fact realisable.

CHAPTER 1

In the days following a heart attack the coronary patient is exposed to various real and imagined threats to his physical and psychological well-being. The following study may be seen as an attempt to map part of the complex field of psychological forces which obtains in this early recovery period. The participants in the study had all suffered a heart attack four to eight days previously, and were all recovering in a specially equipped coronary care unit. It will be helpful to begin by explaining in brief why this particular group of subjects should be of interest to the psychologist.

The main aim of treatment in the early recovery period is to ensure that minimal demands are made on the patient's cardiovascular system. It is essential that this be achieved if potentially lethal complications of the patient's condition are to be avoided. When it is appreciated that heightened cardiovascular activity may result from psychological as well as physical stimulation, the importance of gathering knowledge about psychological processes exhibited by the recovering coronary patient becomes apparent. Such knowledge may ultimately be used to formulate patient management procedures which may reduce distress, and may thereby save lives.

A second practical reason for a psychological study of the coronary patient is to provide information which will be of use in designing long-term rehabilitation programmes. It has been suggested that the basic elements of the patient's reaction to his illness, which is in itself a major determinant of his rehabilitation prospects, are established in the early recovery period (1). An understanding of the dynamics of these early stages of recovery is therefore a prerequisite for effectively helping the patient to adjust to the many changes necessitated by his illness.

Apart from these important practical applications, data concerning psychological processes exhibited by the coronary patient are of great theoretical value. Any major change in health status faces the individual with the problem of adjusting to changed circumstances to some degree. It will be argued that the coronary experience precipitates many patients into a situation which makes great demands on their coping abilities. The recovering coronary patient therefore provides the investigator with an excellent field opportunity to test out hypotheses derived from psychological theories concerned with processes of coping and adjustment.

Faced with the alarming complexity of the coronary patient's psychological predicament, an obvious strategy for choosing study variables of possible importance was to turn to the existing literature on the subject. As will become clear in Chapter 3, most of the work which has been done is deficient in two closely related ways. Firstly, investigators have tended to be atomistic in their approach to the patient, studying variables such as anxiety or depression with little regard for the intrapersonal and environmental complex in which the variables are embedded. Secondly, with the exception of psychoanalytic investigators, workers have tended to neglect explicit theoretical formulation, seeming to prefer a piecemeal analysis of the phenomena which interest them. The result has been a collection of findings valuable in themselves but notable for their lack of organisation and for certain omissions. To take two examples, clinical impression and common sense suggest that both personality factors and the recent life history of the individual will affect his reaction to a heart attack. Yet there are virtually no data available which throw light on the inter-relation between these variables.

It seems unlikely that a coherent and comprehensive picture of the psychology of the coronary patient will emerge from a summation of findings donated by numerous studies of affective reactions, personality factors, psychosocial characteristics and so forth, each studied in comparative isolation. In the following study an attempt was made to gain a more

holistic and integrated picture of the coronary patient than has so far been provided. A particular theoretical approach, namely Richard Lazarus' coping model (2) was used as a framework. The details of the model will be given in Chapter 2 with a justification for its use. For the moment it is important to point out that Lazarus' model does not constitute a developed theory. Its primary functions were: to suggest classes of phenomena which should be included in a comprehensive account of the coronary patient; to generate particular hypotheses relating the actual variables which were selected for study on the basis of established findings; and to integrate the results of the study. Apart from using the model to structure, generate and integrate the present study, an attempt was also made to organise data from existing studies in terms of the model.

Two tasks remain in this chapter. Firstly a brief account of the coronary patient's physical state will be given. Some knowledge of this is necessary for an understanding of the resultant psychological reactions. Secondly, as a bridge to the next chapter on psychological theory, those general characteristics of the patient's predicament which suggest the applicability of an analysis based on the construct of coping will be discussed.

The terms "heart attack", "coronary" or "myocardial infarction" (m.i.) are used synonymously to describe the death and consequent scarring of an area of tissue in the coronary arterial system. Tissue death occurs usually because the local blood supply has been reduced or terminated by a blockage upstream in the coronary artery. Any such disruption of the coronary circulation is potentially serious since it is the coronary arteries which carry the heart's own blood supply. The heart has little capacity for building up an oxygen debt, so a continuous supply of oxygenated blood is essential.

How and why a heart attack occurs is not fully understood. However, it is clear that a major contributory factor is the common state of arterial degeneration called atherosclerosis. The ageing artery becomes

increasingly "furred up" with fatty deposits, notably atheroma, thereby decreasing the size of the bore or lumen. Total occlusion of the lumen and subsequent infarction may then result in various ways which need not be discussed here. Perhaps the most well known to the layman, but by no means the most common, is when the narrowed lumen is blocked by a clot or thrombus. Hence the expression "coronary thrombosis".

The occurrence of an m.i. may have a number of possible outcomes. In the case of a "silent" infarction the sufferer is aware of nothing other than perhaps a slight transitory twinge of pain, often mistaken for indigestion. At the other extreme the individual may literally drop dead, usually the victim of abnormal heart rhythms evoked by the patch of dead tissue. But, most commonly, the sufferer experiences extreme enduring pain, sometimes radiating from the chest into the arms, back and neck. Other common symptoms include sweating, breathlessness and sometimes loss of consciousness.

The survivor of a heart attack, to which medical attention has been drawn, will be treated either at home, in the case of a mild attack, or now with increasing frequency in hospital. There is some variation in the type of hospital care afforded, but it will usually take place in a specialised coronary care unit (CCU). The dangers to which the coronary patient is prone during the early recovery period include: cardiac arrhythmias, which cause the heart to function inadequately or to cease functioning altogether; an extension of the original infarction, associated with disruption in the formation of the scar tissue; or a further new infarction.

Accordingly, as indicated earlier, the prime concern of coronary care is to keep the cardiovascular workload to a minimum by restricting physical activity and preventing emotional disturbance. Complete or near complete rest is enforced for anything from 8 to 14 days. During this time anticoagulant drugs are usually given to prevent blood clotting, and diuretics to reduce blood pressure. Medication is also given to remove

pain, to improve heart action, and sometimes to promote sleep and reduce anxiety. After this acute phase of recovery the patient is transferred, either to a general medical ward or to his home. During the following 6 - 8 weeks he gradually increases his physical activity, by the end of which time, if no complications have ensued, he is usually fit enough to return to work. A good non-technical account of the nature of a heart attack is given by Donald Longmore in a recent book (3). For a more detailed exposition of the aetiology, symptoms and treatment of myocardial infarction, Chapter 8 of Desmond Julian's "Cardiology" text book provides an excellent source (4).

Finally, to anticipate the next chapter, what characteristics of the recovering coronary patient's state suggest that his coping abilities are likely to be tested? First and foremost, his situation is life-threatening. He feels, often rightly, that he has been near to death; he has been confronted with the fact of his own vulnerability. This confrontation has two aspects which render it more potent. It is usually sudden, marking a sharp dysjunction with preceding events. Further, it is frequently premature. Most of the recent increase in deaths from ischaemic heart disease, of which myocardial infarction is a major manifestation, has been in the age group of 35 - 55 years (5). Thus many coronary patients have been threatened with death well before their expected span of life has been achieved.

This experience now informs the patient's primary fear, namely that a second heart attack will follow with a less fortunate outcome. He is thus exposed to a whole complex of threats. The coordinating element in this complex is personal death with its many ramifications, both personal - further pain, unfulfilled aims, and interpersonal, notably the fate of his family. A further set of threats is attached to the possibility of continuing to live as a complete or partial invalid. Again many aspects of the individual's personal and interpersonal life are threatened.

The threatening nature of the patient's state is heightened in various ways. His prognosis is inevitably uncertain. Understanding of the mechanisms underlying an m.i. is still too slight to allow accurate predictions of individual prognoses. Although the patient will doubtless be told that "everything is going to be alright", he will quickly learn, if he does not already know, that his future cannot be foretold. His situation is therefore characterized by its ambiguity.

For several reasons there is little that the patient can actually do about his predicament. Standard coping devices of fighting or fleeing are clearly inappropriate. This limitation leaves little alternative but to attempt a cognitive restructuring of his situation, a fact which makes the coronary patient a particularly interesting problem for the psychological theorist. Besides the obvious limitations provided by the patient's physical state, his repertoire of appropriate coping devices is likely to be restricted by his inevitable lack of experience of the particular problems he now faces. But overshadowing all these considerations is the simple fact that there is nothing that the patient can do to avoid with certainty that which he fears. Certainly he can reduce the risk of future harm by following advice on smoking, exercise and so forth, but he is powerless to remove totally the fundamental threat.

Finally, the patient's treatment and the context in which it is given serve to accentuate the seriousness of his condition. Impressive machinery, enforced inactivity, a variety of medications - all emphasize the patient's precarious state. Frequently there are long periods during which there is little to distract the patient from exploring various aspects of his particular problem. Thus, although the care which the patient receives is undoubtedly beneficial physically, it may serve to emphasise his psychological problems.

The foregoing account is derived from a combination of the writer's own observations and a sample of the impressionistic literature on the coronary patient reviewed by Croog, Levine and Lurie (6). It is not

suggested that the description applies to all coronary patients. Rather that their predicament has sufficient characteristics to make it an appropriate and promising area for an analysis based on the notion of coping. In the following chapter the primary task will be to describe the particular theoretical model which was adopted.

CHAPTER 2

"Phenomena are often labelled stress for what appear to be purely arbitrary reasons. If one ignores the labels and looks only at what is being studied, ... the nonessentiality of the term stress in understanding the phenomena becomes apparent" (7 p.54).

Had the preceding chapter been written in the early stages of the present investigation instead of several years later, the word "stress" would have been notable for its frequent appearance. In the preliminary search for an appropriate theoretical framework, the concept of psychological stress was an obvious starting point since the coronary patient's state seemed intuitively so patently stressful. However, examination of the literature on the construct of psychological stress quickly evoked the sentiment expressed in the above quotation. Before examining Lazarus' theoretical model it will be helpful to discuss why the construct of psychological stress was excluded from the present study. The following discussion owes much to Gordon Moss' treatment of the subject (7).

Since its introduction into the life sciences by Selye in the 1930s (8), the term "stress" has been applied to many diverse phenomena, and acquired multiple definitions. This lack of a generally accepted definition has been noted by various writers (7, 9, 10). Selye himself began a tradition of designating status of the organism as stress: a complete reversal of its earlier use by engineers to describe the stimulus conditions which produce strain. The Selye convention has been adopted by various physiological, psychological and sociological theorists who have conceived of stress as the product of the action of certain stressors (11, 12, 13, 14). Others have defined stress as those conditions which impinge on the organism (15, 16).

Examination of these various definitions indicates certain

characteristics in common. For example, Appley & Trumbull have noted a concentration by stress theorists on 'extreme' environments and responses (9). But such characteristics can hardly be seen as necessary or sufficient criteria for the applicability of the term 'stress'. In other words, in no way do they provide the basis for a definition of the term. These comments have been made about the general term 'stress', but also refer specifically to the concept of psychological or psychosocial stress.

Lack of a generally accepted definition has led to a state of semantic near-anarchy and thence to conceptual confusion. Doubtless much of this confusion stems from the idiosyncratic everyday usage of the expression. In practice there seem to be few restrictions on the phenomena to which the word "stressful" can be applied. Perhaps the only characteristic common to the diverse applications of the word is its negative evaluative tone. Yet even this comment seems unsafe since it appears that certain individuals actually create "stressful" situations and enjoy the pressures they seek out for themselves. These "Type A" individuals will be discussed in detail in Chapter 5.

The use of psychological stress as a hypothetical construct was rejected on the basis of two considerations. First, the term suggests a unified set of phenomena and thus provides a good example of the "unum nomen, unum res" fallacy. That is to say, it does not follow that, because one expression can apparently be applied to diverse phenomena, then similar explanations will account for those phenomena. They are not necessarily all aspects of the same "thing". Adherence to this fallacy leads quickly to oversimplification, blinkering one to the true complexity of the situations being studied.

Second, the use of the notion "psychological stress" focuses attention on those phenomena which the researcher suspects are "stressful", in the everyday sense of the word. A commonplace finding in stress research has been the enormous inter-individual variation in reactions to

"stressful"situations (9). To select stress situations or responses for study according to commonsense criteria is thus a dangerously narrow and potentially misleading procedure, if not supplemented by empirical investigation of subjects' appraisal of the experimental or field situation. Too often stress research implicitly involves circular explanations of the form: situation X is stressful because subjects exhibit stress reactions; subjects exhibit stress reactions because situation X is stressful.

The Lazarus Model

To avoid these pitfalls, the theoretical model developed by Richard Lazarus was adopted in the present study. The bulk of this chapter is taken up with an account of the model, and its applicability to the behaviour of the recovering coronary patient. The account is based entirely on Lazarus' 1966 monograph "Psychological Stress and the Coping Process" (2), since in more recent writings he has made no significant changes or additions to this detailed work (17-22). All page references in the following refer to the 1966 monograph.

Before going into the details of the model, certain of its general merits should be briefly mentioned. It is primarily a psychological model, as opposed to a sociological or physiological one. Thus it is intended for the analysis of the psychological functioning of the individual, and accordingly appropriate for the study of coronary patients. The notion of 'psychological stress' is not a component of the model, but is reserved by Lazarus as a generic term to describe loosely a field of diverse research activities. Further, one of the model's central constructs, that of appraisal, takes explicit account both of the idiosyncracies and the complexities of stress behaviour. Finally, the model focuses attention on cognitive processes, and is therefore particularly suitable for the analysis of situations where direct action is precluded as a form of coping with stress - a primary characteristic of the coronary

patient's predicament.

Threat

The concept around which Lazarus's model is organised is that of threat. It has the status of an intervening variable, inferred from patterns of observable phenomena. By threat Lazarus means the anticipation of harm triggered by appropriate stimulus cues. Thus the concept has two primary characteristics: firstly, it is future oriented, in contrast with the actual confrontation of harm. Secondly, threat is the result of cognitive processes. For the purposes of this psychological model Lazarus defines harm as anything motive-thwarting. Thus much of the theory is concerned with the cognitive appraisal of those stimuli which have motive-thwarting potential.

It follows from these general definitions that the degree of threat experienced will depend on the number and strength of the individual's motives which he feels are jeopardised. In this respect the coronary patient provides an excellent opportunity to examine Lazarus's notion of threat. Since a myocardial infarction (m.i.) is, in a very real sense, life-threatening, there can be little doubt about the strength of the motive which may be under attack and hence the high degree of threat which may be experienced by at least some patients. An important point to bear in mind about his state is that it is 'post-confrontation'; that is, the patient has in a sense faced a major threat, namely his attack, and now is threatened with a recurrence of the event. This experience is of some importance in the patient's appraisal of his future.

Not only does the coronary patient's situation imply the potential thwarting of a very strong motive, namely to stay alive; it also throws a great number of motives into jeopardy. Assuming the patient survives, he is faced with a reorientation of his life. His reduced physical capacity makes it likely that his work load may have to be lightened, which could mean a reduction in salary and status. In more serious cases,

premature retirement may be enforced. Recreational and perhaps social activities will probably need curtailing. The patient's ability to maintain his home, to play with his children, his sexual activity may all be adversely affected. It is important to realise that major changes may be made by the patient despite his doctor's assurance that only slight modification of his behaviour is advisable. Thus the amount of change thought necessary by the patient may well be independent of the severity of his physical condition. It should be clear from the above that many motives may be threatened in the case of the coronary patient.

Primary Appraisal and its Determinants

Of fundamental importance in this cognitive model is the notion of appraisal. Appraisal is a judgement or an inference concerning certain stimulus configurations, and is seen as a necessary condition for a state of threat to occur. The nature of the appraisal is determined by the interplay between the properties of the individual and those of the situation, that is, it characterises the transaction between the individual and his situation. Lazarus distinguishes two types of appraisal - primary and secondary. Primary appraisal concerns the identification of particular stimulus configurations as threatening. Secondary appraisal consists of the subsequent evaluation of those factors relevant to coping with the perceived threat.

According to Lazarus three main considerations are relevant to the ways in which stimulus factors determine primary threat appraisal, considerations which concern various aspects of the nature of the threatened harmful confrontation.

1) Balance of power

The degree of threat appraised is determined by the balance of power between the threat stimulus and the counterharm resources of the individual and of his environment. "When the balance favours the harm-producing stimulus threat is increased up to the limits set by the strength of the

motive being threatened. When the balance favours the counterharm resources, threat is reduced" (p.89). This balance of power type of analysis is well suited to the coronary patients situation, since the constituent elements are relatively well-defined and identifiable, yet in no way contrived, as in so many laboratory situations. At one end of the balance is the perceived potency of harm-producing stimuli. It has been argued that the coronary patient's predicament is notable for the potential number and strength of motives which may be under attack. It follows from this that the perceived potency of the threat stimuli should show a wide range of variation between individuals. Such a range is conducive to measuring differences and thus to testing relevant, specific hypotheses.

At the other end of the balance of power lie the resources available to the individual from within or without himself. As Lazarus points out, a case of particular interest is where individual resources are low or non-existent, that is, where the person is helpless. He cites various studies of both field and laboratory settings which indicate that where the individual has little or no control over his situation threat is heightened (p.93-). More recently Averill (23) has argued that no general statements can be made about the relationship between degree of personal control and potency of threat. He distinguishes three types of control - behavioural, cognitive and decisional - and provides evidence to show that all have highly complex relationships to threat, depending primarily on the meaning of the control response for the individual. The apparent inconsistency between these two positions is resolved when it is realised that Lazarus is discussing the determination of primary appraisal, whereas Averill is describing the final degree of threat experienced, as shown by threat reactions, after coping has occurred. Lazarus arrives at the same degree of complexity by later introducing the ideas of threat reactions, secondary appraisal and coping processes. This apparent inconsistency is worth noting, however, since it highlights the problem of deciding which stage of the process of coping with threat is being described

at any one time. This central problem of operational differentiation of Lazarus' theoretical constructs will be taken up later.

As suggested in Chapter 1, the coronary patient has little or no personal control over the conditions which threaten him. Bearing in mind Averill's distinctions, it is perhaps more accurate to say that the patient's control is likely to be severely restricted, since behavioural and decisional control are, for the most part, irrelevant to his problems, at least during the early part of his recovery. The important point to be made is that the Lazarus model is an appropriate analytic tool since it takes explicit account of an important aspect of the coronary patient's behaviour, namely his relative helplessness.

Acting in combination with and in opposition to this lack of personal control are the resources provided by the patient's environment. The patient may be seen as surrounded by concentric circles of resources, starting with those provided by the coronary care unit (CCU) and moving out through those represented by immediate family, friends and organizations. During the first few days of recovery the resources provided by the CCU are of paramount importance. The patient has little contact with people other than those caring for him. The CCU is the most important part if not all of his world. Once again an important set of variables in the theoretical model - environmental resources - are clearly relevant to and easily identifiable for the recovering coronary patient. Relevant since they are no less than a life-support system, and easily identifiable since they are the product of an organised, rational analysis of the patient's needs.

2) <u>Imminence of anticipated confrontation</u>

Interacting with the potency of the threat stimulus in determining appraisal is the temporal proximity of the anticipated confrontation. Thus Lazarus writes "When the potency for harm is great, nearness of the confrontation increases the threat to the maximum provided by the strength

of the motive to be thwarted" (p.111). This particular determinant of threat appraisal has no obvious application to the recovering coronary patient since the one thing he certainly cannot know is the timing of future events related to his illness. Undoubtedly this consideration is relevant at the time of a coronary attack. Patients often report that they have felt on the point of death and suffered acute psychological distress. But, in the post-confrontation state, degree of threat is unlikely to be affected by considerations of the imminence of the feared event, except perhaps where a recurrence of cardiac symptoms is experienced.

3) Ambiguity of Stimulus Cues

Of great relevance in the analysis of the recovering patient is the ambiguity of the threat stimuli. "Ambiguity concerning the significance of a stimulus configuration will usually intensify threat because it limits the individual's sense of control or increases his sense of helplessness over the danger" (p.117). In the case where the primary threat stimulus is a future myocardial infarction, great ambiguity is introduced by the fact that the patient cannot be given clear, definite knowledge on how to avoid the confrontation. From the medical staff he will receive epidemiological information in probabilistic form. For example, he will probably be told that by giving up smoking he can halve his risk of a further infarction. Or he may be advised that his chances of another coronary will be markedly reduced by joining an exercise programme. These and other similar statements derived from epidemiological studies are true, but they are, of course, statements about trends within populations, and thus carry no guarantee of efficacy for the individual. He can only ever truthfully be told, "this may help in your case", not "this will help".

Further ambiguity is caused by the patient's exposure to "theories" about coronary disease found in the news media and popular literature. These generally take the form "the cause of coronary disease is....".

Putative "causes" have ranged from diet, through hard water, to creases in the ear lobe. The continuing pervasiveness of the germ theory model of disease in the public mind has invested these aetiological "theories" of coronary disease with surprising power and durability. When the individual coronary patient's private theories, based on his own experience, are added to ideas derived from medical and popular sources, his resulting view of ways of avoiding another coronary cannot help but be ambiguous.

Other potential threat stimuli concerning the patient's future life may also be ambiguous both in the sense that ways to alleviate future threats of job changes, for example, may not be clear; and in that the actual forms in which the life changes will manifest themselves are not obvious.

Where there is great ambiguity concerning the stimulus cues in a given situation, threat appraisal is strongly determined by the psychological structure of the individual and his resulting world picture. In the next section there follows an outline of Lazarus' account of personality factors that determine threat appraisal and a consideration of its application to the coronary patient.

Personality Factors which determine threat appraisal

Lazarus distinguishes three groups of individual characteristics which are relevant to threat appraisal: motivational characteristics, belief systems concerning environmental transactions, and intellectual resources.

a) Motivational Characteristics

The basic principle postulated by Lazarus in this respect is: "The upper limits of the degree of threat are set by the strength of the motive engaged" (p.121). It was suggested earlier that the motives threatened in the case of the coronary patient are potentially both numerous

and powerful. It also seems likely that the threat of death will loom large amongst these. However, even in the case of death a warning given by Appley & Trumbull must be noted: "Often the experimenter merely assumes that the situation should have been threatening or would have been threatening had he been the subject. .... the first necessary step .... is to determine how the subject perceives the stimulus or situation presented" (9 p.8 emphasis theirs).

The important and necessary role played by threat appraisal and thus by its determinants is exemplified by Lazarus' review of the evidence concerning the variability of individual reactions to the threat of death - a variability due for the most part to the multi-facetted nature of the phenomenon. Variations in appraisal of such an apparently all-powerful threat can only be understood by taking into account the idiosyncratic motive patterns of the appraiser. As will be shown in the literature review individual motives have been unfortunately neglected in studies of the coronary patient.

b) Belief systems concerning environmental transactions

Closely related to the pattern of individual motives are the beliefs held by the individual about his relationship with the world. As indicated above, the influence of these general beliefs on threat appraisal will vary directly with the ambiguity of the threat stimulus cues. Once again variation in appraisal of the threat of death may be partially understood in terms of differences in beliefs about death - a suggestion for which Lazarus gives some empirical support (pp 134-6). He also presents evidence concerning the ways in which two other types of belief system - Davids' alienation syndrome and trait anxiety - determine threat appraisal. Trait anxiety is of particular interest here since Lazarus argues that it can be seen as a disposition to interpret the environment as threatening, due to high perceived threat and low personal counter-harm resources.

Once again little work has been done on the belief systems of the recovering coronary patient and thus much of the variability in reactions to threat remains unexplained. Despite the evergrowing complexity of the Lazarus model, it seems that belief systems must be taken into account in any comprehensive analysis of coping with threat.

c) Intellectual resources, education and sophistication

In the Lazarus model the individual's intellectual resources, education and sophistication play a nondirectional role in threat appraisal. If better intellectual resources allow more accurate perception of the threat stimuli, logically they should also permit a clearer picture of counterharm strategies. This sort of relationship does not generate predictions as to whether more or less threat will be experienced. However, there does appear to be some evidence, reviewed by Lazarus (p.147), that low resources do increase the degree of threat experienced. The only relevant information available on coronary patients concerns the effect of educational experience on threat appraisal, evidence which is reviewed in Chapter 3.

Coping and Secondary Appraisal

Subsequent to the appraisal of threat come patterns of threat reactions. These responses may be: affective, such as reports of anxiety or depression; behavioral, such as speech disturbances or patterns of motor behaviour; or physiological, such as heart rate or galvanic skin response.

The remaining major concept to be introduced by Lazarus is that of coping, which he defines as "strategies for dealing with threat" (p.151). Two basic statements tie in this notion of coping with the account of primary threat appraisal and reactions to that appraisal. "Observable threat and stress reactions are reflections or consequences of coping processes intended to reduce threat" and "these coping processes (and hence the reactions themselves) depend on cognitive activity very similar

in kind to primary appraisal ... (called) ... secondary appraisal" (p.152).

In Lazarus' view the appraisal of threat inevitably leads to the mobilisation of coping processes. Thus threat appraisal is both a necessary and sufficient condition for coping strategies to be activated. Clearly the next important question is why a particular coping strategy, manifest in a particular pattern of threat reactions, should follow a particular set of appraisals. Lazarus' answer is based on the idea of secondary appraisal - the cognitive process which determines the particular form of coping. That is, "secondary appraisal intervenes between threat and the coping process" (p.155).

In discussing the relationship between primary and secondary appraisal Lazarus notes that, although the latter depends on the former, it need not necessarily follow it in time (p.159). Information relevant to coping processes may be collected at any time: for example, noting the position of escape doors when boarding an aircraft. But the use of this information in a secondary appraisal of conditions leading to the use of a particular coping process will depend on primary appraisal of a relevant threat.

Determinants of Secondary Appraisal and Coping

Since secondary appraisal is also dependent on cognitive activity, it is possible to specify the factors which may determine the form of the appraisal and thus of the coping process. Unlike primary appraisal, secondary appraisal cues concern "the estimated consequences of any action tendency generated to cope with the threat" (p.160). The relevant factors listed by Lazarus are: degree of threat, the location of the agent of harm, the viability of alternative coping actions and situational constraints; and the intrapsychic characteristics of motive strength and pattern, ego resources and coping dispositions. Once again the applicability of each of these factors to an analysis of the coronary patient will be sketched in brief.

1) Degree of Threat

The hypothesised relationship between degree of threat and coping is expressed as follows: "More adaptive and reality-oriented forms of coping are most likely when the threat is comparatively mild; under severe threat, pathological extremes become more prominent" (p.162). In reviewing the relevant literature Lazarus notes various difficulties in testing this hypothesis, especially the severe problems of scaling degree of threat and adaptiveness of coping processes. He concludes that the evidence points towards strong threat being a necessary but not a sufficient condition for the adoption of primitive coping processes.

The coronary patient provides a case where serious threat is likely and hence the use of coping processes which are not "reality-oriented" might be expected. In fact there is growing evidence to support the idea that denial is much-used as a coping process by coronary patients. A review of this evidence will be found in Chapter 3. Suffice it to say here that the evidence gives some limited support to Lazarus' hypothesis.

2) Location of Agent of Harm

"Unless an agent of harm is identified, direct forms of coping such as avoidance or attack are not possible" (p.174). This restriction on the type of coping process available to the individual is clearly applicable to the coronary patient. Since there is, strictly speaking, no agent of harm it clearly cannot be located and hence dealt with in some direct way. This point is obviously related to the role of ambiguous stimulus cues in determining primary appraisal. But in that case the issue was one of whether threat was appraised or not, rather than the present concern with what to do about an existing threat.

3) Viability of Alternative Actions

"Other things being equal, the person or animal chooses strategies from its available repertoire on the basis of the apparent viability of the action" (p.179), where "viable" means capable of eliminating or reducing

the threat. It has already been stressed that the coronary patient can do nothing to eliminate the threats which he faces. In the post-hospital phase of his recovery and from then on he has a variety of actions from which to choose which may serve to reduce threat. But during his hospital stay he is encouraged to pursue one course of reducing threat - inactivity. Thus, although a choice of actions exist only one is seen as viable.

It is interesting to note in passing the not uncommon exceptions to Lazarus' postulate. Most striking in the CCU is the phenomenon of patients continuing to smoke despite assurances that such behaviour actually increases the risk of a further coronary. They thus choose an action which actually increases threat. In less dramatic forms this type of risk-taking is a commonplace of human behaviour and has been the object of much theorising, for example, in terms of long-term versus short-term gains. Presumably Lazarus would invoke his usefully comprehensive phrase "other things being equal" to account for behaviour which has powerful short-term threat-reducing potential or for addictive behaviour.

4) Situational Constraints

"Situational constraints make the action tendencies unacceptable because the expression of the latter exposes the individual to threat from a different source" (p.197). These constraints are seen as embodied in social norms which either discourage or encourage certain ways of coping. Perhaps the most obvious example of the former is that of physical attack, which in most situations in Western society is a totally unacceptable method of reducing threat. The most important point which Lazarus makes concerning situational constraints is that they influence the expression of a coping process. Thus the conflict between a coping impulse and an opposing social dictate may be resolved by covert use of the desired coping strategy, but apparent conformity to the social norm.

Lazarus himself cites an interesting example from Hackett & Weisman's work on coronary patients (p.201), where patients were observed to be

trapped between the impulse to cope by discussing their illness with visitors, and the powerful social norm of avoiding discussion of serious illness and death communicated by the visitors. To resolve this conflict patients took refuge in what the investigators called "middle knowledge": in effect, an overt acceptance of the norm of avoiding the subject, but a covert concern with it, as evidenced by certain "cracks" in the facade.

The influence of situational constraints on the expression of coping strategies is an important aspect of coronary patients' behaviour in general. The male coronary patient in particular can be exposed to many subtle influences concerning the appropriate behaviour of a man. Conflicts may arise, for example, between "good patient" behaviour, based on inactivity, passivity and acceptance, and socially encouraged 'male' behaviour, based on ideas of strength, action and fighting adversity. This type of conflict is not, of course, restricted to the patient in the CCU, but it is in his case that the problem is likely to appear in extreme form.

The factors which influence coping and secondary appraisal so far discussed have been, for the most part, characteristics of the threat situation. But to understand why particular coping strategies are used, it is clearly necessary to take into account the psychological characteristics of the individual, and the ways in which these interact with the situational factors.

5) Pattern of Motivation

"The pattern of motivation determines whether additional threats will be mounted by the expression of coping impulses" (p.212). A consideration of individual motives is clearly complementary to the foregoing discussion of situational constraints. That is to say, the influence of social pressures on the expression of a particular coping strategy will be minimal unless the individual's needs are sensitive to these particular social pressures. For example, if a person has a generalised desire for social approval, his expression of coping impulses

will be influenced by a very wide range of social pressures. In making what Lazarus calls his "psychoeconomic decision" he will always be biased towards coping strategies which are socially acceptable. Following what was said about the coronary patient in the preceding section, the relevance of pattern of motivation to his case is clear, and needs no further comment at this point.

6) Ego Resources

By ego resources Lazarus means those personality traits which "reduce vulnerability to threat and facilitate healthy or adaptive forms of coping" (p.225). In one of the weaker sections of his account, Lazarus cites ego strength and impulse control as two examples of ego resources which seem to affect the use of coping strategies. As he admits, both the definition and measurement of these variables have been poor, so that the role of ego resources, whilst theoretically reasonable, remains untested.

7) Coping Dispositions

The notion of a coping disposition stems from the hypothesis that an individual's use of a coping strategy is not situation-specific. In other words the individual is to some extent predisposed to use a particular method of coping regardless of the demand characteristics of a given situation. Lazarus points out that most of the work in this area has been done on defence strategies, a particular subcategory of coping strategies, and restricts himself to a consideration of this evidence (p.233-). He concludes that whilst coping dispositions have been demonstrated, the complete generality of their use is not supported by the evidence. As the later review will show, coping dispositions are another relatively neglected aspect in psychological studies of the coronary patient, despite their potential theoretical importance.

Finally, of general importance in the determination of coping are the individual's beliefs about his environment and his own resources. "Beliefs about what is morally wrong or right, effective or ineffective,

or how the environment will respond to certain kinds of action shape both the coping process and its behavioural expression" (p.245). Lazarus quotes the variable of self-esteem as an example of a particular influential belief about one's own resources which is likely to play a part in the selection and expression of ways of coping with threat. Again the general evidence on this hypothesised relationship is only suggestive, whilst the relevant data concerning coronary patients is non-existent.

Most of the remainder of Lazarus' account of his model concerns the configurations of particular coping reaction patterns and ways to measure indicators of threat. Two tasks remain in the present chapter: firstly to describe the coping reaction patterns relevant to the coronary patient's situation; and secondly, to discuss some of the problems which Lazarus' model encounters.

Coping Reaction Patterns and their Appraisals

Lazarus distinguishes two general categories of coping: "action tendencies aimed at eliminating or mitigating the anticipated harmful confrontation" and "purely cognitive manoeuvres through which appraisal is altered without action directed at changing the objective situation" (pp.258-259). Strategies in the first category are called direct-action tendencies, those in the second, defensive reappraisals.

As suggested earlier, there seems to be little that the coronary patient can actively do to reduce threat, at least whilst he remains in hospital. The only direct-action tendency considered by Lazarus which has obvious relevance is that of inaction. This strategy, if strategy is the word, appears when the individual "is totally resigned that there are no direct ways of preventing the harm or when he makes a successful defensive reappraisal that there is no danger" (p.263). The state of inaction follows a secondary appraisal of helplessness and is manifest in the threat reaction of depression. There is indeed evidence which indicates the presence of depression in recovering coronary patients -

evidence to be reviewed in Chapter 3.

In the second category of defensive reappraisals, Lazarus attempts to specify the appraisals and reactions which underlie the general strategy of defensive reappraisal rather than specific examples of it. The pattern is as follows:

1) "Threat is appraised.

2) The threat is very great. The more intense the threat, the more likely is defence, and the more likely is a primitive version of defence.

3) No direct form of coping is viable ....

4) If an agent of harm cannot be located, defence is also likely, since without such an agent, neither attack nor avoidance nor any other direct action is possible ... Ambiguity concerning the agent of harm is tantamount to the failure to locate one.

5) When social norms favour or produce pressure towards defensive reappraisal, they increase the likelihood of such forms of coping.

6) Stimulus information that supports a defensive reappraisal makes it more likely ...." (p.309).

This particular coping reaction pattern has been quoted in detail since much of the research on coronary patients has been concerned with denial - a particular form of defensive reappraisal. Denial was also one of the major variables studied in the present investigation and will thus be the object of discussion in much of what follows.

One final reaction pattern which also has been much studied and figured strongly in the present investigation is that of anxiety. For Lazarus, "anxiety is a threat reaction when no clear action tendency is generated" (p.310). If a coping process is brought into action and is successful, anxiety will be supplanted by other affective patterns. But if a coping strategy is not attempted or proves unsuccessful, anxiety

will remain the dominant affective response.

The underlying configuration is as follows:

1) "Threat is appraised.

2) No agent of harm is located, or it is ambiguous.

3) Since there is no basis at the moment for either attack, avoidance, or an estimate of hopelessness, no affect supplants the anxiety.

4) In some instances, anxiety occurs when a previously successful defensive reappraisal breaks down, and threat is again appraised..." (p.311-12).

Comment

The foregoing account of Lazarus' model provides a rich source of hypotheses for analysing the behaviour of the recovering coronary patient. In the following chapters existing findings will be reviewed with reference to the model, and the particular research hypotheses, which were derived from the model and then investigated in the present study will be specified.

A great deal of space has been devoted to an uncritical account of Lazarus' theory. Apart from straightforward exposition, the aim has been to show the close similarity between the research problems to which Lazarus addresses himself and those to be found in the coronary care unit. The model was considered a highly suitable analytic tool for the present investigation. But, to end an already overlong chapter it is important to consider some of the model's deficiencies.

Two types of questions may be asked about the strength of the model: firstly, does the model provide a source of testable hypotheses about the phenomena of interest; secondly, what empirical support have these hypotheses received?

A first, and not uncommon, reaction to Lazarus' model is to wonder whether its primary strength is not also its primary weakness. The model rests heavily on the cognitive process of appraisal and, by virtue of this, generates multiple hypotheses concerning individual variation

in threat behaviour. It has been objected that Lazarus has overemphasised the rational, decision-making capacity of the individual. But Lazarus has forestalled this criticism by stating that "appraisal does not imply awareness, good reality testing, or good adaptation" (p.250).

If this is the case, there seem to be serious problems raised concerning the formulation of hypotheses which can be unambiguously tested. (A fact which Lazarus recognises throughout his account). If we cannot actually "get at" the individual's appraisals we are forced to infer them, along with the particular coping process being used, all from an observable pattern of threat reactions. Firstly, this seems to place an undue burden of inferred "findings" on a necessarily limited sample of responses. Secondly, it is difficult to see how conflicts between alternative interpretations of the same or similar response patterns could ever be resolved.

A good example of this type of conflict is mentioned by Lazarus when he discusses the problems of distinguishing between a true acceptance of a threatening situation associated with benign affect, and a defensive reappraisal, perhaps denial, of that same situation (p.265). The threat reactions may be identical, yet two opposing interpretations are possible. This particular problem of measuring denial and distinguishing it from positive affect will be taken up again.

In the present investigation an attempt was made to measure appraisals independently of threat reactions. But this created two problems that seem fundamental to Lazarus' model. The first of these was that it proved very difficult in practice to separate appraisals from self-report threat reactions. The suspicion remained that the same phenomena were being measured under two different headings. This problem is clearly highlighted when self-report measures of threat reactions are used, but there seems to be a general problem of empirically differentiating threat appraisals and threat reactions, even assuming the former are accessible for measurement at all.

The second problem concerns the role of time in the model. Clearly, this type of analysis involves 'freezing' the flow of events in the appraisal and coping processes. Lazarus' model contains a multitude of variables, many of which may appear and disappear with great rapidity. This raises the question of whether, in practical terms, the action can be stopped either by the subject or the experimenter. For example, can we interpose between primary appraisal and coping process to examine secondary appraisal? If the answer is no, then at best we are left with retrospective reports to disentangle, or more likely, no indication at all of earlier events other than the 'final' pattern of threat reactions.

Even if the flow of events can be interrupted, how can we tell at what point we have stopped the action? Here we return to the problem of differentiation. For example, if an anxiety pattern is detected, is this the result of an unsuccessful coping strategy or of no strategy at all? If we detect no anxiety, have we a case of successful defensive reappraisal or one where a primary appraisal of threat has yet to be made? To resolve these problems by resorting to an 'objective' account of the subject's situation and inferring his likely reactions so far, is to undermine the power of the model to account for individual differences. The other alternative is to monitor subjects' state over time and attempt to map the ongoing processes - a task of paralysing magnitude.

Returning to the initial question of whether testable hypotheses can be derived from the model, this is seen as a question itself open to empirical test. Indeed, one of the implicit aims of the present investigation was to examine this question. Although the model presents severe difficulties in this respect, their solution appears to be contingent on investigators' ingenuity, rather than being precluded on logical grounds.

It may be argued that the excellent and comprehensive review of the psychological stress literature provided by Lazarus constitutes support

for the model, and hence resolves the problem of its testability. It is inappropriate and unnecessary to attempt here a detailed critique of Lazarus' use of evidence to support his theory. Particularly since the evidence he cites does exactly that. But there is an important difference between giving general support to a theory and rigorously testing out hypotheses derived from it. As Lazarus acknowledges, much of the evidence he draws from a phenomenally wide literature is deficient in various ways. Virtually every variable of interest has been defined differently by different investigators, and it is thus rarely safe to assume that a variety of findings are in fact concerned with the same phenomenon just because the same name is used. Not only are different definitions assigned, but also different procedures are used to measure nominally the same phenomenon. Moreover, some of these measures, notably projective techniques, are noted for their unreliability and poor validity.

On the basis of the evidence reviewed by Lazarus in his 1966 work it would be fair to conclude that, whilst the existing evidence was in accord with his basic tenets, specific hypotheses derived from the model were, for the most part, untested. It would be a mammoth task, and far outside the scope of this thesis, to attempt an evaluation of the model in the light of subsequent research. A general impression of current psychological stress literatureindicates that the model has yet to be surpassed as an attempt to integrate and explain the diverse phenomena of psychological stress, and remains a useful analytic tool. In the following chapter the more manageable task of reviewing the literature on the recovering coronary patient, from the standpoint of Lazarus' model, will be undertaken.

CHAPTER 3

The psychological literature on the coronary patient may usefully be divided into four categories, using time as the principle of classification. Thus, the first category focuses on the question: what psychological factors increase the risk of prematurely becoming a coronary patient? This first category includes the large number of studies comparing the stable psychological characteristics of coronary patients with those of appropriately matched groups. The second category is concerned with the behaviour exhibited by subjects between the time of overt disease onset, usually of myocardial infarction, and the receipt of medical care. Psychological processes which are manifest during the early recovery period, usually in a coronary care unit (CCU), form the substance of the third category. The final category is concerned with psychological aspects of the coronary patient's long-term recovery and rehabilitation.

The aim of this chapter is to review only the literature in the third category, that concerning the early recovery period in the CCU. This period corresponds with the WHO's "first phase" (24), Kehoe's "acute phase" (25), or Imboden's "middle period" (26). It is not intended to provide a comprehensive catalogue of the psychological literature on the recovering coronary patient. A notable omission is the impressionistic genre of reports exemplified by Lenzner and Aronson's "Psychiatric Vignettes from a Coronary Care Unit" (27). Clinical impressions are, of course, vital to the scientific enterprise. But their primary function is to generate hypotheses. The emphasis in this review is on studies which have systematically tested hypotheses using quantitative methods. Much of the more insightful, impressionistic work has been reviewed by Croog, Levine and Lurie (6).

It was suggested in Chapter 1 that work in this area has displayed two general weaknesses: an absence of theoretical structure, and a

tendency to study isolated elements of the total situation. Accordingly, the review attempts to bring together existing findings within the theoretical framework provided by Lazarus' model.

In the final section of Chapter 2 the problem of empirically differentiating between threat appraisals and self-report threat reactions was raised. This conceptual distinction has not generally been made by investigators of coronary patients. Terms such as reaction, attitude, response, perception and status are used interchangeably. Thus, for the purpose of this review, threat appraisals will not be treated as a separate category of phenomena. All self-report data provided by patients will be included in the class of threat reactions. Findings will be considered under the three headings of (1) threat reactions, (2) coping processes, and (3) their possible determinants. Where appropriate, the extent to which findings support or refute the general principles enunciated by Lazarus will be discussed. The problem of the appraisal/reaction conflation will be taken up in the final discussion of the results from the present study.

1. Threat Reactions

All three categories of threat reaction - affective, behavioural and physiological - have been studied in the recovering coronary patient. The bulk of this section will be concerned with anxiety and depression, certainly the most studied reactions in the first two categories. Two general questions may be posed about threat reactions as such. Firstly, to what degree is a particular reaction exhibited by coronary patients? Secondly, does the prevalence or intensity of the threat reaction show any systematic variation over time?

Various features of the reported work make it difficult to give clear answers to these questions. A meaningful answer to the first question necessarily involves the use of comparative data from some non-

coronary group. The use of comparison groups has been the exception, not the rule. The less arduous task of assessing threat reactions of coronary patients with well-established psychological tests, for which normative data are available, has only been undertaken comparatively recently.

A second problematic feature is the variety of measuring techniques which investigators have used. These range from psychiatric diagnoses, through nurse and investigator ratings of patients' behaviour, to patients' reports on standardised questionnaires and rating scales. Such a variety of measures often makes comparison of prevalence rates a meaningless exercise, the only sure common ground being the investigators' use of the words "anxiety" or "depression".

Measuring techniques are far from the only source of variation between studies. The physical layout of the unit, management procedures, nursing regime, medication practices, length of stay, and perhaps most importantly, the personal characteristics of unit staff - all differ widely. Thus, to say that the subjects of interest are patients in coronary care units is to provide an extremely broad classification. This point necessitates great caution in comparing results from different units, or in generalising on the basis of findings from one unit.

There is one important exception in this catalogue of dissimilarities. Almost all investigators have taken pains to ensure that their subjects have in fact suffered a recent myocardial infarction (m.i.). At the very least then, subjects in different investigations form a homogeneous group with respect to their physical diagnoses.

These caveats stated, what is known about the prevalence of threat reactions in coronary patients? Reactions to particular threat stimuli, such as unit layout, monitoring equipment and cardiac arrests, will be reviewed in Chapter 4. The studies reviewed in the present chapter have

treated the coronary patient's experience as an undifferentiated threat stimulus complex.

Anxiety

Estimates of the prevalence of anxiety vary for the reasons discussed above. Table 1 shows two sorts of estimates: firstly, those which treat anxiety as simply present or absent; and secondly, those which attempt a threefold categorisation. The table also indicates the type of measure used.

Table 1 Estimates of the Prevalence of Anxiety Exhibited by Acute Coronary Patients, using Twofold and Threefold Classifications

Classification	% Prevalence			Measure
Twofold classification	Present		Absent	
Study (28)	29		71	Psychiatric Assessment
(29)	32		68	Psychiatric Assessment
(30)	42		58	Taylor Scale
(31)	44		56	Psychiatric Assessment
(32)	56		44	Nurse observations
(33)	80		20	Behavioural observations
Threefold classification	Severe	Mod.	Mild or None	
Study (34)	15	46	39	Behavioural observations
(35)	17	38	45	Behavioural observations

There is now a growing use of standardised scales, notably the Holland-Sgroi Anxiety-Depression Scale (36), used by Hackett and his colleagues at Massachusetts. However, there are still insufficient data for any one scale to allow useful comparisons of score distributions from different studies.

It was stated earlier that prevalence rates must be viewed in the context of rates found outside the CCU. Anxiety is clearly present in the CCU, but is it any more common or intense than in non-coronary groups in other settings? The trend of the evidence suggests that more coronary patients experience anxiety at levels compatible with psychiatric diagnoses of neuroses than do non-coronary groups.

Using the Personal Disturbance scale of the Symptom Sign Inventory, Cay et. al. (37) found that 30-40% of their 131 m.i. patients fell within the psychiatrically ill classification, as opposed to 16% in a normal population. However, coronary patients appeared to score no higher than other hospitalised patients without coronary disease. In a more recent study Vetter et. al. (38) using a short form of the Neuroticism Scale Questionnaire, found that in the first 30 minutes after admission 272 m.i. patients scored no higher than did other emergency medical admissions. Gentry et. al. (39) have reported that, on the first day in a CCU, patients who are unable to use the coping mechanism of denial, score at the same level as psychiatric patients on the State Trait Anxiety Inventory. Feifel et. al. (40), using psychiatric interviews, have suggested that terminal cardiac patients show significantly greater unconscious fear of death than do normal controls, but to the same degree as terminal cancer patients. Dellipiani et. al. studied two groups of coronary patients: one in a CCU and another taken from a community study of CHD (41). Both groups scored higher than the general healthy population on Cattell's 8 Parallel Form Anxiety Battery.

In contrast Cay et. al. have also reported no significant difference in anxiety level between coronary patients immediately after transfer from

the CCU and either other hospitalised subjects or the general population (28). O'Leary et. al. (42) found that cardiac patients were significantly more frightened by their illness than were other hospitalised subjects. However, no significant difference in anxiety as such appeared in the results from a number of objective scales. We may conclude, in general, that the threat reaction of anxiety is found in many coronary patients in CCUs, and often at levels of intensity experienced by psycho-neurotic patients. Though it is doubtful whether their anxiety exceeds that of other emergency medical admissions, and is in fact lower than patients with myocardial ischaemia (38).

One of the sources of variation in estimates of anxiety prevalence and intensity is the fact that different investigators have assessed patients at different times during their stay in the CCU. Unfortunately, some reports do not make it clear exactly when the assessments were performed, whilst others provide only data pooled over time. However, there have now been sufficient studies carried out which have treated time as an independent variable, to provide a tentative answer to the question - does anxiety vary systematically over time in the CCU?

Five studies have thrown light on this question (35, 39, 41, 43, 44) and, with little reservation, all suggest the same time profile. Both the prevalence and intensity of anxiety seem to peak during the first 48 hours after admission, and then to decline fairly consistently over time until discharge approaches. Froese et. al. (35) and Dellipiani et. al. (41), have reported this secondary peak just before discharge or transfer. The only exception to this time profile is a second peak at the fourth and fifth days after admission reported by Klein et. al. (43). Unfortunately it is not clear from this report whether this second peak coincided with the approach of transfer from the unit, or with some other important event in the patients' recovery. The fact that this second peak occurred for a large number of the patients makes this explanation highly likely.

The bimodal variation of anxiety over time suggested by the literature fits in well with Lazarus' model. As noted in the preceding chapter, Lazarus defines anxiety as "a threat reaction when no clear action tendency is generated" (2p.310). It is the dominant response either when no coping strategy has yet been attempted, or when such a strategy has failed. The early peak in anxiety presumably reflects the extreme degree of threat experienced by those patients who have yet to organise their defences, or those whose attempts at defensive reappraisal have so far failed. As time passes, the potency of the threat stimuli declines,counterharm resources are strengthened, coping strategies become more effective and thus, for most patients, the threat reaction of anxiety is supplanted by other affects. With the approach of discharge from the unit defensive reappraisals may be undermined by the threatened reduction of counterharm resources, a process which is perhaps reflected in a rise in anxiety levels.

It should be borne in mind that score profiles based on grouped data hide great inter-individual variation. Some of the sources of this variation will be discussed in later sections on the determinants of threat reactions and coping processes. For the time being, in the interests of clarity, coronary patients in the CCU will be treated as a psychologically homogeneous group.

Depression

Table 2 indicates that estimates of the prevalence of depression in the CCU also vary widely.

Table 2 Estimates of the Prevalence of Depression Exhibited by Acute Coronary Patients, using Twofold and Threefold Classifications

Classification	% Prevalence			Measure
Twofold classification	Present		Absent	
Study (31)	6		94	Psychiatric interview
(28)	23		77	Psychiatric interview
(30)	29		71	Zung Scale
(29)	30		70	Psychiatric assessment
(32)	42		58	Nurse observations
(33)	58		42	Behavioural observations
Threefold classification	Severe	Mod.	Mild or None	
Study (34)	7	34	59	Behavioural observations
(35)	8	35	57	Behavioural observations

The striking similarity between the two threefold classifications probably reflects the fact that both studies were done by the same team of investigators in the same hospital. This team, led by Dr Hackett, have invested a great deal of energy in developing their measuring procedures, and have thereby made a significant contribution to our understanding of the recovering coronary patient.

The question as to whether the depression displayed by coronary patients is any more or less prevalent or intense than that found in other groups has been little discussed. As in the case of anxiety, the few findings suggest that coronary patients exhibit higher levels of depression than those found in the general population. For example,

Gentry et. al., have reported higher scores than normal on the Zung Depression Scale amongst coronary patients, though their scores were lower than those achieved by diagnosed reactive depressives (39). Dovenmuehle and Verwoerdt have also produced evidence which suggests that patients with cardiac diseases exhibit more intense depression than that found in the general population (45).

When the prevalence rates of anxiety and depression in any one study are compared there is a striking tendency for depression rates to be consistently lower. Of course, this may be an artifact caused by the different problems associated with assessing anxiety and depression. But it may be argued that, since these rates are based on data pooled over time, the higher anxiety rates represent a summation of the threat experienced by most patients at various times during the early recovery period. Thus, anxiety would be experienced by many patients in the precoping phase at admission, perhaps again as discharge approaches, and intermittently between these times as coping strategies fail.

There is some evidence that depression, on the other hand, does not appear in many patients until the third or fourth day, and may not prove a management problem until some time after this. Hackett and his colleagues have argued in favour of this bimodal distribution of affect prevalence - first an anxiety peak, then a depression peak (46). The bulk of their anxiety referrals in a series of 441 coronary patients occurred on the first two days after admission, whilst depression referrals peaked on the third and fourth days (29).

For those patients who do experience depression the evidence is mixed as to the variation in its intensity over time. Froese et. al. have provided evidence of a consistent downward trend between days 1 and 7 using the Holland Sgroi Scale (35). As in the case of anxiety, depression levels rose again as discharge approached. Klein et. al.'s study (43), referred to earlier, made use of an upset score of which depression was a component. This upset score followed a similar profile

to that found in Froese's study. In contrast, Gentry et. al., using the Zung Depression Scale, could find no difference between patients' scores on the first and fifth days after admission (39). This latter finding may be due to the insensitivity of objective self-report scales relative to that of observer scales for assessing affect in the CCU. This point has been raised by several investigators who have attempted to use both types of scale (42, 44).

Once again the available data on depression in coronary patients are consistent with Lazarus' theoretical formulations. In Lazarus' terms depression reflects a state of inaction following a secondary reappraisal of helplessness. We would therefore expect the advent of depression to follow that of anxiety chronologically. In the immediate post-confrontation period the anxiety experienced by many patients reflects their struggle to cope with threat. As time passes some patients will appraise their coping attempts as futile and, for these, depression will ensue. Evidence from various studies suggests that anxiety and depression exhibited by coronary patients are positively correlated (30, 32). So it appears that depression does not supplant anxiety, but coexists with it. Thus, although inaction, reflected in depression, is seen as a direct-action coping pattern, it appears to be ineffective at reducing threat, as reflected by heightened anxiety. However, as further time passes and counterharm resources are strengthened, it seems that patients experience less and less depression. As in the case of anxiety, only the nearing confrontation with new threat stimuli associated with transfer and discharge reverses this trend.

Other Affective and Behavioural Threat Reactions

No other single threat reaction has received as much attention as either anxiety or depression. Various investigators have studied the complex of emotions denoted by terms such as hostility, anger, aggression

and irritability. In a study of 441 m.i. patients reported by Cassem and Hackett, 8% of psychiatric referrals were for hostility problems (29). From another sample of 50 m.i. patients, 11 were judged to be angry (33). Karstens, in a psychoanalytic study of 10 m.i. patients, reported that all of his subjects displayed problems in handling their aggression (47). In a group of 62 patients hospitalised with various types of cardiac disease Dovenmuehle and Verwoerdt found that 9 (15%) were experiencing at least moderate irritability, which was positively correlated with their anxiety experience (45). No clear picture of the prevalence of these affects can be gained from these data, especially in the absence of comparison groups. Only one study has provided time related data on hostility. Since one of the components of Klein's upset score, described above, was hostility, there is some suggestion that when hostility occurs it peaks shortly after admission, declines over the following 3-4 days, and then begins to rise again (43).

A much quoted study performed by Parker and Hodge (48) is one of two which have reported the prevalence of delirium in CCU patients. In a series of 500 patients these authors were alerted to 11 (2%) cases of delirium. They indicate that this is probably an underestimate since the cases were not sought out, but notified to them by staff. The time of onset was between 15 and 96 hours after admission and the mean duration was 4½ days. In attempting to explain these extreme reactions the writers refer to the sensory monotony and sleep deprivation induced by the use of oxygen tents and monitoring equipment for these patients. Hackett et. al. (33) found that 5 out of 50 m.i. patients displayed delirium. In their discussion they describe this as a low rate in comparison to that found in patients recovering after cardiac surgery. However, the striking absence of comment on delirium in other studies of the coronary patient suggest that the reaction may be less common than either of the two quoted studies suggest.

Various other reaction rates have been reported including: 16% agitation (33), 66% cooperation (32) and 42% lowered self esteem (45). However, since the present writer could only find one study on each of these reactions little of note can be said in conclusion about them. To avoid too much detail, the results from these studies will not be discussed any further.

Physiological Threat Reactions

It has been known for some years that catecholamines are elevated immediately following a myocardial infarction (49, 50). But only recently have attempts been made to relate these physiological parameters to psychological processes exhibited by coronary patients in the CCU. To this writer's knowledge only two teams of investigators have examined catecholamine changes over time in this context, though at least one other study has treated catecholamine levels as threat reactions to a particular stimulus complex - that of transfer from the CCU (51)

Klein et. al. (43) found that both adrenaline and noradrenaline peaked during the first two days after admission, then dropped to normal levels by the fourth day. Noradrenaline then rose again, presumably as transfer approached, whereas adrenaline did not. The noradrenaline time profile was thus very similar to the upset score profile referred to above. Adrenaline, on the other hand, showed a reciprocal relationship to positive feeling scores over time, but little relationship to upset score changes. A breakdown of the upset score into hostility and depression components revealed an apparent tendency for the former reaction to be associated with lower adrenaline levels than the latter - a confirmation of Funkenstein's hypothesis on the different affects associated with adrenaline and noradrenaline (52).

Miller and Rosenfeld (44) found a similar early peak in adrenaline and noradrenaline levels followed by a decrease, flattening out by the

sixth day after admission. These investigators also studied corticosteroids, and reported a peak on day 3 for corticosterone and unchanging but high cortisol levels. Such a pattern fits well with the general adaptation syndrome described by Selye (8), wherein the initial alarm reaction, manifest in adrenal medulla activity, is followed by the stage of resistance reflected by adrenal cortical activity.

In contrast to Klein et.al.'s study, Miller and Rosenfeld (44) reported an association between adrenaline levels, anxiety and arrhythmias, whereas noradrenaline appeared to be mainly associated with cardiac damage and failure. Corticosteroid levels also appeared to be related to anxiety. These mixed findings are further complicated by a very recent investigation conducted by Vetter et. al. (38). This investigation of 19 m.i. patients found no association between catecholamines and anxiety immediately after admission. However catecholamines were related to infarct severity - an indication that catecholamine levels are mainly determined by physical factors, at least in the early stages. This variety of findings undoubtedly reflects the massive problems involved as disentangling psychological and purely physiological determinants of catecholamine and corticosteroid activity. Although specific relationships remain to be clarified it may at least be said that the general trends of psychological and physiological findings are consistent with each other. This general picture of heightened activity, with a subsequent decrease to normal levels found in a number of parameters meshes with both intuition and with Lazarus' general model of coping with threat.

One final physiological threat reaction has recently been studied, that of galvanic skin potential (GSP). In a study of 25 acute coronary patients Froese et. al. (53) found no clear association between GSP and either anxiety or depression, as measured by the Holland Sgroi scale. However, as the author states, it is an over-simplification to treat mean GSP as a direct measure of anxiety or indeed of any other affect (page 7).

Significant associations did appear with both anxiety and depression when particular GSP responses to groups of interview items were analysed using multiple regression techniques. Froese et. al. rightly advise great caution in interpreting these results and, certainly, no clear statement on GSP as a threat reaction in coronary patients can be made before the results of replication studies now in progress are known.

2. Coping Processes

The literature on coping processes used by the recovering coronary patient is dominated by reports on denial. This domination is reflected by the amount of space given to denial in this section.

Denial

Weisman and Hackett have defined denial as "the conscious or unconscious repudiation of all or a portion of the total available meaning of an illness in order to allay anxiety and to minimise emotional stress" (54). In a later paper (55) Hackett and Cassem, the leading investigators in the field of denial and CHD, describe the development of their thinking on denial, and acknowledge a major debt to the seminal work of Weinstein and Kahn (56).

Measures of denial have fallen into three categories: those which attempt to assess only the repudiation phenomenon; those which try to measure denial indirectly in terms of the subject's success in allaying anxiety and minimising emotional stress; and those which seek to assess both of these aspects. An example of the first type is provided by Croog et. al.'s study of 345 m.i. patients (57). In this investigation subjects were classified as deniers if they answered "no" or "I don't know" to the question "Do you think you had a heart attack?" Gentry et. al.'s 1972 study (39) exemplifies the indirect approach to denial measurement. Here subjects were categorised as deniers if they answered

"No" to the question "Did you feel afraid, frightened or apprehensive at any time during your hospital stay so far?"

The global approach to denial assessment, which attempts to detect both the occurrence and emotional consequences of repudiation, is clearly seen in the work of Hackett and his colleagues at Massachusetts. The term "global" is used since, in fact, these investigators assess not only the current cognitive, affective and social behaviour of the subject, but also his past use of coping strategies. Their work is also noteworthy for its progress beyond the binary, present/absent approach to denial measurement. In their early studies they used a three-fold classification of denial - major, partial and minimal - based on subjective assessments of patients' behaviour (33, 58). More recently, this method has been supplanted by the Hackett-Cassem Denial Scale (55). This is a 31 item rating scale consisting of questions asked and scored by the interviewer, though a 14 item short form has also been used (35). The interobserver reliability and external validity in relation to the three-fold classification system have been reported as satisfactory (59).

Table 3 lists various estimates of the prevalence of denial amongst coronary patients, classified according to the type of measure used.

Table 3 - Estimates of the Prevalence of Denial exhibited by Acute Coronary Patients Using Three Types of Measure

Measure	% Prevalence			Study
Cognitive Repudiation				
Denial present	20			(57)
Affective Control				
Denial present	25			(30)
	50			(39)
Global				
(a) Hackett-Cassem Scale : Denial present	47			(35)
(b) Three-fold classification :	Major	Partial/ Moderate	Minimal/ Mild	
	17	38	45	(59)
	23	47	30	(34)
	30	26	44	(60)
	40	52	8	(33)

If the three-fold classifications are reduced to twofold ones by combining the "major" and "partial" categories, a clear prevalence gradient of denial appears across measures. The gradient is in line with common sense, in that at its lowest point are those patients who exhibit absolute denial of the occurrence of their m.i. More common are those who report no negative affects. Probably the main reason for the higher prevalence of this aspect of denial is the inclusion of false positives, that is, patients who are genuinely not threatened by their experience and thus have no need of a coping strategy such as denial. The two estimates of denial assessed via affective control are strikingly different. The figure of 50% is probably an unstable over-estimate since the sample size in this study was only 16.

As one would expect, at the top end of the prevalence gradient of denial lie estimates based on global assessment. The estimates range from 47% to 92%. Again, the figures should be treated with caution since the sample sizes are rarely large. In fact, one of Hackett's earlier studies has been omitted completely since only 8 m.i. patients were assessed, 7 of whom were deniers (58).

Presumably much of the variation in these global ratings is due to the subjective nature of the assessment procedure, a problem only partly overcome by the introduction of the Hackett-Cassem Scale. Even attempts to assess straightforward denial of being ill are prone to problems of low interobserver reliability. Miller and Rosenfeld provide data exemplifying this problem, and an interesting discussion of some of its possible causes in a recent paper (44).

Although estimates of the prevalence of denial vary both within and between measures, it is undoubtedly the coping process most reported in the CCU. As an extreme example, one report from Hackett's team (31), also omitted from Table 3, suggested that all of a sample of 32 patients exhibited denial. At the other extreme, of 145 psychiatric referrals from

a CCU only 8 (6%) were for denial (29). These were undoubtedly extreme cases detected by nurses and physicians, not sought out by investigators. Yet, even here denial was the only coping process reported since no other coping process was clearly present enough to warrant attention. Karstens (47), in a psycho-analytic study of 10 patients reported being particularly impressed with the common use of almost total denial of illness. As a final comment on the evidence regarding the prevalence of denial, no information was readily available on how much this coping strategy is used by non-coronary groups.

Some evidence has been reported concerning the stability of denial over time during the patient's stay in the CCU, and indeed beyond. If patients are classified as deniers and non-deniers then, over time, they do not change from one group to the other. However, if denial is measured globally, on a continuous scale, the intensity of the experience seems to vary systematically over time. In support of the first point, Froese et. al. (35) found that deniers and non-deniers, determined by their scores on the Hackett-Cassem Scale, remained so classified throughout the first 25 days after admission. Croog et. al. (57), defining deniers as patients who at discharge rejected the occurrence of their m.i., have reported that such patients are still denying the event 1 year later. In a study of 10 survivors of cardiac arrests Druss and Kornfield (61) found that, 6 weeks after the event, all subjects were still employing defensive reappraisals, notably denial and isolation.

Data from Froese et. al.'s study (35) suggests that the intensity of the denial experience peaks in the first few days and declines over time. In general, the more intense the initial experience the sooner the drop in intensity. As discharge approaches deniers show an increase in the intensity of their denial behaviour, whereas non-deniers (scores below 15 on the Hackett-Cassem Scale) do not. In support of this early peak in denial Cassem and Hackett (29) have reported that psychiatric referrals for

denial problems in CCU are at their maximum on the second day after admission. In contrast Miller and Rosenfeld (44), measuring mainly the cognitive denial of illness component, could find no significant changes in intensity during the first 6 days after admission. However, as was mentioned earlier, these investigators also reported difficulty in the administration of their measuring procedures.

Denial and Threat Reactions

Various investigators have looked at relationships between the coping process of denial and threat reactions such as anxiety and depression. All of the five studies known to the present writer seem to encounter a fundamental difficulty. To establish that a meaningful association exists between two phenomena it is first of all necessary to define the two variables independently of each other. Yet in the studies to be discussed, denial is defined partly or wholly in terms of affect intensity. Thus, it is hardly surprising that denial and affect appear to be significantly correlated.

Froese et. al. (35), using the Hackett-Cassem Denial Scale and the Holland-Sgroi Anxiety Depression Scale found that deniers were less anxious than non-deniers, though only significantly so at the third and fourth days after admission. The anxiety levels of deniers dropped faster than those of non-deniers, but swung up higher as discharge approached. The authors suggest that deniers thus control their anxiety more quickly than do non-deniers. No significant differences in depression were found between deniers and non-deniers, except that only the former were significantly less depressed on the fifth and seventh days as compared to the preceding days. Denial is therefore seen as an effective strategy to combat anxiety, but less so for depression. In a later study Froese et. al. (53) found that denial was also significantly related to GSP reactions to certain sets of interview items.

Grosser et. al. (60), using the three-fold classification system, report that both major and partial deniers display minimal anxiety and depression. Gentry et. al. (39) assessing denial by a simple question about affective experience (see above), found that non-deniers were more anxious on the fifth day than were deniers on the first day after admission. No difference in blood pressures was found between deniers and non-deniers though the pressures of both groups declined uniformly over time. Finally, Miller and Rosenfeld (44), using two separate measures of denial of illness could find no association between denial and either catecholamine or corticosteroid excretion.

Although the notion that denial and affect are inversely related is reasonable and theoretically sound, the above studies cannot be viewed as unreservedly supporting this hypothesis. To do this a study must avoid the contamination of one variable by another, consequent upon overlap in their definitions. In the case of associations between physiological threat reactions and denial, the problem still remains that denial may be confounded with anxiety and depression. Thus, the findings of Froese et.al. (53) concerning GSP and denial may not hold up if the effects of anxiety and depression are partialled out. At this stage our knowledge concerning the relationships between denial and threat reactions in coronary patients is insufficient to support any general conclusions.

Before leaving this section it is interesting to consider the possible consequences for the coronary patient who successfully uses denial. On the positive side, Hackett and his colleagues have suggested that successful deniers have better prognoses, both in terms of morbidity and mortality, for the two years following myocardial infarction (33, 62). They tend to return to work and other activities more quickly; marital conflicts are fewer; and, in general, they report that their m.i. has had little impact on their lives (30, 57). On the negative side, successful deniers tend to be less compliant than non-deniers with regard to medical

advice (57, 62). The consequences of this non-compliance are not apparent in mortality and morbidity experience of the two years following the m.i., but it is possible that deniers may be increasing their coronary risk in the more distant future. Croog et. al. (57) have also reported that deniers experience more depression in the year following their m.i., but Stern (30) has reported quite the opposite for both depression and anxiety.

Other Coping Processes

Although other coping processes, such as reaction formation, repression (47), displacement and projection (61) have been reported, little systematic work has been done on processes other than denial. In fact only one study of note has been reported. Klein et. al. (43) combined threat reaction scores to provide two coping patterns: adjustment/non-adjustment and expression/repression. Non-adjusters had higher adrenaline levels than adjusters on Day 1 and a general tendency towards elevations in noradrenaline levels, whereas adjusters' levels tended to decline. Moreover, in the days following the five day study period, the mortality rate for non-adjusters appeared to be significantly higher than for adjusters. Expressors, who also tended to be adjusters, had lower adrenaline levels than did repressors. Until further work clarifies the relationships between denial, adjustment and expression/repression the significance of this pattern of findings remains unclear, particularly the apparent contradiction between the respective consequences of denial and repression.

To conclude this section on coping processes we must ask how well do the findings discussed fit in with Lazarus' model? If we re-examine Lazarus' description of the appraisals which lead to a defensive reappraisal, we would predict that a strategy such as denial would be that most commonly used by the recovering coronary patient, as indeed the evidence

suggests. The potentially high degree of threat, the absence of viable direct-action strategies, the ambiguity of the threat stimuli and the social pressures to be optimistic about recovery - all push the patient in the direction of cognitive coping strategies such as denial. As threat decreases and counterharm resources are strengthened, other coping strategies should become viable, and the intensity of denial should decrease. This pattern is consistent with the evidence on time changes in denial intensity. As in the earlier case of anxiety and depression, denial only appears to increase again as discharge approaches and threat is heightened again. The apparent protective effect of denial casts an interesting light on a coping process which one might be tempted to label as maladaptive, and has important implications for nursing and rehabilitation strategies.

3. Determinants of Threat Reactions and Coping Processes

So far in this review m.i. patients have been treated as a homogeneous group, except that some exhibit certain threat behaviour, whilst others do not. For the remainder of this chapter we shall consider which characteristics of patients appear to explain this variation in behaviour. The word "determinants" is perhaps less appropriate than "correlates". But it has the advantage of focusing on characteristics which existed before the threat reactions and coping processes were exhibited, as opposed to the consequences of this behaviour.

Anxiety

There is evidence that the age of a patient does not bear any relationship to the anxiety he experiences in a CCU (32). Vetter et. al. (38) have recently reported that women are more anxious than men in the period immediately following admission to a CCU, but there seem to be no other reports of sex differences in anxiety experience.

Two teams of investigators have found no relationship between the previous experience of a myocardial infarction and anxiety in the CCU (30, 34), whilst two others have suggested that patients who have suffered a previous m.i. experience less anxiety than those who have not (37, 32). The second of these two studies, conducted by Rosen and Bibring, found an interaction between m.i. history and social class, such that white collar workers experienced greater anxiety than did blue collar workers following their first attack. However, at their second attack, this class difference in anxiety disappeared. Hackett and Cassem have recently contrasted these findings with some of their own showing no anxiety differences between social classes, or indeed education, and discussed possible reasons for disparities between studies (34). In the context of social class it is also appropriate to mention Cay's finding that unemployed patients were more likely to be upset in the CCU than were employed patients (28), and Dominian and Dobson's report that patients from the lower social classes were less likely to be reassured (1).

Neither infarct severity nor duration of hospital stay appear to affect anxiety levels as such (28, 37). However, Dominian and Dobson (1) have found that both of these variables are inversely associated with the extent to which a patient is reassured.

There seems to be no evidence available which directly links patients' history of psychiatric problems to anxiety levels in the CCU. Cay et. al. (28) have reported that patients with such a history are less likely to be reassured, a reaction which they found to be associated with high anxiety levels. However, Dominian and Dobson report no association between psychiatric history and reassurance (1). Of related interest is the finding that psychological disturbance appeared to be higher in patients who had been under stress in the two years preceding their m.i. (37). No evidence could be found which demonstrated the influence of stable personality characteristics on anxiety in the CCU. Related to this point is Dominian

and Dobson's finding that patients' scores on the Taylor Manifest Anxiety Scale and on the Eysenck Personality Inventory bore no relationship to whether or not they were reassured in the CCU (1).

Depression

Unlike the findings on anxiety and age, the evidence regarding the relationship between age and depression is conflicting. Rosen and Bibring (32) have reported a positive correlation between these two variables. Although tangential to this issue, it is appropriate to quote Kavanagh and Shepherd's findings on depression after m.i. (63). Using the MMPI on patients 16-18 months after their m.i., they found two distinct groups, one of which was both notably more depressed and older than the other group, which was distinguished principally by elevated hypomania scores. Once again Hackett and Cassem (34) have taken issue with Rosen and Bibring's findings, and claim that there is no significant relationship between coronary patients' age and their depression experience in the CCU. Two other investigators (30, 45) have also reported no significant association. Only one study could be found which examined the association between sex and depression (45). No such association could be demonstrated.

Two studies have provided conflicting information concerning social class and depression. Stern et. al. (30) report that depression is significantly more common in lower class coronary patients, whilst Hackett and Cassem (34) find no evidence to support such an association. Until methodological differences are resolved it is likely that such conflicting results will continue to appear.

The only other relevant data known to the present writer concern the relationship between depression and the patient's m.i. history. Again, conflict is the hallmark. Cay et. al. have reported that patients with a history of m.i. experience more depression than do patients with no history (28, 37). Stern et. al. (30) could find no such association. No evidence

could be found relating depression experience in the CCU to any other patient characteristics.

Coping Processes

The use of denial appears to be unrelated to age or sex (35, 57). Three teams of investigators have reported that sociodemographic variables such as social class, marital status and education, with the exception of nationality (57), bear no relationship to the use of denial (34, 30). Rosen and Bibring again provide an exception to the main trend since they have reported that blue collar workers are more likely to exhibit denial than are white collar workers, though only after their first m.i. (32).

A recurrent theme in the writings on denial in the coronary patient is that of the prevalence of trait denial. Hackett and his colleagues, in particular, have repeatedly stated that patients exhibiting state denial in the CCU tend to use denial in a variety of situations (33, 35, 58, 60, 62). Deniers show a consistent under-reaction to threat, tend to disavow fear in others (58), tend not to seek medical aid for angina pectoris (60), and so forth. The difficulty here, as stated earlier, is that Hackett and his colleagues define state denial partly in terms of trait denial. Accordingly, in these studies, state denial is being correlated partly with itself.

One study has escaped this problem by defining deniers simply as patients who do not think they have had a heart attack (57). The investigators were in substantial agreement with Hackett's position in suggesting that state deniers exhibit a generalised tendency to cope with any sort of threat by using denial. This conclusion meshes well with earlier comments on the apparent stability of state denial over time.

Three studies have examined the possible influence of other stable psychological characteristics on the use of denial, all with negative

results. Croog et. al. (57) found that none of 22 items comprising a personality measure was associated with denial. Stern et. al. (30) reported that deniers produce completely normal scores on the California Personality Inventory. Finally, Gentry et. al. (39) could find no association between scores on two measures of trait anxiety and denial.

Only one other coping process has been examined in relation to patient characteristics. Klein et. al. (43) found that patients without a history of m.i. were more likely to adjust to their experience than were patients with a history. However, this finding was statistically non-significant.

The section of determinants of threat reactions and coping processes is notably shorter than those on their prevalence. This reflects our comparative lack of knowledge about relationships between the variables that have been discussed. In turn, this supports the introductory comment on the tendency for researchers to study variables in relative isolation from each other.

In conclusion, how well do the findings in this final section correspond with hypotheses derivable from Lazarus' model? The mixed evidence concerning the effects of sociodemographic variables on anxiety, depression and denial is consistent with the non-directional role assigned to these variables in the model. Undoubtedly the most striking correspondence is between Lazarus' comments on the notion of a coping disposition and the evidence concerning state and trait denial. Though, as we have noted, the failure to separate these two variables in various studies necessitates great caution in interpretation of the evidence on the coronary patient.

Throughout this chapter comments on how far findings support or refute Lazarus' model have been notable for their weakness. Terms such as "correspond with", "is consistent with" abound. This low-powered and seemingly uncritical commentary is made inevitable by the simple fact that

investigators have not been testing hypotheses which they have specifically derived from Lazarus' theoretical model. There is thus a gap between the general principles embodied in the model and the specific findings reported by various investigators which can be bridged in many ways according to the particular hypotheses under investigation. The investigation reported in Chapters 5-9 was an attempt to provide a more rigorous evaluation of parts of Lazarus' model by testing specific hypotheses derived from it.

CHAPTER 4

I

When the present investigation was being planned in 1972, the literature contained few reports of objective psychological assessment of coronary patients during the acute phase of their recovery. The first priority was therefore to establish the general constraints imposed on measuring procedures, both by the state of the patient and by the coronary care unit (CCU) setting. The first pilot study undertaken is reported in some detail in Section II, since the results shed important light on matters other than the feasibility of the assessment procedure used. In Section III there follows a discussion on the general problems of assessing coronary patients in a CCU.

The cardiologists responsible for the patients in the Stoke Unit introduced a major constraint before any investigations were initiated. They decided that no patient assessment should be attempted until the fourth day after admission. By this time patients are mobile, though not necessarily walking, and no longer attached to any monitoring equipment. It has been interesting to note the increasing confidence of researchers in the last few years, who now assess patients from the time of admission. In the present study both the cardiologists and the investigator were unwilling to risk upsetting patients at this most critical time of their recovery. The resulting lack of information concerning psychological reactions during the 72-hour period after the patient's attack was a deficiency in the study, but an unavoidable one at the time. Possible effects of this missing information are discussed in Chapter 8.

It was both desirable and necessary to set out by establishing good relations with both patients and staff. The cooperation of the staff was of particular importance for various reasons, besides the investigator's obvious desire to establish a friendly working relationship. Staff/patient

relations on this particular Unit were outstandingly good and were reflected in the almost continual conversations held between the two. Since the present study would obviously be a topic of conversation on the Unit it was important that the staff should convey a favourable impression of it to patients, to encourage their participation. Staff were also extremely useful in general discussions of the coronary patients' psychological situation. Informal discussions of their impressions and theories proved very helpful in the planning and running of the study. In the course of the investigations, staff also relayed useful information concerning the comments of patients following their participation.

The general aim of the pilot study was to establish contact with patients and staff, and thereby gain some idea of the problems attendant on the assessment of coronary patients. More specific subsidiary aims were to assess the feasibility of interviewing patients during their stay in the CCU, and to gain a qualitative account of patients' reactions to various aspects of the Unit. Given this last aim it is appropriate here to describe the Unit and to stress its unusual characteristics.

The Stoke CCU is a large open ward for men only, containing 20 beds. The first six beds are equipped for continuous electrocardiographic (ECG) monitoring. All of the beds can be surrounded by curtains, but these are usually drawn back. The vast majority of patients admitted to the ward are suspected cases of myocardial infarction. Patients spend their entire hospital stay, which rarely exceeds ten days, in the Unit. During the first 72 hours they are monitored and then typically spend the rest of their hospital stay further down the ward, and in an adjoining common-room. After the third day physical activity is gradually increased, so that by the fifth day patients are usually walking. Patients are allowed to see visitors for thirty minutes each week-day evening and for an hour on week-end afternoons. In fact, this system is operated by the staff in a flexible way to suit the needs of the individual patient and his family.

Most patients are discharged from the Unit to their homes, a few being transferred to a convalescent home because of inadequate home circumstances. During the six weeks after discharge patients who have no heart failure follow a programme of gradually increasing physical activity. At the end of this time they are reviewed in the outpatient clinic, where they are advised to return to work if there are no contra-indications. Each patient remains under the care of the same consultant cardiologist throughout his stay in the Unit and for subsequent visits to the outpatient clinic. A more detailed description of the Unit and its procedures can be found in a recent paper (64). For a general account of the development of CCU design and management procedure, Meltzer & Kitchell's recent paper provides a good source (65).

Three major features of the Stoke CCU distinguish it from other units. Firstly, the Unit is open plan and not divided into cubicles as are most other units. Secondly, both the duration of bed rest and of overall stay in the Unit is unusually short, though in the last few years, this policy of early mobilisation has become more widespread. Thirdly, patients are discharged directly to their homes, rather than to a general medical ward. The unusual characteristics of the Stoke CCU were the primary reason for choosing to study patients' reactions to it. As the results showed, this proved to be a worthwhile investigation.

II

Subjects

Forty patients were selected at random from those admissions to the Unit who were aged between thirty and sixty, had suffered a recent proven myocardial infarction (m.i.), and were in a sufficiently good state of health to be interviewed. Table 1 shows the primary psychosocial characteristics of the sample.

Table 1 Primary Psychosocial Characteristics of 40 Coronary Patients

Age

Group	Frequency
36-40 years	1
41-45 years	7
46-50 years	9
51-55 years	8
56-60 years	15

Age range = 39 - 60 years

Mean age = 51.4 years

Social Class (Registrar General's)

Class	Frequency
I	3
II	5
III N	1
III M	16
IV	7
V	7
Unemployed	4

Marital Status

Category	Frequency
Married	36
Widowed	2
Single	2

Method

Discussions with staff indicated that patients are usually both able and willing to discuss their experiences. Accordingly it was decided to interview patients individually, as this seemed the least distressing type of assessment procedure. Most patients were interviewed between the fourth and eighth day after admission in a side room on the Unit. At the beginning of each interview the confidentiality of any information received was emphasised, as was the fact that the purpose of the study was to improve coronary care for future patients. It was further stressed that the

interviewer was not a member of the Unit staff, but had been invited by them to study coronary care. These points were emphasised to encourage honest replies.

Each interview lasted approximately thirty minutes, and was based on a schedule of questions intended to elicit patients' reactions to various aspects of the Unit. Every attempt was made to avoid asking leading questions, and patients were encouraged to respond freely, digressing if they wished. The aspects of the Unit to which patients' reactions were sought were: the monitoring procedure, transfer from the monitor to an unmonitored bed, witnessing the cardiac arrest of another patient, the prospect of leaving the Unit, the adequacy of information provided and general aspects of the post-monitor period, including the commonroom and visiting arrangements.

Patients' replies were recorded on tape, and later classified as indicating either an adverse, neutral or favourable response to a particular aspect of the Unit. This classification was based entirely on the content of patients' replies. The actual range of replies given by patients was fairly limited, and replies to specific questions tended to be short. A particular reply was usually clearly identifiable as belonging to one of the three categories. Replies expressing any form of negative affect, however mild, were placed in the adverse category. Neutral responses were typically of the form "I didn't mind" or "It didn't affect me". Any reply which clearly expressed a positive affect, such as enjoyment or pleasure, was categorised as favourable. Very occasionally replies contained a mixture of adverse and favourable responses. Such replies were counted twice, once for each category. The subjective nature of this procedure was appreciated and felt justifiable in the context of what was essentially a qualitative study.

As patients' views of leaving the Unit and of the adequacy of information provided were undoubtedly affected by the time at which they

were interviewed, it was decided to check patients' retrospective views of these two aspects. Thus six weeks after discharge patients were either re-interviewed at the out-patient clinic or received a short questionnaire by post. Of the thirty six survivors six weeks after discharge, fifteen patients were re-interviewed and twenty-one received the questionnaire. The ten percent mortality rate was unusually high, but in a sample of only 40 was probably of no significance.

Results

No patient refused to be interviewed. Of the twenty one questionnaires sent to patients six weeks after discharge, seven were not returned. As a result, data concerning patients' attitu des in retrospect were obtained from only twenty nine patients.

A general picture of the distribution of patients' adverse responses is given in Table 2.

Table 2 Frequency of adverse reactions to various aspects of a Coronary Care Unit reported by 40 patients

Aspect	Frequency
Monitor	4
Transfer from monitor	0
Common room	4
Visiting arrangements	19
Witnessing a cardiac arrest (N = 33)	8
Prospect of leaving the CCU	2
Leaving the CCU in retrospect	1

Monitoring procedure

Of the four patients who reported that they had been disturbed by the monitoring procedure, three were unable to pinpoint the source of their disturbance, whilst the fourth reported that his reaction was evoked when he remained on the monitor for a fourth day, having been told by another patient that he would be taken off after three days. Several other patients said that they had been irritated by the problem of ECG electrodes working loose.

No patient reported any adverse psychological reaction to being transferred to an unmonitored bed. Most of the patients said that they saw the move as a sign of progress towards recovery and were consequently very pleased. This feeling was often enhanced by a sense of relief at being freed from the constraints of the monitor leads.

Commonroom and visiting arrangements

The four patients who expressed adverse reactions to the commonroom all felt that it was an unnecessary part of the Unit, and would have preferred to remain in the ward throughout their stay. The remaining thirty six patients felt that the commonroom was an extremely valuable and essential part of the Unit where they could sit in comfort and talk or be entertained. Various criticisms were made of particular aspects of the room, but the vast majority of patients were strongly in favour of there being such a facility.

Almost all of the nineteen patients who expressed dissatisfaction with the visiting arrangements wanted longer periods during the week.

Cardiac arrest

Of the thirty three patients who were aware that another patient had suffered a cardiac arrest, eight reported that the experience had upset them in some way. In attempting to explain their reactions, several

patients referred to the fact that the arrest had revived memories of close relatives who had died in similar circumstances. Frequent mention was also made of the physical proximity of the patient suffering the arrest. It is interesting that no patient who was aware of a cardiac arrest reported feelings of alarm concerning his own survival.

Typically, the reactions of these eight patients were short-lived, being frequently over-shadowed by feelings of admiration for the speed and efficiency of the staff in dealing with the arrest. Each of these patients, when asked if he would have preferred a single room to have avoided being in the proximity of an arrest, said that he would not.

Most of the patients who were apparently undisturbed by a cardiac arrest in another patient, including one who had himself suffered an arrest, reported a primary reaction of admiration for the staff. Patients were often puzzled by their own lack of distress and usually attempted to explain it as the consequence of a general accepting and fatalistic attitude towards their future.

Leaving the Unit

Only two patients said that they were disturbed at the prospect of leaving the Unit. When re-interviewed six weeks after discharge one of these patients reported that after leaving he had on occasions experienced the desire to return. The other said that his worries had soon disappeared when he had reached home.

Many of the thirty eight patients who had said that they were undisturbed at the prospect of leaving the Unit had stressed how important it was for them to return to their relatives and homes as quickly as possible. None of the patients from this group who were questioned six weeks after discharge reported having felt any desire to return to the Unit during their convalescence.

Adequacy of information

The two most frequently reported deficiencies were: lack of information about what had actually happened to the patient's heart; and a shortage of specific advice concerning future activities and avoidance of further infarction. A few patients also felt the lack of information on their treatment progress. Most of the seventeen patients who said that they were satisfied with the information supplied to them indicated that their satisfaction stemmed from their desire to remain in ignorance. Of the twenty nine patients who gave their retrospective views on the adequacy of the information supplied specifically to guide their activities during their six weeks' convalescence, only five felt that it was insufficient.

Social aspects

Patients' reactions to the social characteristics of the Unit are implicit in some of the results already described, particularly in those concerning the commonroom. More explicit evidence was provided by the fact that twenty four patients spontaneously stressed the importance of frequent contact with patients and staff in combatting loneliness, boredom and preoccupation with personal problems. One patient said that he was infuriated by most of the other patients, but confessed that he was in great need of someone to talk to.

Age and social class

Chi square analyses and, where appropriate, Fisher's exact probability tests (66) were applied to the data to discover whether age or social class influenced patients' reactions to the Unit. Only one significant finding emerged. Significantly more men in the 39-49 than in the 50-60 years age group reported adverse reactions to witnessing a cardiac arrest (Fisher's $p = 0.0152$).

Discussion

The principal psychological benefit experienced by patients on the Unit was the social support given by other patients, staff and visitors. Apart from patients' specific statements to this effect, evidence was provided by: the widespread conviction about the importance of the commonroom; the frequent desire for longer visiting hours; the preference for an open ward expressed by those patients who had been upset by another patient's cardiac arrest; and the desire, reported by many of the patients, to return to their families as quickly as possible.

These findings are consistent with evidence from various psychological and sociological studies which indicate that in crisis situations people experience a heightened need for social support and reassurance (67 pp 92-3). More specifically, Dominian and Dobson (1) have reported similar findings in their study of patients' reactions to the CCU at the Central Middlesex Hospital. Leigh et. al. (68) have also produced evidence which suggests the importance of social contact in their comparative study of patients' reactions to an open CCU and to one consisting of individual cubicles. They found a significantly higher incidence of separation anxiety and covert hostility in patients in the closed unit, reactions which seemed to be associated with the occurrence of cardiac arrhythmias.

In contrast, Cay et. al. (28) found that of the 179 patients who were reassured by the CCU in their sample of 203, 51% said that one of their reasons for being reassured was the privacy afforded them by their single rooms. Other investigators have described the hazards of social contact, particularly the witnessing of crises. For example, Bruhn et. al. (69) reported significant increases in blood pressure and heart rate, and increased anxiety in a group of patients who had seen a death on the ward. These findings encouraged them to recommend separate rooms for patients in CCUs. Hackett et. al. (33) found that all of the eleven patients in their

sample who had witnessed a cardiac arrest expressed a preference for a single rooms should they ever return to the unit, although only three had reported anxiety at the time of the event.

This last finding contrasts strongly with data from the present study since, although the percentage of patients who reported anxiety on witnessing a cardiac arrest was similar, none of our patients expressed a preference for a single room. Although no systematic attempt was made to measure coping mechanisms, the low incidence of adverse reactions to cardiac arrests in the present study strongly suggests that psychological defences, such as denial, were being used by patients. As indicated in the last chapter, the use of denial by coronary patients has been well documented. If such defences are being used effectively by at least some patients in CCUs, and if their use does not itself hinder recovery, it may be that witnessing cardiac arrests is less psychologically hazardous for many patients than one might expect. In this connection it is worth reiterating Hackett and Cassem's finding that those patients whom they call major deniers have a better short-term and long-term prognosis than those whom they call minimal, mild and moderate deniers (33).

It is clearly not yet possible to weigh the benefits of social contact against the hazards of witnessing cardiac arrests in order to provide practical advice on the design of CCUs. Neither of these phenomena has been studied in sufficient detail to allow a definitive assessment of their effects on the patient. However, the results suggest that both the importance of social contact and the ability of patients to cope with crises in the CCU may have been underrated. If the use of psychological defences provides effective protection from distress without interfering with recovery, a general policy of protection by social isolation may be unnecessary for many patients and may even inhibit their recovery.

Patients' reactions to the monitoring procedure suggest that it was not seen as being particularly distressing. This finding is in accord with that reported by Dominian and Dobson (1) who found that only six of their 74 patients were distressed by the monitoring procedure, and with the findings of Hackett and Cassem (70). In general the monitors seem to promote a sense of security and a feeling of reassurance in most patients, as long as they are sufficiently well-informed as to the monitor's function and behaviour.

Patients who are admitted to the Stoke Unit experience two major transitions, the first from a monitored to an unmonitored bed, and the second, from the Unit to their homes. It is interesting that no patient reported distress at the first transition, whilst only two felt at all disturbed at the prospect of the second. There is thus little evidence of dependency at either stage. Comparisons with other studies are complicated by the fact that in many other units, transfer from the monitor coincides with transfer to another ward, and transfer home often follows a hospital stay of some weeks. Nevertheless, other investigators have reported that dependency is a not uncommon problem, particularly at transfer from the unit to a general ward, but also at final discharge from the hospital (1, 51, 61).

In the present study the prevailing attitude towards transfer from the monitor and leaving the Unit was that both were concrete signs of progress and were consequently cause for reassurance and often for elation. It is possible that certain features of the Stoke CCU promote this attitude and combat dependency. Since transfer from the monitor does not coincide with transfer from the Unit, patients do not seem to feel any sense of being suddenly and finally taken away from intensive care facilities. As they remain in the same ward with the same staff no major adjustment to their surroundings has to be made at this stage in their recovery. If such a situation were prolonged it might encourage dependency. However, since a

patient is rarely in the Unit for more than ten days, it seems likely that this provides insufficient time for serious dependency problems to develop.

The results also indicate that the provision of information for patients on the CCU has potentially hazardous aspects. The most common of these seems to be the presentation of ambiguous information. As Kornfeld (71) has pointed out, the CCU can have the dual effect of both reassuring the patient and emphasising the critical nature of his condition. This can result in the patient being confused as to his actual diagnosis, treatment and particularly his prognosis. More than half of the patients in the present study wanted more information on at least one of these matters. It was apparent from their comments that they were seeking information not primarily to combat ignorance, but to remove confusion engendered by ambiguous information already received from both staff and patients. Not surprisingly, patients often stressed their desire for information which would produce a maximum reduction of ambiguity. This finding is consistent with Lazarus' suggestion that threat is heightened where threat stimuli are ambiguous (2 p.117).

Besides receiving ambiguous information a patient may also be misinformed, particularly by other patients. There is a great exchange of facts and beliefs between patients in an open CCU as in any social group. This process may result in distress, especially where the information received conflicts with that provided by the medical staff. The patient in the present study who was alarmed by his four day stay on the monitor, having been told by another patient that he would be transferred after three days, provides a clear example of this phenomenon.

It is important to highlight the finding that most of the seventeen patients who declared themselves satisfied with the information they had received said that they preferred to remain in ignorance. Individual variation in methods of coping with threatening situations forbids a straight-forward approach to the problem of information presentation. Over-

zealous presentation may be as distressing to some patients as withholding it is to others. In an attempt to meet the needs revealed by this study a booklet was prepared and made available to the patients on the Unit. It contained information on the nature of the myocardial infarct, the treatment procedures used in the Unit and patients' future activity. While this was clearly not a complete solution, it was hoped that provision of such a booklet helped to counteract some of the hazards described.

The finding that younger patients were more likely to react adversely to witnessing a cardiac arrest is without apparent precedent in the literature. It seems reasonable to suppose that younger men would find it more difficult to adopt the fatalistic attitude described by many patients. On a more empirical footing, it was likely that the younger patients were suffering their first m.i. Since there is some limited evidence (32, 37) to suggest that patients with a coronary history generally experience less anxiety than those without, the present finding may be an indirect replication of this finding, rather than an indication of some purely age-related phenomenon. The absence of relationships between patients' social class and their psychological reactions adds to the mixed evidence in this area, which suggests that sociodemographic variables have no clearly definable influence on behaviour in the CCU.

A discussion of the general problems discovered in working with coronary patients follows in the remainder of this chapter. With reference to the subsidiary aims of this small pilot study, it may be concluded that the primary psychological benefit reported by patients was the social contact allowed by the open plan design of the Unit. The low prevalence of dependency problems suggested that the policy of admitting patients for a short period and discharging them directly to their homes may be psychologically beneficial. On the question of the feasibility of an interview assessment procedure, no problems of any importance were encountered.

III

Experience in the preceding pilot study indicated various constraints on psychological testing in the coronary care unit. The first set of constraints was purely the result of the structure of the Unit and its management procedures. As noted earlier, the Unit is organised and designed to maximise patients' physical and psychological well-being. Thus every member of the staff has a clearly defined role in management; every area of the Unit has a specialised purpose related to patient care. The running of the Unit is governed by routine punctuated only by emergencies when the cardiac team has to act swiftly to save a patient's life.

The investigator is inevitably an intruder into this setting. He has no assigned role, no place to work and is outside the hospital routine. These comments are made to stress the care which had to be taken to ensure minimum interference in the Unit's functioning. In practical terms this resulted in constraints both of time and space. The necessary inflexibility of the hospital routine meant that patients were frequently "on call" for anything from a meal to the consultant's ward round; thus lengthy psychological assessment procedures were not possible. Because of space limitations the only testing area available was a small side bedroom used by staff on call during the night. The size and design of this room precluded the use of any laboratory equipment of any size, or the use of sophisticated observation techniques.

A matter of paramount importance in selecting measures was the physical and psychological state of the patients. As has already been indicated, it was decided not to assess patients before the fourth day after admission. Even after the fourth day the patient is still very weak. Sometimes he experiences chest pain and occasionally has difficulty in breathing. It is vital at this stage that he experiences the minimum possible exertion, thereby allowing scar tissue to form over the site of the infarct; and that no

excessive demands are made of an inefficient heart. Accordingly the patient cannot be exposed to any assessment procedures which are physically tiring either as a result of the intensity or duration of the testing experience.

Demands on the cardiovascular system may also result from autonomic nervous activity in the wake of some psychological stressor. Measures had therefore to be chosen which were unlikely to arouse undue anxiety or any sort of strong emotional reaction. Clearly, many of the patients would enter the assessment situation in an anxious state due to their physical predicament. This anxiety would undoubtedly be heightened, if only temporarily, by the testing situation itself. Bearing in mind the potential disruptive effect of intense anxiety on skilled performance, it seemed unwise to include tests which demanded great concentration from the patient. It also seemed likely that patients would not be highly motivated to engage in seemingly pointless and perhaps repetitive tasks often found in laboratory settings.

Given these general constraints on assessment procedures, four general categories of measurement were then considered. These were physiological, ethological, behavioural and self-report measures. Physiological assessment appeared attractive because patients were already undergoing various forms of physiological examination, notably enzyme assays, though these were only carried out during the very early part of the admission period. It might, for example, have been interesting to have measured catecholamine output as a measure of arousal in response to the m.i. crisis. However, no physiological techniques were employed. Not the least important reason for this was the writer's lack of knowledge and expertise in the field of physiological measurement. Although clinicians with the appropriate expertise were at hand, their workload was such that they could not undertake further investigations on the writer's behalf. Two further reasons for the exclusion of physiological techniques stem from

the patient's state following his m.i. The cardiovascular system is in the process of recovering from a major assault. It has been shown that catecholamine excretion increases greatly during the four to five days after an m.i., a process which appears to be independent of psychological factors (49, 50). This unusual physiological state would therefore make it very difficult to interpret a parameter such as catecholamine excretion as a potential measure of anxiety since it would involve the disentangling of the physiological and psychological components of the response. Once again it is interesting to note that very recently attempts have been made to do exactly this, as was discussed in Chapter 3.

As Levi (72) has pointed out, the variables which have to be controlled if accurate and reliable catecholamine assays are to be achieved are numerous: notably diet and time of day. It was neither possible nor desirable to attempt to exercise any such control over patients during their acute recovery period. One of the most obvious sources of uncontrollable variation was the various drug regimes which patients undergo. Their medication includes sedatives, diuretics, beta blockers, and anticoagulants, most of which are known to induce changes in the autonomic nervous system, thereby potentially confounding psychological interpretations of sympathetic and parasympathetic nervous activity. For example, it has been shown that beta blockers can have a significant anti-anxiety effect (73).

Finally, and most importantly, there were the patient's feelings to consider. By the time he was fit enough to be seen for psychological assessment he had undergone a multitude of intensive examinations and monitoring procedures. It was felt that to expose him to yet more intrusive, potentially stressful procedures involved in physiological examinations was both unwise and unsympathetic.

By ethological assessment in this context is meant the systematic observation of patients' activities in the ward setting. The first problem with this sort of measurement is that of <u>who</u> is to be the observer.

It was felt that the writer could not adopt this role himself. Clearly the absence of covert observation facilities would have made the observer painfully obtrusive in such a setting. In a ward where patients' inactivity is enforced any newcomer or any new event obviously attracts great attention. Although this would have doubtless decreased with time the potential disruption of patients' behaviour by the observer's presence was felt to be too great for valid measurement. Further, the total observation time for any one patient would only have been four days at the most, perhaps too short a time for patients to become habituated. The obtrusive nature of the observor's presence would have been accentuated by his lack of role in a situation where, as has been pointed out, every member of the medical staff has a clearly assigned set of tasks. Apart from rendering the observer obtrusive, the more important problem of possible disruption of ward routine was raised. Conversation with the medical staff made it clear that to have entered the ward as an observer would have been to go beyond the permissible bounds of disruption. Quite simply, the observer would have been in the way however much care he exercised. In a ward where emergencies are not uncommon, such an intrusion would have been not only unwarrantable, but potentially lethal.

The alternative to participant observation was to train a member of the staff in the appropriate observation techniques. Again the primary objection was disruption. Since the observer would have had to have been an active member of the ward staff either observation or nursing or both would have suffered. Apart from this practical objection ethical problems are also raised. Such a situation would have involved the communication of confidential information by the observer to the investigator without the patients' knowledge. No procedure of this type was therefore undertaken.

A further tactic to obtain information about the patient would have been to question his friends and relatives who visited the Unit. Once again this method was rejected on the grounds that it was both unethical and

unsympathetic to request friends and relatives to observe and report on a particular patient. It is also worth reiterating that visitors to the Unit usually saw the patients for only thirty minutes every week-day and for one hour at the week-end. Further, since only two visitors were allowed at the bedside at any one time the actual time spent by any one visitor was typically much less than half an hour. Thus observation periods would have been exceptionally short. A final difficulty is that patients clearly have a vested interest in avoiding upsetting their visitors and may therefore present a totally unrepresentative behaviour sample.

In the early stages of test battery construction, various behavioural tasks were pilot tested. These included a speed writing task, a time estimation task and a learning task. It quickly became clear that such behavioural tasks were not appropriate measures for coronary patients at this stage in their recovery. Most of the problems stemmed from the fatigued state of the patients who therefore had some difficulty in concentrating on a learning task or in exhibiting skilled physical performance. Poor concentration and reduced physical tone made such tasks inappropriate. A further problem was raised by the time estimation task and resulted from the type of setting in which the test was given. It was discovered that after completing the task, patients returned to the common-room where, not surprisingly, they discussed the tests with other patients.

This latter group, who were later selected as subjects, then proceeded to practise tasks in the commonroom and were thus highly skilled by the time they reached the investigator. Various ways of avoiding this practice effect were considered including, masking the true purpose of the task and simply asking patients not to discuss the test procedure. Apart from the limited success of these strategies, the difficulties created by the patients' physical state were sufficiently great to warrant excluding the use of behavioural assessment procedures. One exception to this, an

interview technique, was made, for reasons to be discussed later.

After many discussions with staff and patients and attempts to pilot test various forms of assessment techniques, it was finally decided to include only self-report techniques. The weaknesses of self report data are well known - notably the effects of response styles - though it is interesting to note that Nunnally has argued that response styles in fact explain very little variance in most tests and inventories (74 Ch.15). Details of the interview, questionnaires and rating scales which were used in the main investigation are given in Chapter 6. The purpose of this chapter has been to communicate the factors which generally constrained the investigator's activities in the CCU, and specifically led to the adoption of self report techniques.

CHAPTER 5

The background to the main investigation has now been given in sufficient detail. Two tasks are undertaken in this chapter. In the first section the particular variables chosen for study in the main investigation are described. The theoretical categories of Lazarus' model provide appropriate headings within this section. In the second section follows an account of the research questions and hypotheses to which the present study was addressed.

I

Threat stimuli and their appraisal

Bearing in mind the warning given earlier on the dangers of assuming the threat potential of stimuli, attempts were made to discover which aspects of their situation most concerned patients. This information came from various sources. Primary amongst these was the section of the interview, described in Chapter 4, concerning the adequacy of information provided for patients. It was assumed that patients' answers to this open-ended question would reflect at least some of their concerns.

To supplement this information two other sources were tapped. During the first few weeks of visiting the Coronary Care Unit (CCU), the investigator spoke informally with many patients about the problems of recovering from a coronary attack. Often patients seemed glad of the opportunity to discuss their worries and spoke with surprising frankness. Finally, the nursing staff were asked to describe the sorts of questions which they commonly received from patients, or which patients were heard to discuss amongst themselves. The excellent staff-patient relations in the Unit, based on their almost continuous contact, suggested that the staff would provide a rich source of knowledge on patient problems.

On the basis of two criteria - frequency of report and apparent intensity of feeling associated with the report - four threat stimulus complexes

were selected for investigation.

A heart attack

It was no great surprise to find that patients' problems revolved around their perception of a heart attack. This complex of threat stimuli exhibited three major facets. Firstly, was the experience of having had a heart attack, with its common associations of pain and fear. Secondly, and of most interest from the theoretical standpoint adopted here, was the threat of a future heart attack, perhaps with less fortunate consequences than the first. Thirdly, was the perceived impact of both the experienced attack and the threatened future attack on the patient's life. When developing a measure of the appraisal of this threat stimulus complex, the threat of a future attack was thought of as the primary element, whilst the experience and personal meaning of an attack were seen as subsidiary elements, contributing to the form of the primary threat.

The future

Discussion with patients made clear the great variety of specific problems which they thought the future held. Rather than attempt to measure specific threat stimuli concerning various problem areas, it was decided to gain a global, and necessarily crude, picture of patients' appraisals of their future life. The selection of "the future" as a threat stimulus was based on patients' natural deep concern with the general question as to what their future life would be like. The inclusion of this threat stimulus was also justifiable on theoretical grounds, given the central role of threat, defined as the anticipation of future harm.

The job

Perhaps not surprising, given the sex of the patients involved, was their concentration on problems concerning their work. Once again the

stimulus complex seemed to have various foci. The most important amongst these were: the possible role of work pressures and dissatisfactions in the aetiology of their attack; and the future job changes which would be necessitated by their disease. A growing literature attests to the significance of the work situation, both in the development of the disease (75), and in the rehabilitation of the coronary patient (76). Accordingly, an attempt was made to measure patients' appraisal of their job, again in a panoramic fashion.

The Coronary Care Unit

Hackett and his colleagues have written of the psychological "hazards" of the CCU (33), and other investigators have expressed their worry over the threat potential of such units (77, 78). This literature and the writer's own observations have already been documented in Chapter 4.

Early discussions with patients in the present study indicated a common concern with the questions "What is being done to help me recover, and why is it being done?" It seemed therefore important to examine patients' appraisal of their support system, namely the CCU. Apart from wanting to investigate the potency of the CCU as a collection of threat stimuli, it was also desirable to measure aspects of patients' counterharm resources, amongst which the CCU inevitably looms large. Moreover, following the interesting results obtained in the pilot study of the CCU, to obtain a more objective, quantitative measure of patients' appraisal of the Unit was a logical next step.

Before moving on to the next section, two important points must be made. It cannot be stressed strongly enough that no assumption was made as to the threatening nature of the chosen stimulus complexes. Rather, on the basis of existing findings and personal experience, it was suspected that the chosen stimuli would probably be appraised as threatening, to some degree, by many patients. Indeed, this assumption of individual variation

in appraisal patterns was necessary for measurement to be undertaken at all.

Finally, no distinction has been made in this section between primary and secondary appraisal. This reflects the fact that both types of appraisal were measured simultaneously, using the same measure. However, the appraisal measures were designed so that it was possible to examine individual items of the measure and thereby obtain a picture of both primary and secondary appraisal of the threat stimuli.

Threat Reactions

Two threat reactions were studied: anxiety and depression. These were chosen since they appear to be the most prevalent threat reactions found in the CCU. Also, as will become clear in the following section, they constitute the affective components of the coping processes which were studied.

Coincidentally, the particular measuring instrument which was used to assess anxiety and depression also contained a hostility scale. The threat reaction of hostility was also therefore measured, though no specific hypotheses were formulated concerning this variable.

Coping Reaction Patterns

Three coping reaction patterns were chosen for investigation. This choice was determined by the evidence reviewed in Chapter 3, which suggests a high prevalence of these patterns amongst coronary patients, and by theoretical considerations discussed in Chapter 2.

The three patterns were denial, inaction and anxiety. Each pattern was operationally defined in several ways, in terms of its cognitive and/or affective components, as assessed by appraisal and threat reaction measures. This approach was suggested by Lazarus' description of coping processes as being reflected in particular configurations of appraisals and threat reactions. The operational definitions given below are derived from

Lazarus' descriptions of the patterns quoted on pages 24-26.

(1) Denial

This was defined in three ways:

(a) Cognitive and affective denial, manifest in positive appraisal and low anxiety and low depression scores.

(b) Affective denial, manifest in low anxiety and low depression scores.

(c) Anxiety denial. Since there is some evidence that denial may be effective in controlling anxiety rather than depression (35), the coping process may be manifest simply in low anxiety scores.

(2) Inaction

This was defined in two ways:

(a) Cognitive and affective inaction, inferred from a combination of negative appraisal and high depression scores. Since anxiety and depression states may co-exist, the anxiety level in this pattern is not specified.

(b) Affective inaction, manifest simply in high depression scores.

(3) Anxiety

This was defined in two ways:

(a) Cognitive and affective anxiety, inferred from a pattern of negative appraisal and high anxiety scores. Following the same argument as above, depression scores are not specified.

(b) Affective anxiety, inferred just from high anxiety scores.

The actual measurement technique used will be discussed in the appropriate section of the following chapter.

Determinants of Appraisal and Coping

The outline of Lazarus' model in Chapter 2 contains a list of the many factors which may influence appraisal and coping. Particular variables were studied in the present work either because of their suspected theoretical importance, or their evident relevance to the coronary patient, or both.

Type A Behaviour

The Type A or Coronary-Prone Behaviour Pattern has been described as follows:

"The Type A Behaviour Pattern is a particular action-emotion complex which is exhibited by an individual who is engaged in a relatively chronic and excessive struggle to obtain a usually unlimited number of things from his environment in the shortest period of time or against the opposing efforts of other things or persons in this same environment. The Type A individual exhibits enhanced personality traits of aggressiveness, ambitiousness, competitive drive, is work oriented with preoccupation with deadlines, and exhibits impatience and a strong sense of time urgency" (79 p126).

This pattern is seen as one end of a continuum. The other end is designated Type B and consists essentially of the relative absence of the characteristics described. The various measures which have been developed to assess the pattern, and the particular measures chosen for the present study will be discussed in the following chapter.

Why should this pattern be examined in the present study? In theoretical terms it provides a specific set of motivational characteristics and beliefs concerning environmental transactions - important determinants of primary and secondary threat appraisal in Lazarus' model. On intuitive grounds, it seems likely that a behaviour pattern which revolves around notions such as "struggle", "action", "achievement" and "time urgency" will

be of great interest in a setting where these characteristics are actively discouraged, if not actually downright dangerous.

But overshadowing these speculative considerations is the impressive body of evidence which supports the significant role played by the behaviour pattern in the aetiology and recurrence of myocardial infarction (m.i.). The pattern is, without doubt, the most researched and best established psychological risk factor in coronary disease (CHD).

The bulk of this evidence has come from a series of studies conducted by Friedman and Rosenman in San Francisco. Of prime importance has been a prospective study, recently terminated after 8½ years (80). In 1960 over 3000 men aged 39-59 were assessed on known CHD risk factors such as cholesterol and smoking, and their behaviour classified as being Type A or B. Followup data showed that extreme Type As experienced double the incidence of CHD experienced by extreme Type Bs (81, 82). These same studies indicated that the behaviour pattern was significantly associated with each of the three major manifestations of CHD: myocardial infarction, angina pectoris and sudden death.

Attempts have also been made to relate Type A behaviour to known risk factors or precursors of CHD. When compared with extreme Type Bs, extreme Type As have significantly higher cholesterol and triglyceride levles (83, 84), and a significantly higher consumption of cigarettes (85). Of particular interest have been data which indicate that Type As exhibit approximately twice the degree of coronary atherosclerosis shown by Type Bs (86).

Since the pathogenic effects of the pattern are presumably mediated by the pituitary-adrenal system, endocrinological investigations have also been carried out. The results indicated that Type As exhibit significantly higher total catecholamine and noradrenaline secretions (87, 88) and lower growth hormone levels (89).

The main weakness in the work on Type A behaviour and CHD is the

relative absence of replication studies. No other prospective studies have been reported. Two retrospective replication studies have confirmed the association (90, 91) (See Cassel (92) for a confirmatory interpretation of Keith et. al.'s findings). Various other retrospective studies have demonstrated significant associations between the prevalence of CHD and personality characteristics similar to those found in the Type A pattern (93, 94). Jenkins has published an excellent and comprehensive review of work in this area (95, 96).

Friedman and Rosenman's findings are impossible to dismiss, but their generalisability remains open to question. All the more so since their main study sample was a non-random group of selected company employees, the vast majority of whom held executive posts. Moreover, no attempt was made to measure environmental factors such as job pressures. The possibility remains therefore that Type A behaviour only has pathogenic significance in certain environments. Evidence now coming from the Honolulu Heart Study gives some support to this suggestion. Cohen and her colleagues report that Type A behaviour alone is not associated with CHD among Japanese-Americans in Honolulu (97). Their data suggest that the components of the pattern vary from culture to culture, and that the risk of CHD may increase as the pattern more closely approximates that found in San Francisco.

It is not appropriate here to examine further the complexities of the evidence relating Type A behaviour to CHD. The point to be made now is that the inclusion of the pattern as a variable in the present study can be justified on theoretical and intuitive grounds, but above all on the empirical grounds that no other set of motives and beliefs has been shown to have such clear relevance to the development and recurrence of myocardial infarction.

Trait Denial

The selection of trait denial for investigation needs little description or justification. As noted in Chapter 2, among the theoretical determinants of secondary appraisal are the individual's coping dispositions. Further, as described in Chapter 3, various investigators have suggested that subjects who use denial in the CCU, also do so in other contexts. Since state denial was included as a coping reaction pattern, it seemed useful to examine also the role of trait denial, that is the propensity to use state denial as a coping strategy.

Psychiatric History

The notion of ego resources as a potential determinant of secondary appraisal and coping is an attractive one, though as yet unsubstantiated (See Chapter 2). Since the investigator had access to the complete medical records of the subjects, it was an easy task to discover which patients had at some stage been referred to a psychiatrist. The existence of a psychiatric history was therefore adopted as an exceedingly crude indicator of low "ego resourcefulness". Whatever the inadequacies of this operational definition, the inclusion of psychiatric history may also be justified on the grounds of wishing to replicate those studies which have examined this factor as a predictor of coronary patients' behaviour (See Chapter 3).

Psychosocial and Medical History

As a matter of course, standard psychosocial information including patients' age, education, social class and religion, and their history of CHD were recorded. Two variables however were examined with a definite purpose in mind, both relating to Lazarus' comments on the role of intellectual resources, education and sophistication in threat appraisal. The number of years of education experienced by patients was recorded as an indicator of "education". Also a record was made of whether or not patients

had experienced a previous myocardial infarction, as a very rough gauge of their level of sophistication regarding coronary disease. This last variable was not seriously intended as an operational definition of sophistication, but rather as an easily collected, potentially relevant piece of information.

Recent Life Changes

The final variable selected for investigation was the amount and type of changes experienced by patients in the year preceding their coronary attack. Lazarus does not explicitly take account of the possible effects of recent experiences on the appraisal of and reaction to current threat. But the idea is implicit in his insistence on explaining threat behaviour by reference to its intrapsychic and situational context. Thus, it seems reasonable to hypothesise that recent experiences will shape appraisal of the current threat situation and may thereby influence the resulting coping reaction pattern.

The recent upsurge of interest in life change measurement and theory undoubtedly stems from Holmes and Rahe's 1967 paper in which they introduced their Social Readjustment Rating Scale (98). Holmes in turn has acknowledged his debt to Adolf Meyer's concept of the life chart, a device for relating psychosocial information to patterns of disease and health (99). Perhaps because of Meyer's precedent, investigators have tended to concentrate on the relationships between life change and illness susceptibility. Certainly the contents of two recent books on the subject strongly indicate this trend (100, 101).

In a search of available life change literature the present writer was unable to find any study which explicitly took as its dependent variable the appraisal of, and reaction to, disease, rather than the actual onset of disease. Yet, on both theoretical and intuitive grounds, it seems likely that recent life changes may be a partial determinant of a disease's psychological impact.

A further reason for including a life change measure was the existence of evidence which suggests that life changes play a part in the aetiology of myocardial infarction. For example, coronary patients report significantly more life change in the year prior to their coronary event than do healthy controls for a comparable year; and they also report a build-up of life change as their attack approaches (102, 103). Unfortunately, these and similar findings are open to criticism because of the retrospective design used by the investigators. This type of study encounters various problems including, differential reporting accuracy, a possible conflation of prodromata and life changes, and the possible operation of a major confounding variable which may influence both reporting of life events and the onset of disease. Brown has provided an excellent critical discussion of methodological problems in life change technique (104).

The few prospective studies that have been reported suggest that life changes are not yet clearly implicated as predisposing factors in CHD (105), but do seem to play a precipitative role (106). However, the suggestive nature of the evidence from retrospective studies and the low level of measurement so far achieved, suggest that recent life changes cannot be discounted as possible risk factors in CHD.

As in the earlier section on Type A behaviour, it is neither appropriate nor necessary to go any further into the intricacies of life change research. The major aim has been to indicate the relevance of life change measurement to CHD and to supplement the theoretical justification for its inclusion in the present study.

II

The research questions and hypotheses formulated for the main investigation may be classified under three headings: prevalence questions, comparative hypotheses and hypotheses derived from the theoretical model.

A. Prevalence Questions

The first general aim of the study was simply to describe the distribution of the variables chosen for study in a group of 50 coronary patients, during the early days of their recovery. Specifically, the following questions were asked:

1) How do patients appraise four threat stimulus complexes: a heart attack, the future, the job and the coronary care unit?
2) With what frequency do threat reactions of anxiety, depression and hostility occur?
3) How common is the Type A behaviour pattern amongst patients?
4) To what extent do patients exhibit the characteristic of trait denial?
5) What are the primary psychosocial and medical history characteristics of the patients?
6) How may the extent and type of recent life changes reported by patients be characterised?

B. Comparative Hypotheses

Since the only available normative data from the various measures used came from studies in other countries, it was decided to assess at least one comparison group of males without CHD, using items from the coronary group test battery. Apart from providing a set of data which suggested "normal" score profiles, this arrangement also enabled the investigator to test out certain hypotheses concerning differences between the coronary group and the comparison group.

These three hypotheses were all suggested by the literature on the role of psychosocial risk factors in the aetiology of CHD, already discussed in earlier sections of this chapter. It cannot be emphasised strongly enough that, since the design of the current study

was essentially retrospective, no firm conclusions can be drawn from these comparative data concerning the pathogenic influence of these psychosocial factors in CHD. The following hypotheses were seen only as attempts to replicate earlier retrospective studies which had produced evidence of the significance of Type A behaviour, life changes and job dissatisfactions in the development of CHD.

1) Coronary patients will score significantly higher on measures of Type A behaviour than will their coronary-free counterparts.
2) Patients will report significantly more life change for the year preceding their coronary attack than will healthy comparison subjects for the same period.
3) Patients will exhibit significantly lower job appraisal scores than will a coronary free comparison group.

C. Hypotheses derived from the theoretical model

The third general aim was to formulate and test certain specific hypotheses suggested by Lazarus' model. In the following, a high appraisal score indicates a positive or benign appraisal; a low appraisal score indicates a negative or harmful appraisal. Threat reactions refer to the negative affects of anxiety, depression and hostility. Coping reaction patterns refer to particular configurations of appraisal and affect scores. Page references refer to Chapter 2.

The hypotheses tested were:

1) "CCU" appraisal scores will correlate positively with both "heart attack" and "the future" appraisal scores. This hypothesis follows from Lazarus' postulated balance-of-power relationship between counterharm resources and perceived potency of threat (p.12).

2) Three coping reaction patterns will be discernible: successful defensive reappraisal or denial, inaction and the anxiety pattern.

Assuming that these patterns can be identified, two further hypotheses may be tested.

a) The anxiety reaction will be less common than either denial or inaction. The rationale for this is that patients were not assessed until the fourth day after their attack at the earliest. Thus, it may be argued that by this time many patients will have successfully adopted coping strategies and their anxiety reactions will have been supplanted.

b) Following the same line of reasoning, the anxiety reaction will appear significantly more often in patients seen in the first half of the assessment period, than in those seen in the second half. (The assessment period was from the fourth to the eighth day after admission).

3) Patients who display the Type A behaviour pattern will have significantly lower "heart attack" and "future" appraisal scores, and significantly higher affect scores than will Type B patients. This hypothesis reflects Lazarus' general principle concerning the influence of motivation and belief systems on the degree of threat experienced (p.16). As suggested earlier, the Type A individual is of special interest since, intuitively, it seems that he would be particularly threatened by situations which endangered his potential for action.

4) Patients who score highly on trait denial will more likely exhibit state denial than will those who score low on trait denial. This is a straightforward hypothesis derived from Lazarus' discussion on the role of coping dispositions (p.23).

5) Patients with a psychiatric history will be more likely to use the coping reaction pattern of denial than will those without such a

history. As noted above, this constitutes a very rough and indirect method of examining Lazarus' suggestions on the role of ego resources in the use of coping reaction patterns which are not reality-oriented. (p.23).

6) Patients with limited educational experience will tend to exhibit lower appraisal scores and higher affect scores than those with more prolonged education. Similarly, patients with no previous experience of myocardial infarction will show the same pattern of scores relative to experienced patients. Once again these hypotheses are seen as a crude attempt to assess Lazarus' suggestion on the relevance of education and sophistication to threat behaviour (p.18).

7) Finally, it was hypothesised that patients who exhibited high life change scores would be more likely to show the coping reaction pattern of inaction than would patients who had experienced low life change. The rationale here was that patients would be overwhelmed by a major health crisis coming at the end of an already taxing year, and would thus be more likely to experience feeling of hopelessness and helplessness.

This completes the list of hypotheses which were tested in the main investigation. In the next chapter we turn to a consideration of the subjects, methods and procedures used in the study.

CHAPTER 6

Subjects

Coronary Group

All subjects who took part in the study were male admissions to the Stoke Coronary Care Unit (CCU). (At this time no similar unit was available for female patients). In order to be selected, patients had to meet certain criteria.

1) Patients had to be aged between 30 and 60 years old. The upper age limit was adopted since many of the questions asked by the investigator referred to the patient's current working conditions. Many patients over the age of 60 would have been retired, and therefore unable to respond appropriately. The lower age limit simply reflects the age below which myocardial infarction is virtually non-existent.

2) Subjects had to be of British birth and to display a reasonable degree of literacy. These criteria were necessary since patients were called on to read and understand various forms in the assessment procedure. In the event, only two patients were excluded because they did not meet these criteria.

3) The remaining criteria concerned the diagnosis and clinical status of the patients. The most important of these was that patients should have been definitely diagnosed as having suffered a myocardial infarction (m.i.). This diagnosis was based on the presence of at least two out of three characteristics: an appropriate history, serial electrocardiographic (ECG) changes and serial enzyme changes. The particular ECG and enzyme changes taken to be of diagnostic significance in the Stoke CCU are indicated in the words of the Unit's director, Dr Peter Carson: "The ECG criteria for transmural

myocardial infarction were the presence of pathological Q waves which were accompanied by serial ST-T wave changes to indicate that the pathological Q waves were probably of recent origin. Non-transmural infarcts were diagnosed when there were only serial ST-T wave changes. Left bundle branch block was not taken to be proof of recent myocardial infarction unless it was accompanied by serial enzyme changes. The enzyme criteria for acute myocardial infarction were serial changes in serum glutamic oxyloacetic acid transaminase and/or in lactic dehydrogenase; blood was taken for these enzyme studies on the first three days after admission" (Personal communication).

4) To be selected, patients had to have been in the Unit for no less than four days, and no more than eight days. As stated in Chapter 4, for various reasons it was decided that no patient should be approached before the fourth day. Moreover, often it was not until this time that a definite diagnosis was made. The choice of the fourth day was also governed by the decision that no patient should be seen who was still attached to a monitor, or to an intravenous drip, or, for any other reason, confined to bed. Thus the patients who were seen were either in wheelchairs or walking.

The eighth day was chosen as an upper limit since after that day patients were discharged with rapidly increasing frequency. In fact, as will be described later, some patients were discharged before the eighth day, thereby undermining the original design of the study.

A sample of 50 patients who fulfilled the above criteria was collected over a period of several months during 1973-4. Due to other commitments, the investigator was unable to obtain a sample of consecutive admissions. Instead the Unit was visited usually at least three days a week. During these visits <u>all</u> patients who met the selection criteria were asked if they

wished to participate in the study. Of those approached, only two patients refused to take part.

Since the sample was clearly non-random the question of possible biases must be raised. Two possible sources of bias suggest themselves. As will be explained in the procedure section, it was originally planned that patients be assessed on two days between the fourth and eighth day after admission. Since this procedure involved a balanced block design, patients were to be assigned at random to pairs of days, with the constraint that no more than five patients should be assigned to any one of the ten possible pairs of days.

However, since the investigator could not visit the Unit every day, a bias was introduced into this assignment procedure. Thus, by being admitted on a particular day of the week patients were more likely to be assessed on certain pairs of days than on others. This bias is, of course, only of importance if we have evidence which suggests that different physical or psychological subgroups are admitted at different times of the week. The present writer knows of no evidence relating patient characteristics to day of admission.

A second possible source of bias in the sample concerns the effect of crises in the Unit. On two or three occasions it was suggested to the investigator by the medical staff that he refrain from seeing patients on that particular day. On these occasions the ward staff were in a state of turmoil, either over a flurry of admissions, or because one or more cardiac arrests had just occurred. The investigator of course complied with the staff's request to return on another occasion. This meant that certain, eligible patients were sometimes not assessed during or immediately following times of great activity and perhaps upset in the Unit. It is possible therefore that the samples of behaviour investigated did not include some examples of extreme, short-term threat reactions which may have occurred during the investigator's absence.

The first source of bias discussed, that of the timing of visits, is not seen as serious since, in the event, it proved impossible to carry out the balanced block design. Even though the day of admission to some extent still determined the days of assessment, the lack of evidence relating patient characteristics to day of admission reduces the risk of serious bias. The occasional omission of patient assessment due to ward crises is much more serious. However, all that can be done is to make it clear that the prevalence rates of threat reactions reported in the present study are possibly an under-estimate of the true rates.

It may be concluded that, although the patients seen were probably representative of the defined subpopulation of admissions to the Unit, the sample of their behaviour was perhaps biased in the sense that it possibly provided an underestimate of the intensity of threat reactions exhibited by patients. Generalisation to coronary patients in other CCUs should be viewed with great caution, given the unusual characteristics of the Stoke CCU, and the inevitable wide variation in staff-patient relationships between units.

Comparison Group

Among the aims of the study was to generate normative data with the coronary test battery thereby providing "baseline" scores and the opportunity to compare coronary patients and coronary-free counterparts on certain measures. At first a comparison group was sought within the hospital where the CCU was situated. The principle aim was to find a group whose hospitalisation experience parelleled that of admissions to the CCU. In the event, a combination of failure to find a particularly appropriate group, and administration difficulties involved in gaining access to other hospital patients, led to the abandonment of this idea.

It was then decided to seek a group of males without coronary heart disease who had similar work environments to patients admitted to the

Stoke CCU. An informal analysis of recent admission records showed that the bulk of patients were employed in the pottery, coal or rubber industries. This pattern of employment reflects accurately the domination of these three large industries in the Stoke area. Approaches were made to chief medical officers within these three industries, seeking access to their workers. A direct refusal to cooperate was received from the rubber industry, whilst communications with the particular pottery company selected died through neglect.

The National Coal Board Medical Officer for Staffordshire, Dr D. McKirdy, was, in contrast, outstandingly helpful. Through his efforts the investigator gained access to Wolstanton Colliery, one of the largest mines in Staffordshire, with over 1100 employees. With the generous assistance of the Personnel manager, Mr Grocott, a stratified random sample of 50 men was selected from those employees eligible for the study.

To be eligible the employee had to be male, aged between 30 and 60, of British birth, literate and apparently without coronary disease. All but the last of these criteria were obviously needed to form a group with similar characteristics to the coronary patient sample. The apparent absence of coronary disease was established entirely on the basis of the subject's reported history of chest pain. To have excluded all subjects giving a history of chest pain from a group of miners, for whom respiratory problems are commonplace, would have resulted in a tiny remaining sample. Accordingly, those subjects who had been given by their doctors a clear diagnosis of a disorder other than coronary disease were included in the study. Any subjects who admitted to unidentified or unreported chest pain, either in the past or present, were excluded from the study.

This selection criterion was exceedingly crude but unavoidable, since the resources necessary for coronary disease screening were not available to the investigator. Undoubtedly the comparison sample contained

misdiagnosed or asymptomatic cases of coronary disease. Equally, several men without coronary disease were doubtless excluded from the sample. The possible presence of false negatives in the comparison group will be taken into account in the interpretation of the results.

It proved administratively impossible to match the comparison group characteristics to those of the coronary group. The only constraint placed on the sampling of those eligible for the study was that the proportions of surface, underground and administrative workers in the sample should reflect those found in the colliery. Thus, using random numbers, a stratified, random sample was obtained containing 50% underground workers, 30% surface workers, and 20% administration workers. Since no clear evidence has yet linked measures of social class or occupation to the incidence of coronary heart disease in any systematic way (95, 96), it was reasonable to assume that the coronary patients in the present study would be an unbiased sample (with respect to class and occupation) of the local, working population. It seemed appropriate therefore to select a comparison group which reflected the structure of at least a section of the local population.

The inadequacies of this comparison group hardly need amplification. However representative of Wolstanton colliery they may have been, they nevertheless constituted just one small group from one division of one industry in the area from which the coronary patients were drawn. Once again, these inadequacies must simply be noted and attributed to circumstance and to the necessarily small scale of a project such as this.

Methods

An inordinate amount of time was spent in constructing a test battery suitable for use with recovering coronary patients. The following description of those measures which were finally used excludes the details of the many blind alleys which were explored.

Appraisal Check Lists

The original intention was to measure patients' primary and secondary appraisals of a heart attack, the future, the coronary care unit and the job, with a series of semantic differentials. From tape recordings of early interviews with patients, a list of adjectives was obtained which patients used in talking of these four threat stimuli. The opposites of these adjectives were added to the list, as were certain pairs of adjectives taken from Osgood's original differentials (107).

Four semantic differentials containing a total of 68 scales were constructed to assess patients' appraisals of the four threat stimuli. When the differentials were pilot-tested, many patients complained at the large number of decisions that had to be made, namely 68 ratings on seven point scales. Others clearly lost interest part way through and began treating the scales as having three points, two extreme and one in the middle.

There appeared to be two alternative solutions to this problem. One was to reduce markedly the domain of appraisal dimensions by removing a number of the scales. The other was to retain the scope of possible appraisals, but to reduce the discriminative power of the instrument by removing some of the scale steps. Since the investigator was more interested in the variety of individual appraisals than in the range of intensity of a limited number of them, the latter course was taken. The reduction in measuring power was realised, but felt to be justifiable in the light of the aims of the study.

Four check lists were constructed, one for each stimulus complex. The check lists, which appear in Appendix A2, consist of pairs of opposing adjectives, although the individual adjectives are presented in random order. Pilot testing indicated no problems in administration, and a wide range of scores. The ease with which patients completed the check lists may have been partially due to the similarity they bore to the preceding

test, the Multiple Affect Adjective Check List, to be described in the following section.

The check list instructions were as follows: "I would like to ask you about your view of certain things such as the Coronary Care Unit, the future, and so forth - the words which you see underlined on the sheet. Instead of asking you to describe them in your own words I have given a list of possible words in each case. Those are the words in capital letters. Please underline those words which you think accurately describe the thing in question. Underline as many as you wish, even where they seem to contradict each other". If a patient checked only one adjective for a particular stimulus he was told again that he could check as many as he wished. When no adjectives were checked the patient was asked if he could find no suitable words to describe his view.

A scoring system was devised which allowed the computation of a total positive appraisal score for each threat stimulus complex. The system was based on pairing opposing adjectives, and, to this extent, relied on the investigator's subjective opinion as to whether the pairs were in fact opposites, and as to which adjective was 'positive', which 'negative'. The positive appraisal score was essentially a ratio score expressed in percentage form.

To obtain the denominator the number of pairs of adjectives, where either one or both adjectives had been checked, was doubled. The numerator was computed by assigning a score of one for each positive adjective checked, and one for each negative adjective unchecked, except where that negative adjective was one of an unchecked pair. This use of a ratio score takes into account the fact that certain pairs of adjectives or dimensions may be irrelevant or meaningless in the subject's view of the stimulus. If the denominator is omitted there is no way to differentiate between a genuinely low positive appraisal score and one which reflects the

lack of meaning or relevance of many of the adjective pairs for the subject.

A small hypothetical example should make the scoring system clear.

		Numerator
GOOD	BAD	2
SAFE	DANGEROUS	1
FRIENDLY	UNFRIENDLY	0
ACTIVE	PASSIVE	0

$$\text{Total positive appraisal score} = \frac{2 + 1 + 0 + 0}{3 \times 2} \times 100$$

$$= \underline{50\%}$$

The numerator is self explanatory and shows the three values that are possible for different checking configurations. Since neither adjective of the last pair has been checked the numerator is not increased, and the total possible score is adjusted by reducing the denominator from 8 to 6. Finally the ratio score is multiplied by 100 to transform it into a more convenient form. The only confusion arises where one subject has a totally negative appraisal and thus scores, for example, $^{0}/20$; and another subject checks no adjectives at all and scores $^{0}/0$. Strictly speaking both subjects score 0 and are indistinguishable. To resolve this difficulty it seemed logical to exclude subjects who had checked no adjectives at all from any analysis.

It should be clear from the foregoing that the maximum possible degree of negative appraisal is represented by a score of 0 on the positive appraisal scale. The maximum positive appraisal score is represented by a score of 100. Apart from studying total positive appraisal scores it was also possible to examine aspects of primary and secondary appraisal by referring to individual items on the check lists.

Threat Reactions Measure

For reasons discussed in Chapter 4, a self report measure of threat reactions was adopted. The particular instrument selected was Zuckerman's Multiple Affect Adjective Check List (MAACL) (108). A copy of the MAACL complete with instructions is given in Appendix A3.

For this particular study the requirement was for a reliable and valid measure of state anxiety and depression which could be quickly administered, and which made minimal demands on subjects with diverse educational experience. Since it was planned to measure changes in affect over short time periods, a further requirement was that the chosen instrument be sensitive to such changes.

Evidence gathered together in the MAACL manual suggested that the measure was suited to the needs of this study. The MAACL appears in two forms, the only difference being the time set of the instructions, one set referring to "Today", the other to "General" affects. In the present study only the "Today" form was used to obtain measures of state anxiety, depression and hostility. Administration of the measure takes about five minutes. The only demand made of subjects is that they decide which of a list of words describe their feelings at that time. All of the words listed are at or below the reading level of American school children in the eighth grade.

Since it was important that the selected measure be sensitive to short term changes in affect, a test with high internal consistency but moderate to low test-retest reliability was sought. The evidence presented in the test manual regarding the reliability characteristics of the MAACL "Today" form is mixed but, with the exception of the Hostility Scale, fits this pattern sufficiently well. As no specific questions were posed regarding variation in state hostility, the suspect nature of the Hostility scale's reliability was not seen as a relevant problem.

The items which make up the MAACL scales were obtained empirically. For the construction of the Anxiety and Depression scales the criterion groups were appropriately diagnosed psychiatric patients. In the test manual Zuckerman and Lubin present the results of various validation studies. With regard to the "Today" form of the Anxiety and Depression scales, evidence in support of their construct validity is cited from studies of examination situations, hypnotically induced anxiety, perceptual isolation, stage fright, and stressful films. The concurrent validity of the two scales is supported by results from studies comparing them with clinical ratings, Cattell's IPAT and Rosen's Anxiety Reaction Scale.

Once again the findings reported do not uniformly evidence the validity of the "Today" Anxiety and Depression scales of the MAACL. Nevertheless the positive trend of the results was felt to be sufficiently strong to warrant the inclusion of the MAACL in the test battery.

Coping Patterns Measure

Since, in the Lazarus model, coping processes are inferred from particular configurations of appraisals and threat reactions, no measure of coping as such was needed. No attempt was made to measure the strength of coping strategies for example, in terms of Hackett's classification of strength of denial (34). The hypotheses under study demanded only that the presence or absence of a coping reaction pattern be detected.

The original intention was to examine the three hypothesised coping patterns which were described on pages 24-6 and operationally defined on page 80 by using a form of profile cluster analysis, described by Nunnally (74 Ch.11). The aim of the analysis was to group subjects by seeking clusters within their appraisal and affect score profiles. The relevant hypotheses were then to be tested by seeing whether the resulting groupings were in fact based on the hypothesised profiles. For example, evidence which suggested the use of state denial would consist of the detection of

a subgroup of patients characterised by positive appraisal and low affect scores.

In the event, the appraisal data obtained did not meet the assumptions necessary for this sort of profile analysis. Acting on the advice of a consultant statistician, the coping patterns were instead examined by simply cross- tabulating high (positive) and low (negative) appraisal scores with high, medium and low anxiety and depression scores to form two by three by three contingency tables. Table 1 shows the type of contingency table obtained, presented in two dimensions. Those cells which represent the three coping patterns of interest are labelled appropriately, following the operational definitions 1(a), 2(a) and 3(a) on page 80.

Table 1 Three Coping Reaction Patterns : Denial, Inaction and Anxiety, based on Crosstabulations of Appraisal and Affect Scores

High (Positive) Appraisal

Depression \ Anxiety	Low	Medium	High
Low	Denial		
Med.			
High			

Low (Negative) Appraisal

Depression \ Anxiety	Low	Medium	High
Low			Anxiety
Med.			Anxiety
High	Inaction	Inaction	Anxiety Inaction

In comparison to the denial measures reviewed in Chapter 3, the present method has certain advantages. On two counts it is clearly more sensitive than the single question measures, assessing either cognitive repudiation or affective control, used by Croog (57) or Gentry (39). Firstly, the present method assesses both cognitive and affective dimensions of the denial phenomenon. Secondly, it makes use of continuous measuring scales, though finally scores on these scales had to be dichotomised or trichotomised.

The method used is probably less sensitive, and certainly less comprehensive, than global measures such as the Hackett-Cassem Scale (55). It is probably less sensitive since it relies on objective self-report measures, as opposed to observer ratings. However, as a compensation, in the present case no problems of inter-observer reliability, of the sort described by Miller and Rosenfeld (44), could arise. In obtaining a comprehensive assessment of denial, global measures tend to conflate both the various aspects of the denial process and stable characteristics of the individual, notably trait denial. The present measure was designed to permit separate analyses of the cognitive and affective components of denial. Further, it included no assessment of behaviour exhibited by the patients outside the CCU, and was thus a relatively uncontaminated measure of state denial.

Type A Measures

Various measures of the Type A Behaviour Pattern have been developed including a questionnaire (109), a rating scale (110), a set of behavioral tasks (111), and a voice analysis test (112). The criterion measure against which these various tests have been validated is a structured interview called the Standard Situation Interview (SSI) (83). Acting on the advice of Dr David Jenkins, (personal communication), the leading expert in Type A measurement, it was decided to adopt the SSI in

the test battery.

The SSI is seen by the authorities quoted above as the most sensitive measure of Type A Behaviour yet developed. Its test-retest reliability has been shown to be as good as that exhibited by standard clinical procedures, such as X-ray interpretation or blood pressure recording (113). To maintain high inter-observer reliability all users of the SSI must be trained by trainers who have in turn been trained by the San Francisco team, headed by Friedman and Rosenman. Accordingly, the present writer travelled to Rotterdam to be trained by Dr Ad Appels of the Department of Social and Preventive Medicine at Erasmus University.

The SSI is a structured interview taking 10-15 minutes to conduct. During the interview subjects are asked a series of questions relating to Type A behaviour. The interview schedule used in the present study appears in Appendix A4. It is a slightly modified version of the schedule used in Rotterdam, the main change being the reordering of questions to achieve a more logical succession of queries. The only other change was the omission of a question referring to queuing in restaurants - an irrelevant question in a predominantly working class area where restaurants are rarely crowded.

From the interview three types of information are gained. Of least importance are the subject's actual replies. More important than these are observations of the subject's motor behaviour during the interview, and of his speech and conversational mannerisms. For this reason data in the first category are recorded at the end of the interview, whilst speech and conversational characteristics are derived afterwards from a tape-recording of the interview. The behaviours of interest include postural tension, hand-clenching, "chopping" gestures to underline comments, a tendency to reply to questions before the interviewer has finished, hissy sibilants and explosive plosives. A detailed description of these Type A behaviours has been given by Jenkins (114).

Using information from all three sources - self report, motor behaviour and oral characteristics - the interviewer decides whether the subject is Type A or Type B. If a more detailed scaling is wanted, he may label the subject as: A1 - extreme Type A, A2 - moderate Type A, B3 - moderate Type B or B4 - extreme Type B. A fifth category, X5, may also be used to indicate neither a clear A nor B type.

The SSI training programme involves sensitising the trainee to Type A characteristics, and checking his assessments of subjects on a standard set of tapes with those made by the trainer. In this writer's case, after four days of training, trainer and trainee achieved 75% agreement in placing subjects on the four point scale, and 90% agreement in designating subjects as A or B. It was both intriguing and gratifying to achieve this degree of concordance with such a subjective assessment procedure.

For various reasons it was decided to use in addition to the SSI a more quantitative, objective Type A measure. Despite the impressive inter-observer reliability figures the investigator remained concerned about the highly subjective nature of the SSI procedure. This concern was increased by the discovery of a comment by Rosenman to the effect that overt Type A behaviour in post-infarct patients is probably attenuated due to their physical fatigue (79). Thus the use of the SSI to assess Type A behaviour in coronary patients may result in an underestimate of the pattern's prevalence.

The overriding consideration, however, was the fact that it was impossible for the investigator to be completely unaware of the health status of subjects when assessing the behaviour pattern. It was possible, therefore, that knowledge of the potential relationship between Type A and CHD might lead him to "discover" more Type As in the coronary group than in the comparison group.

Efforts were in fact made to reduce the risk of this bias. No attempt was made to assess any subject at the time of the interview. The tapes and the interview data were identified only by random numbers. All assessment took place at least six months after the interview, when the investigator had forgotten most of the individual subjects. This procedure was, of course, not foolproof. Background noises or inadvertent comments made by the subject on the tapes sometimes indicated to which group he belonged.

To counter these problems the Bortner Rating Scale was also included in the test battery. A copy of the scale and instructions is given in Appendix A5. Although the rating scale measures only the self report component of the Type A pattern, its power to discriminate Type As from Bs (as designated using the SSI) was sufficiently great to warrant the scale's inclusion (110). Thus, in Bortner's original study, the full scale correctly assigned 64% of subjects to their interview classification. This figure increased to 75% when weighted scores on seven of the 14 items were used.

Apart from the psychometric properties of Bortner's scale, other practical considerations dictated its selection rather than one of the other available objective measures. The most powerful self-report measure of Type A is Jenkins' Activity Survey for Health Prediction (115). However, the survey is a fairly long questionnaire which, it was felt, would demand too much of patients in a CCU. The remaining measures are behavioral tests of some form, which were also unsuitable for use in the CCU setting. The problems of behavioral testing in the CCU were discussed in Chapter 4.

Trait Denial Measure

The measure of trait denial used was an experimental subscale of the Minnesota Multiphasic Personality Inventory (MMPI) reported by Little

and Fisher (116). The twenty six items which make up the denial scale were derived by cluster analysis from the MMPI Hysteria scale. A copy of the scale and the modification of the standard MMPI instructions which was used appear in Appendix A6.

It is clearly unwise to assume that the trait measured by this scale is identical to the disposition to make use of defensive reappraisal, as defined by Lazarus. By virtue of its derivation the Little and Fisher scale refers primarily to denial of psychiatric symptoms, as expressed in the statements of the Hysteria scale. They describe the high scorer on this scale as "uninsightful", "anti-intraceptive", "morally virtuous", and displaying a "pseudo-normal profile" (116 p.306). Thus, although there is some overlap between trait denial as defined here, and as defined by Lazarus, the differences are sufficiently great to warrant a very cautious interpretation of results gained with this measure in the context of Lazarus' theory.

Life Change Measure

During the last few years the measurement of life changes has occupied the attention of many researchers. It is now unusual to find a copy of the Journal of Psychosomatic Research which does not contain at least one report of a life change study. A short review of the main issues in this area has been provided by Barbara and Bruce Dohrenwend (117). They discuss, for example, the problems of which particular life changes should be studied and of deciding on the best methods for measuring the impact of life changes.

When the present study was being planned this debate had hardly got under way. At that time the writer was only aware of one method of measuring life changes: the Life Change Unit (LCU) method, developed by Holmes and Rahe (98). At the time of writing the author is now aware of better methods of measuring life change, and is currently using more

sensitive techniques.

In their 1967 paper (98) Holmes and Rahe report the development of the Social Readjustment Rating Scale (SRRS), which forms the basis of LCU Measurement. Subjects were presented with a list of 43 life events and asked to rate them in terms of their relative degree of necessary readjustment, regardless of their desirability. The event "marriage" was assigned an arbitrary value of 500, which was to be used as a fixed reference point by subjects. Thus they were asked to give a smaller or larger value to each event proportionate to the amount of adjustment they thought it would demand. On the basis of these results the events were ranked, and the weights assigned to each were averaged and transformed to fit on a scale between 0 and 100. The ranked list of events, each with its assigned weight, or number of LCUs, forms the SRRS. A copy of the scale is given in Appendix A7. In a recent paper Holmes and Masuda have reviewed various studies using the SRRS (99). Notable amongst these are cross-cultural studies which show a high degree of concordance between ratings performed by subjects in different countries.

From the SRRS the Schedule of Recent Experience (SRE) was formed. This is essentially the list of 43 items of the SRRS, but presented with different instructions. Subjects are simply asked to indicate which of the events have happened to them during a particular period of time. In the present study subjects were given the following instructions: "Here is a list of events, many of which occur at some time in everyone's life. If any of these events has occurred in your life during the last year, please put a tick opposite the event". Subjects in the coronary group were asked to exclude their coronary event from consideration. On various occasions during the administration of the measure it was stressed again that only events from the preceding year should be recorded.

Subjects' LCU scores were computed by summing the appropriate LCU values for each event checked. The LCU weightings used were those given

by Holmes and Rahe in 1967 and shown in Appendix A7. Cochrane (118) has produced a set of British LCU weightings, but these were not available at the time of the present study.

Psychosocial and Medical Record

Standard psychosocial characteristics were recorded before the test battery was administered. Age, education, religion, marital status, home situation, socio-economic group and social class were recorded as shown on the data sheet, which appears in Appendix B1. Home situation data was collected following an early intention to test out a hypothesis concerning the effect of social isolation on recovery from a myocardial infarction. However, since ideas of following up the patients were never realised, these data were not used. Socio-economic group and social class were determined according to the 1966 Registrar-General's classification system.

The full medical records of each of the coronary group were available to the investigator. From these, data concerning patients' psychiatric and coronary history were recorded as shown. The admission record of each patient, containing a full description of his physical state, his physical history, and any complications which occurred during admission, was also available, but no use was made of these data in the present investigation. The primary reason for this was a fear of overloading the study with too many variables, given the limited number of subjects. Accordingly the analysis was restricted to an examination of the psychological data collected.

In retrospect it is clear that the present study was flawed by the presence of too great a divorce between psychological and physiological variables in the investigator's mind. As a result, no attempt was made to record the anti-anxiety medication being taken by patients at the time when they were seen. Patients' records were later examined to rectify this omission, but it proved impossible to gather information which was

sufficiently precise concerning the dosage and timing of the medication given. Further, since no standard criteria governed the use of such medication, the drug regime experienced by patients could not be deduced from any other medical data.

This omission of medication data was the most important single defect in the study design. Its effects can only be speculated upon, speculation which will be reserved for a discussion of the results.

Before closing this chapter with an account of the procedures used, it will be helpful to bring together much of the foregoing by listing in tabular form the study variables and measures within each theoretical category. This is shown below in Table 2.

Table 2 - Study Variables and Measures Classified by Theoretical Category

Theoretical Category	Variables	Measures
Appraisal of threat stimuli	Heart attack, future, job, CCU	Appraisal Check Lists (ACL)
Coping reaction patterns	Anxiety & Depression and above appraisal variables	MAACL and ACLs
Determinants of appraisal and coping	Type A behaviour	SSI and BRS
	Trait Denial	MMPI Dn Scale
	Life Changes	SRE
	Psychosocial and Medical Characteristics	Interview and Hospital Records

MAACL : Multiple Affect Adjective Check List

SSI : Standard Situation Interview

BRS : Bortner Rating Scale

MMPI Dn : Minnesota Multiphasic Personality Inventory Denial Scale

SRE : Schedule of Recent Experience

Procedures

Coronary Group

Patients who met the selection criteria were brought individually to the testing room and introduced to the investigator by a member of the nursing staff. It was decided to minimise the impact of the testing procedure by focusing the patient's attention on his history, and then obliquely approaching his current state of mind. Accordingly the study was presented as an investigation into the causes of heart attacks. The actual introduction used appears in Appendix A1. As stated earlier, only two patients refused to participate.

It was originally intended to examine changes in affect over time. To this end a randomised balance block design was used in which patients were assigned at random to a particular pair of days between the fourth and eighth day after admission. Patients were thus seen on two occasions, an arrangement which allowed the MAACL to be given twice, and the remaining tests to be divided equally between the two sessions. In the early stages of the investigation the testing schedule was as follows:

Session 1 : Type A interview, trait denial scale, MAACL.

Session 2 : Schedule of Recent Experience, Appraisal Check Lists, Type A rating scale, MAACL.

As the investigation progressed a problem appeared which ultimately resulted in the discarding of the block design. Either because of an unconscious shift in discharge policy, or a run of quickly recovering patients, or most likely, a heavy demand on beds in the CCU, more and more patients were discharged before their second testing session. The discharge date of a particular patient became such an unpredictable event, that the two testing sessions were abandoned, and all testing was done on one occasion. Test order was as before except that, of course, the first MAACL was omitted. This change in testing policy, and the problems which

preceded it, are reflected in the varying numbers of subjects whose data are reported in different sections of the results chapter.

Comparison Group

Subjects were tested individually at Wolstanton Colliery. The investigator's visit was preceded by the distribution of a short notice explaining the purpose of the study (Appendix A1). A list of subjects was generated from the personnel records. Each subject was brought to the testing room and asked by the investigator if he wished to participate. There were no refusals.

Measures were administered in the following order: Type A interview, Schedule of Recent Experience, Appraisal Check List, Type A rating scale and MAACL. The only difference between this procedure and that for the coronary group was the omission of the trait denial scale and the appraisal check lists concerning a heart attack, the future and the Coronary Care Unit.

CHAPTER 7

Part I of this chapter contains the results relating to the prevalence questions and comparative hypotheses listed on pages 87-88. In Part II findings concerning the hypotheses derived from Lazarus' model, listed on pages 88-90, are presented. The raw data on which the following analyses were performed are contained in Appendix B2.

I

Threat Appraisals

Figure 1 shows the distributions of patients' appraisal scores with regard to three threat stimuli: the Coronary Care Unit (CCU), the future and a heart attack. The scores were computed following the method outlined on pages 98-99. It is clear from the bunching of subjects at one of the extremes in each case, that the scales were not sufficiently pre-tested to maximise score variance. This insensitivity of the scales necessitated the use of dichotomised appraisal scores in the analysis - a far weaker type of measurement than was originally intended.

Since the total appraisal scores tell us little beyond the fact that the bulk of patients reported highly positive appraisals of their CCU and their future, and very negative appraisals of their heart attack, it is instructive to examine the frequencies with which patients checked particular adjectives on each scale. This information is displayed in Table 1. Positive and negative adjectives have been paired and rank ordered according to how frequently they were chosen.

Job appraisal data were obtained from both the coronary patients and the comparison subjects. The distributions of these appraisal scores and the individual adjectives checked are shown in Figure 2 and Table 2 respectively. Hypothesis B3 predicted that patients would exhibit significantly lower job appraisal scores than would comparison subjects.

Figure 1 Distributions of Three Threat Appraisal Scores for 44 Coronary Patients

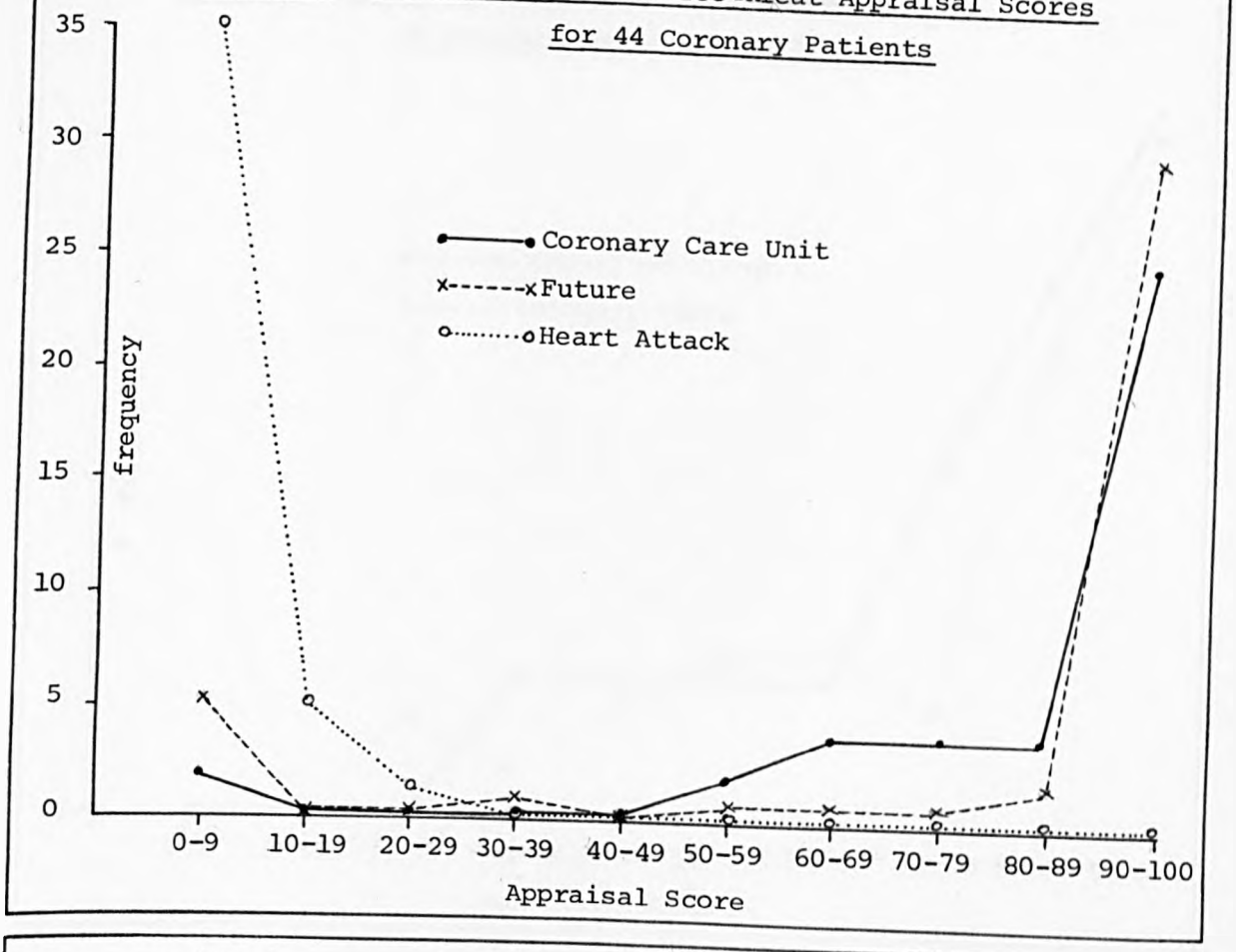


Table 1 Frequency with which adjectives were chosen by 44 coronary patients on three appraisal check lists

Coronary Care Unit		Future		Heart Attack	
Adjective	Frequency	Adjective	Frequency	Adjective	Frequency
Friendly	36	Important	28	Frightening	34
Unfriendly	0	Unimportant	0	Comforting	0
Valuable	32	Happy	23	Painful	33
Worthless	0	Unhappy	0	Painless	2
Safe	28	Hopeful	22	Worrying	31
Dangerous	1	Hopeless	2	Reassuring	0
Comforting	28	Pleasant	22	Unpleasant	31
Frightening	8	Unpleasant	8	Pleasant	0
Reassuring	27	Valuable	21	Dangerous	26
Worrying	3	Worthless	1	Safe	0
Relaxed	18	Good	19	Violent	22
Tense	3	Bad	0	Gentle	0
Interesting	16	Peaceful	13	Threatening	17
Boring	7	Stormy	4	Harmless	0
Pleasant	15	Active	12	Important	7
Unpleasant	4	Passive	1	Unimportant	0
Cheering	9	Full	10		
Depressing	4	Empty	2		
Liberating	6	Secure	10		
Restricting	5	Insecure	4		
		Positive	9		
		Negative	2		
		Reassuring	6		
		Worrying	6		
		Harmless	3		
		Threatening	2		

Figure 2 Distribution of Job Appraisal Scores for 44 Coronary Patients and 50 Miners

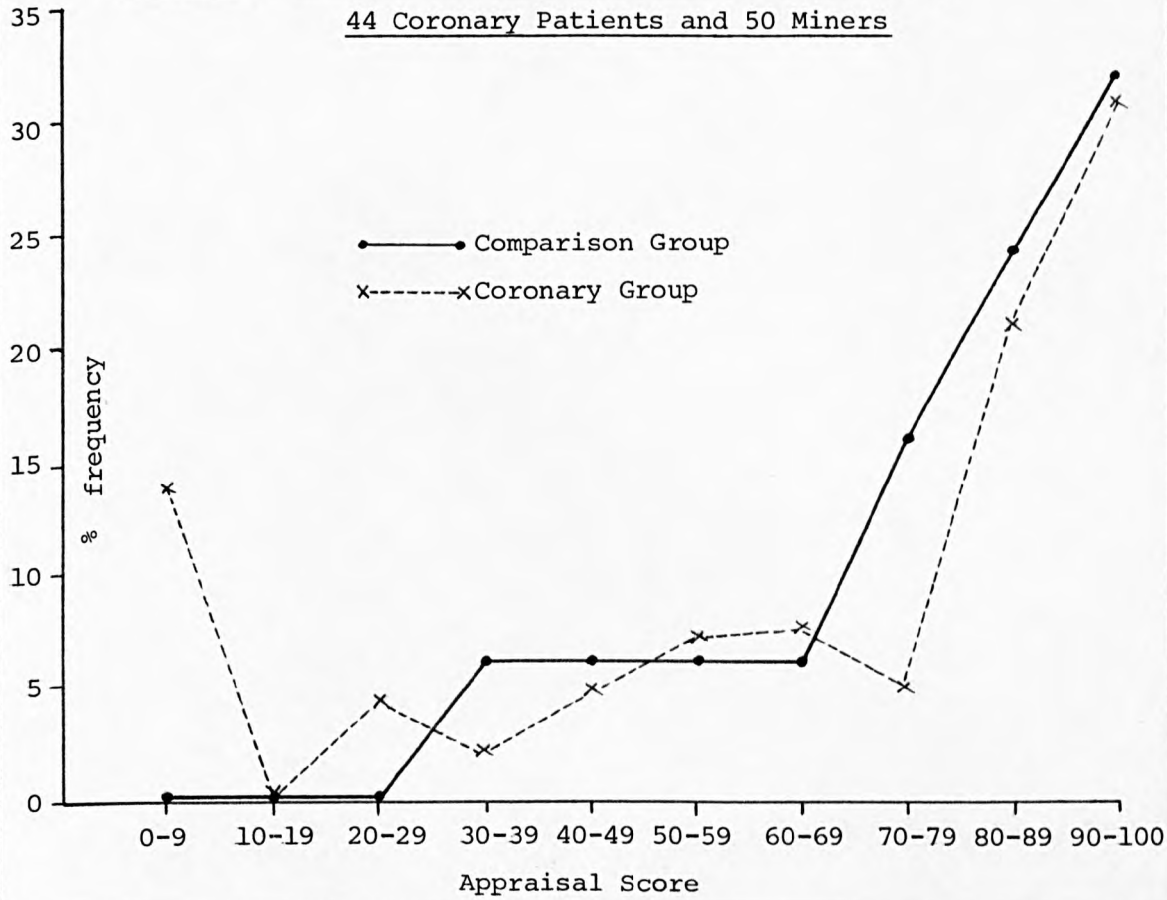


Table 2 Frequency with which job appraisal adjectives were checked by 44 Coronary Patients and 50 Miners

Adjective	Coronary Group (%)	Comparison Group (%)
Interesting	68	72
Boring	18	2*
Satisfying	57	72
Frustrating	30	22
Important	50	64
Unimportant	11	2
Useful	48	60
Useless	2	2
Pleasant	46	40
Unpleasant	2	8
Good	39	46
Bad	0	0
Worrying	34	24
Reassuring	11	14
Tiring	25	22
Stimulating	11	26
Competitive	21	26
Non-competitive	16	14
Unhurried	16	16
Hurried	9	10

*Fisher's p = 0.009

A Mann Whitney U analysis (66) showed no such difference ($z = 1.075$, $p<0.14$). A Kolmogorov-Smirnov two sample test (66) was also applied to detect any significant differences at particular points in the cumulative distributions. The maximum difference of 0.1953 just failed to achieve significance at the .05 level ($\chi^2 = 3.5279$).

Since the method used to compute appraisal scores involved a great loss of information, chi square analyses or Fisher's exact probability tests were performed on the numbers of subjects in each group who checked particular adjectives. Coronary subjects checked the adjective "boring" significantly more often ($p = 0.009$). No other significant differences emerged.

Threat Reactions

Description of the threat reaction data is complicated by the fact that some of the coronary patients provided two scores on each variable, whilst comparison subjects produced only one. For comparisons between the two groups it seemed appropriate to use only patients' first session scores, since their second scores were undoubtedly influenced by earlier test experience.

In Figures 3 and 4 are displayed the frequency distributions of both groups' anxiety and depression scores. Student's t tests (119) showed that patients had significantly higher anxiety ($t = 2.368$, $p<0.05$) and depression scores ($t = 3.127$, $p<0.01$). The apparent bimodality of the depression scores was in fact shown to be within normal limits, using the Kolmogorov-Smirnov goodness of fit test. The distributions of hostility scores, which are not shown, were clearly normal and were not significantly different ($t = 0.639$).

Type A Behaviour

Data obtained from the Standard Situation Interview and the Bortner

Figure 3 Distribution of Anxiety Scores for Coronary and Comparison Groups

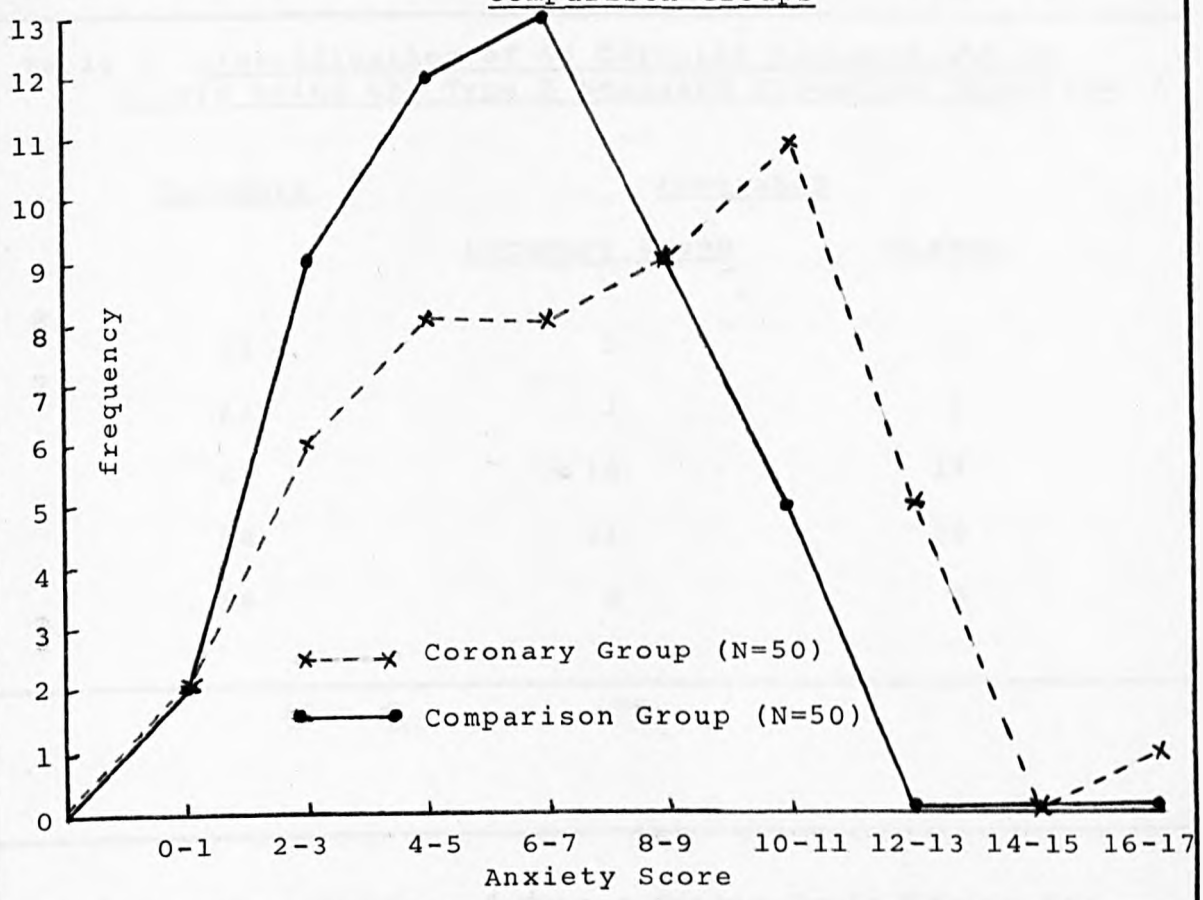


Figure 4 Distribution of Depression Scores for Coronary and Comparison Groups

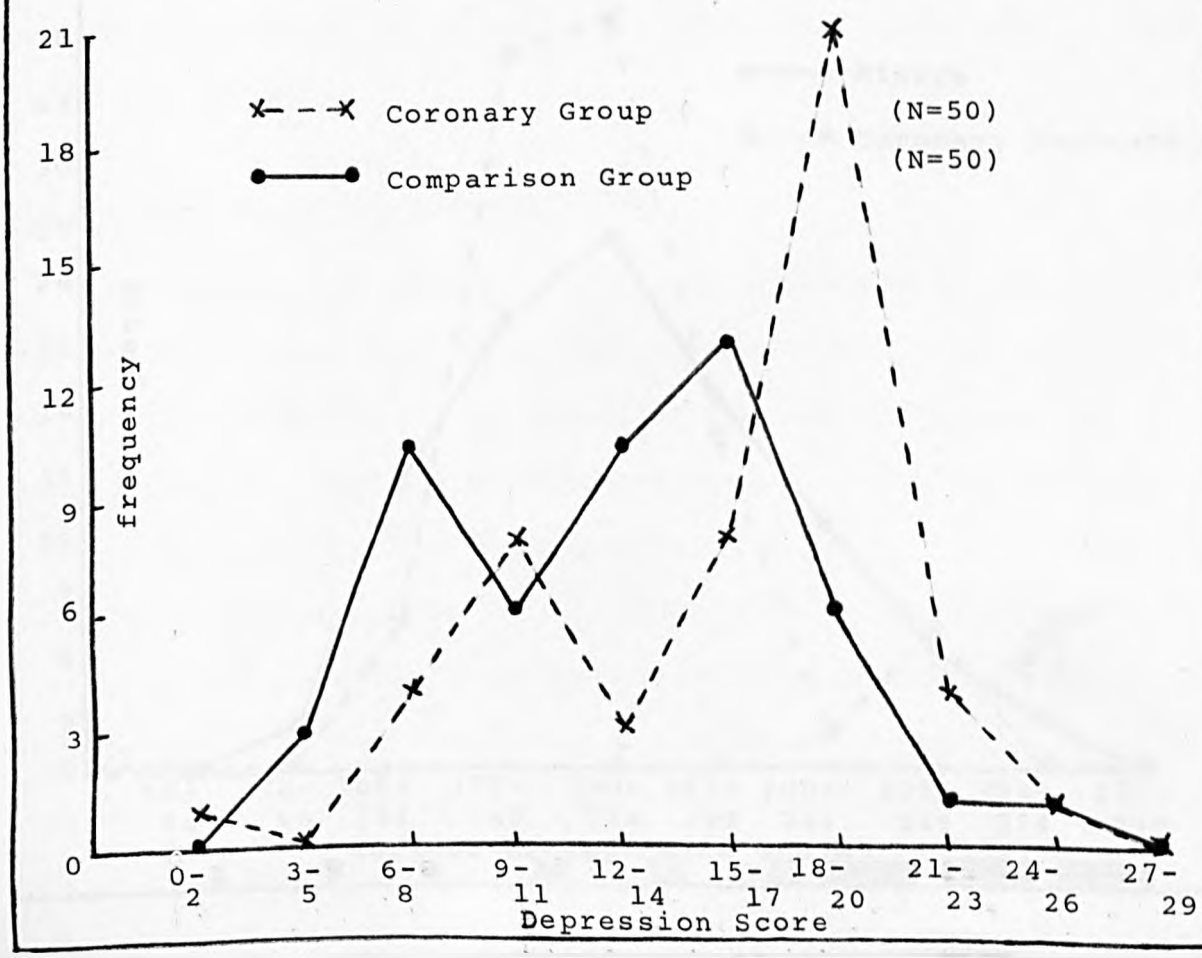
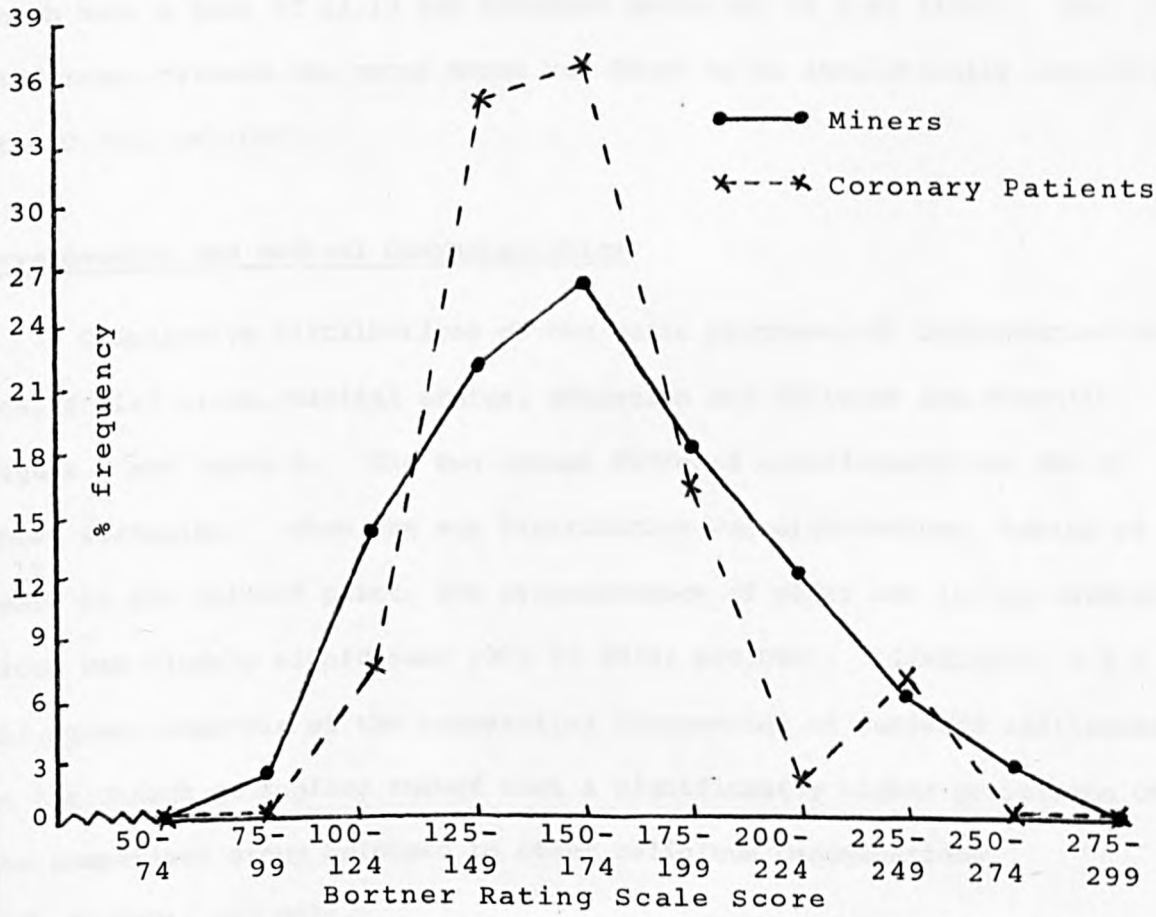


Table 3 Classification of 50 Coronary Patients and 50 Miners using the Type A Standard Situation Interview

Category	Frequency	
	Coronary Group	Miners
A1	3	2
A2	2	3
B3	16	19
B4	21	20
X5	8	6

Figure 5 Distribution of Type A Rating Scale Scores for 44 Coronary Patients and 50 Miners



Rating Scale are shown in Table 3 and Figure 5. Hypothesis B1 predicted that the coronary group would contain significantly more Type A individuals than would the comparison group. A t test of the rating scale results showed no significant differences between the two group means ($t = 0.4402$). In the case of the interview data, no analysis was necessary to underline the absence of any significant differences between the group frequencies in each of the categories.

To assess the relationship between the two measures of Type A behaviour a point-biserial r was computed (119). For this purpose X5 subjects were excluded and those remaining were classified as either Type A or B. The resulting r of 0.587 was highly significant ($p<0.001$).

Trait Denial

The distribution of trait denial scores given in Figure 6 is clearly normal with a mean of 15.54 and standard deviation of 3.866. These figures were compared with the original Minnesota normative data for men which have a mean of 12.13 and standard deviation of 4.52 (120). The difference between the group means was found to be statistically significant ($t = 0.563$, $p<0.001$).

Psychosocial and Medical Characteristics

Comparative distributions of the basic psychosocial characteristics of age, social class, marital status, education and religion are shown in Figure 7 and Table 4. The two groups differed significantly on two of these variables. When the age distribution was dichotomised, taking 44 years as the cut-off point, the preponderance of older men in the coronary group was clearly significant ($\chi^2 = 12.7033$, $p<0.001$). Similarly, a 2 x 2 chi square analysis of the comparative frequencies of subjects affiliated to the Church of England showed that a significantly higher proportion of the comparison group belonged to other religious denominations ($\chi^2 = 25.8371$, $p<0.001$).

Figure 6 Distribution of Trait Denial Scores for 50 Coronary Patients

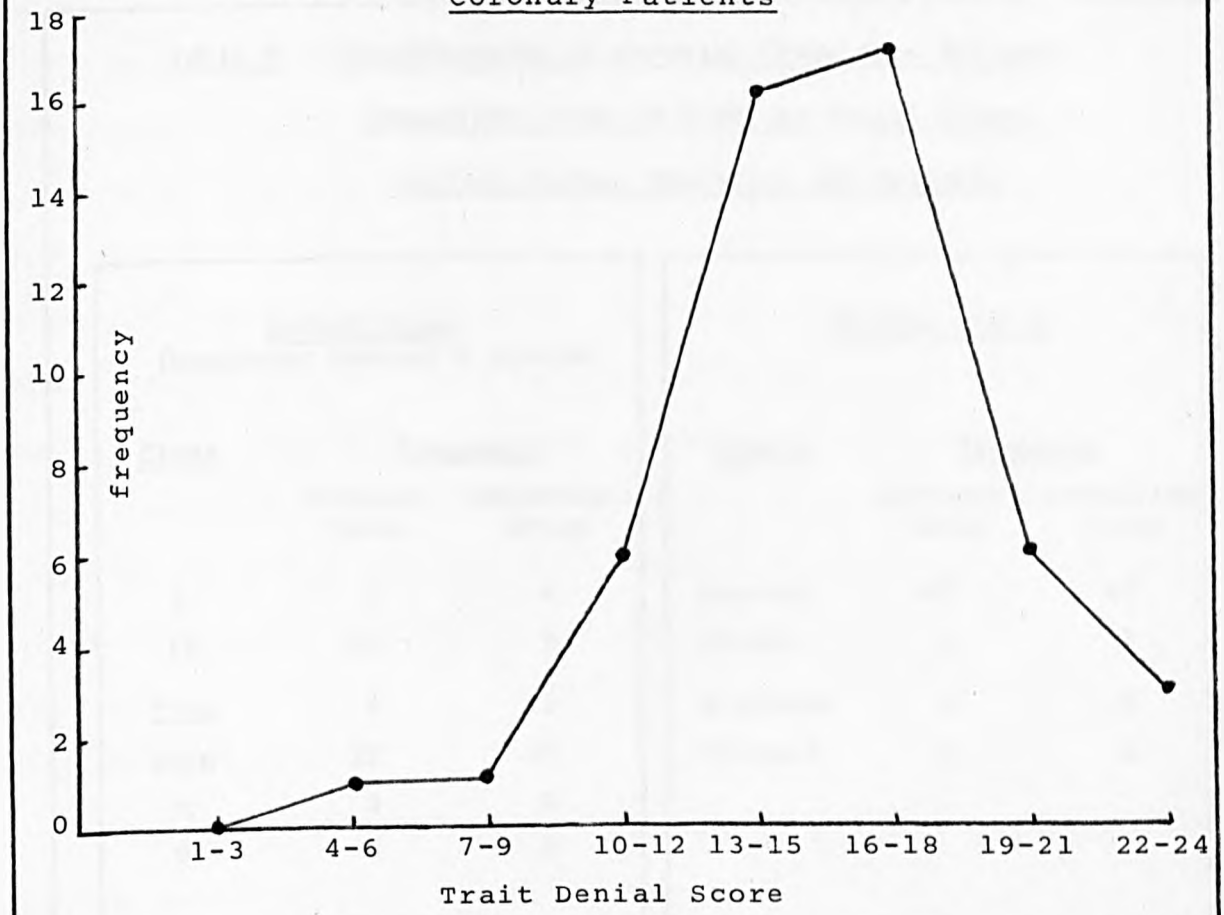


Figure 7 Age Distributions of 50 Coronary Patients and 50 Comparison Subjects

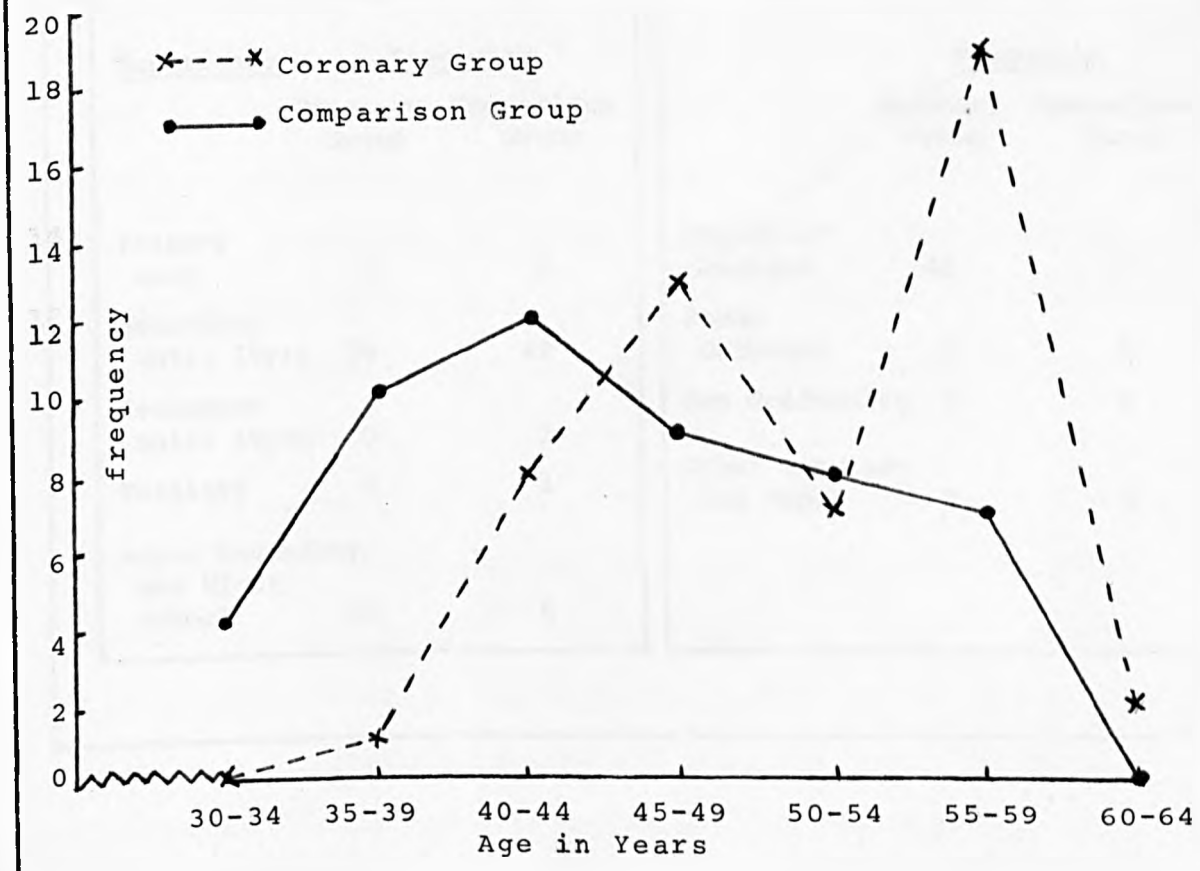


Table 4 Classification of Coronary Group (N = 50) and Comparison Group (N = 50) by Social Class, Marital Status, Education and Religion

Social Class
(Registrar General's System)

Class	Frequency	
	Coronary Group	Comparison Group
I	0	4
II	11	3
IIIN	6	2
IIIM	22	33
IV	8	8
V	3	0

Marital Status

Status	Frequency	
	Coronary Group	Comparison Group
Married	47	47
Single	0	3
Divorced	2	0
Widowed	1	0

Educational Experience

Experience	Frequency	
	Coronary Group	Comparison Group
Primary only	0	0
Secondary until 15yrs	38	42
Secondary until 18yrs	0	1
Tertiary	2	1
Basic Secondary and Night School	10	6

Religious Affiliation

	Frequency	
	Coronary Group	Comparison Group
Church of England	42	17
Roman Catholic	3	9
Non Conformist	5	9
Other (including none)	0	5

Only two of patients' medical characteristics were relevant to subsequent analyses: their previous experience as coronary patients, and the presence of a psychiatric history. Of the fifty coronary patients who took part in the main investigation, eight had previously been treated in a coronary care unit for myocardial infarction. The medical records of three patients evidenced their referral for psychiatric treatment at some earlier time. Two further patients said that they had received psychiatric help, though no indication of this was found in their records. These two "possibles" were included in subsequent analyses of the relationship between psychiatric history and coping behaviour.

Recent Life Changes

Figure 8 shows the distributions of total LCU scores obtained by subjects in both groups. To test whether coronary subjects had experienced greater life change in the preceding year than had comparison subjects, (hypothesis B2), a Mann Whitney U analysis was performed. The result indicated that this was indeed the case ($U = 691.5$; $z = 3.095$, $p<0.001$). There was, however, a suspicion that this difference was due to the fact that some of the coronary patients had reported their current illness as life event 6, "major personal illness or injury", despite instructions to the contrary. Accordingly, a further analysis was conducted, excluding the LCU scores derived from life event 6. Even with this item omitted, the amount of life change experienced by coronary subjects remained significantly greater ($U = 800.5$; $z = 2.392$, $p<0.008$).

Given the existence of such a difference, the items which accounted for it were sought. The percentage frequencies with which individual life events were reported by all subjects appear in Table 5. It was first confirmed that some of the difference between the two groups, when all events were included, was due to life event 6. Thus, the coronary group reported this item significantly more often than did their

Figure 8 Distribution of Life Change Unit Totals for Coronary and Comparison Groups

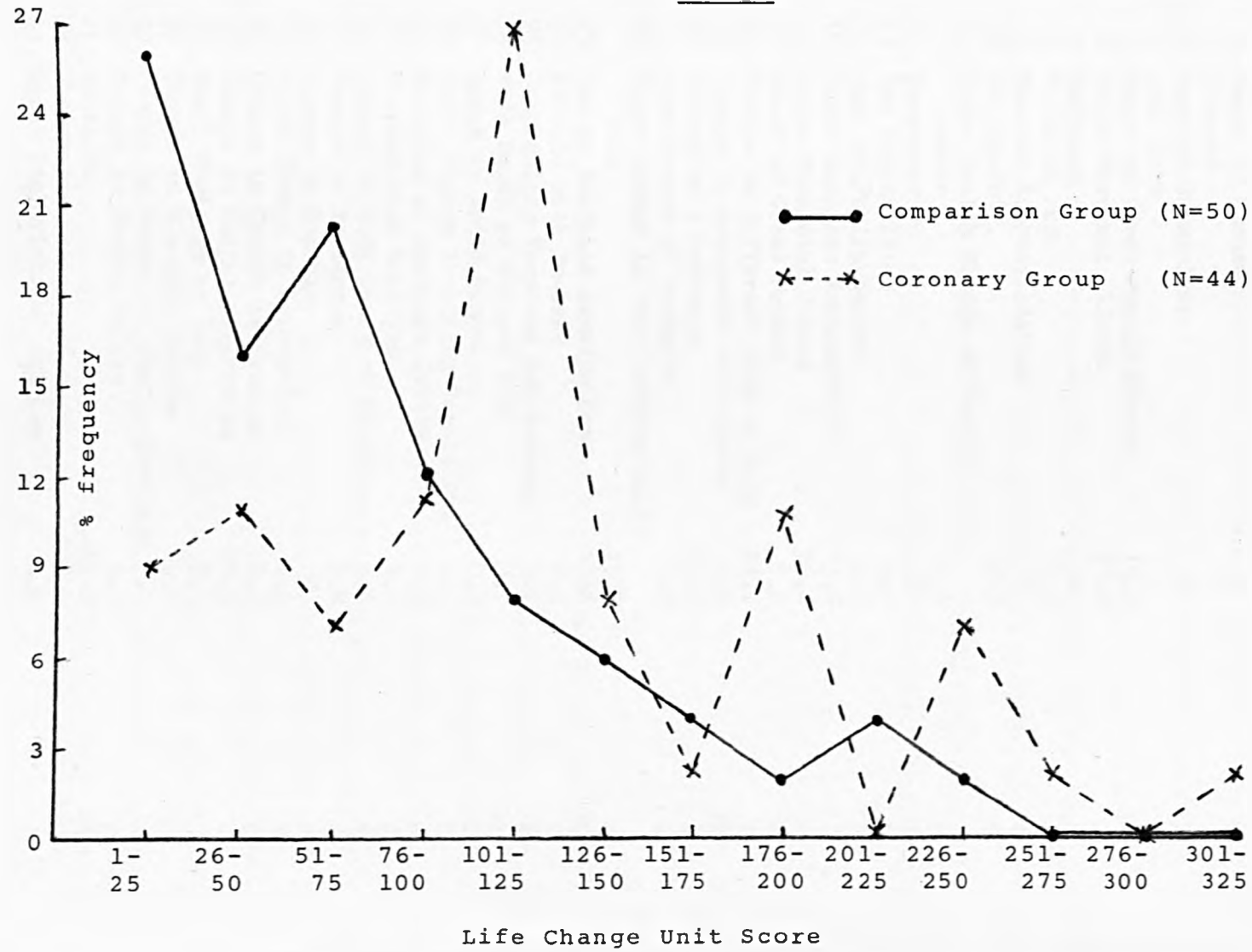


Table 5 Frequency with which Individual Life Events were Reported

	Life Event	% Frequency Coronary Group (N = 44)	% Frequency Comparison Group (N = 50)
1	Death of Spouse	0	0
2	Divorce	0	2
3	Marital Separation	0	2
4	Jail Term	0	0
5	Death of Close Family Member	13.6	12
6	Major Personal Illness	27.3	2
7	Marriage	0	0
8	Fired at Work	2.3	0
9	Marital Reconcilliation	0	4
10	Retirement	2.3	0
11	Major Health Change of Family Member	9.1	8
12	Pregnancy	0	4
13	Sex Difficulties	9.1	8
14	Gain of Family Member	2.3	2
15	Major Business Readjustment	13.6	0
16	Major Financial Change	18.2	8
17	Death of Close Friend	6.8	6
18	Change to Different Line of Work	34.1	8
19	Change in Arguments with Spouse	6.8	10
20	Taking on a Mortgage	15.9	2
21	Foreclosure of Mortgage	2.3	2
22	Major Change in Work Responsibilities	15.9	4
23	Son or Daughter Leaving Home	13.6	10
24	Trouble with In-Laws	2.3	8
25	Outstanding Personal Achievement	9.1	6
26	Wife Began or Stopped Work	9.1	12
27	Began or Ended School	2.3	0
28	Major Change in Living Conditions	2.3	0
29	Revision of Personal Habits	2.3	0
30	Trouble with Employer	9.1	2
31	Change in Work Hours or Conditions	6.8	6
32	Change in Residence	6.8	4
33	Change in Schools	0	0
34	Major Change in Recreation	6.8	2
35	Change in Church Activities	9.1	0
36	Change in Social Activities	15.9	2
37	Small Mortgage or Loan	9.1	16
38	Change in Sleeping Habits	9.1	10
39	Change in Number of Family Meetings	9.1	14
40	Change in Eating Habits	9.1	10
41	Vacation	15.9	24
42	Christmas	100.0	100
43	Minor Violations of the Law	6.8	2

counterparts (χ^2= 10.5127, p<0.01).

Following earlier writers' suggestions on the importance of the work situation, those events which ostensibly referred to this area (Nos. 8, 10, 15, 18, 22, 30 and 31), were combined and the frequencies with which these items were checked by the two groups were compared. The coronary group reported the occurrence of many more work related events than did the comparison group (χ^2= 38.4545, p<0.001).

In particular, patients reported more employer trouble, more changes in responsibility, more business readjustments and more changes to different lines of work, though only the last of these achieved statistical significance (χ^2= 8.3274, p<0.01). On no other single event did the two groups differ significantly.

II

Balance of Power Hypothesis

Hypothesis C1 stated that patients' appraisal of the CCU would correlate positively with their appraisals of both the future and a heart attack. Because of the bunching in the score distributions (Fig. 1), scores were dichotomised and entered into 2 x 2 contingency tables. A score of 100 was classified as a high or positive appraisal of either the CCU or a heart attack; any score less than 100 was classified as a low or negative appraisal. In the case of the heart attack threat stimulus, a non zero score was classified as a high appraisal, and zero as a low appraisal. Fisher's tests showed no association between either CCU and future appraisal scores (p = 0.0983), or between CCU and heart attack appraisal scores (p = 0.3).

The use of dichotomised appraisal scores clearly resulted in a comparatively weak analysis. Out of interest, raw appraisal scores were also analysed. These were scores derived by simply adding one for each positive adjective checked and one for each negative adjective unchecked.

Since the distribution of these variables showed less bunching, analyses which involved far less data loss were possible. These showed that CCU appraisal was positively correlated with both future (Spearman's rho = 0.6325, $p<0.005$) and heart attack appraisal ($r = 0.3637$ $p<0.05$).

Coping Patterns

To detect the three coping patterns of denial, inaction and anxiety, appraisal and affect scores were crosstabulated as described on page 102. The appraisal scores were dichotomised using the cut-off points described in the preceding section on the balance of power hypothesis. The anxiety and depression score distributions were divided into approximate thirds to provide the low, medium and high categories.

Since patients were conceivably displaying one coping pattern with regard to the future, and another with regard to a heart attack, two separate cross-tabulations were performed, each based on one set of appraisal scores. Table 6 shows the prevalence of the three coping patterns detected in this way. Since various operational definitions were used for each pattern (p.80), several prevalence estimates are shown in each case.

Table 6 Prevalence of the Denial, Inaction and Anxiety Coping Patterns exhibited by 44 Coronary Patients

Coping Pattern*	Threat Stimulus Appraised	Frequency
Denial		
Cognitive & Affective	Future	8 (18%)
	Heart Attack	3 (7%)
Affective		10 (23%)
Anxiety		14 (32%)
Inaction		
Cognitive & Affective	Future	3 (7%)
	Heart Attack	8 (18%)
Affective		10 (23%)
Anxiety		
Cognitive and Affective	Future	5 (11%)
	Heart Attack	9 (20%)
Affective		10 (23%)

* For the definitions of these coping patterns see p.80

It was predicted in Hypothesis C2a that the anxiety pattern would occur less often than either denial or inaction. If the highest prevalence rates of the three patterns are selected we obtain: denial 32%, inaction 23% and anxiety 23%. Anxiety was thus less prevalent than denial but no less so than inaction. Hypothesis C2b predicted that the anxiety pattern would be more prevalent in the early days of the assessment period than in the later days. When patients who displayed the anxiety pattern were grouped according to whether they were assessed on the fourth or fifth day after admission, or on the sixth, seventh or eighth day, the two groups contained equal numbers of subjects, regardless of whether future or heart attack appraisal scores were used. The hypothesis concerning a possible reduction in the prevalence of anxiety over time was further tested by examining the MAACL anxiety score component of the coping pattern. A correlated t test was performed on the anxiety scores of those subjects who had been tested on two occasions. No significant change in anxiety between the first and second sessions was detected ($t = 0.8065$). An independent t test was then performed on first session anxiety scores gathered on the fourth day and fifth day after admission compared with those gathered on the sixth and seventh day. Again, no significant difference was found ($t = 0.9464$).

Although no specific hypothesis had been formulated, similar t test analyses were conducted on the MAACL depression data. The correlated t showed no significant difference ($t = 0.1688$), but the independent t test revealed that mean depression scores recorded on the fourth and fifth days after admission were significantly higher than those recorded on the sixth and seventh days ($t = 2.26$, $p<0.05$).

Type A Behaviour

No significant differences were found between the affect scores of Type As and those of Type Bs. Mean affect scores displayed by Type As and Bs, as classified both by the interview and the rating scale, are shown in Table 7. Student's t tests revealed no significant differences. In the case of the interview classification, X5 subjects were excluded from the analyses and the remaining subjects were classified as either A or B. The median rating scale score of 162 was used as a cut-off point above which subjects were designated Type A, and below which as Type B. To avoid confounding effects associated with repeated testings, first and second session affect scores were analysed separately.

It was further stated in Hypothesis C3 that Type As would report significantly lower appraisal scores regarding the future and the heart attack. Appraisal scores were dichotomised as before into high and low categories. Cross tabulating the appraisal scores with the Type A interview data produced the two contingency tables shown in Table 8. Fisher's test was applied and showed that the distributions of frequencies did not differ significantly from chance in either case.

To examine the relationship between the Type A rating scale data and appraisal scores, without reducing the former to a dichotomy, a point-biserial r analysis was performed. Thus it was hypothesised that a significant negative correlation would emerge between Type A and appraisal scores. Type A correlated -0.1436 with future appraisal and 0.1058 with heart attack appraisal indicating no significant associations.

Table 7 Mean Affect Scores exhibited by 50 Subjects Classified on two measures of the Type A Behaviour Pattern

MAACL Subscale		Type A classification: Interview, Type A	Interview, Type B	Rating Scale, Type A	Rating Scale, Type B
First session	Anxiety	6.6	7.7	8.5	6.9
	Depression	14.8	16.4	16.0	15.6
	Hostility	7.8	8.1	8.3	7.6
Second session	Anxiety	5.5	7.6	7.6	7.0
	Depression	14.0	16.0	17.4	15.0
	Hostility	7.0	7.8	8.4	7.4

Table 8 Cross Classification of Type A interview ratings and appraisal scores for 37 subjects

Future appraisal

	Type A	Type B	
High appraisal	3	23	26
Low appraisal	1	10	11
	4	33	37

Fisher's p = 0.66

Heart attack appraisal

	Type A	Type B	
High appraisal	2	5	7
Low appraisal	2	28	30
	4	33	37

Fisher's p = 0.16

Trait and State Denial

Trait denial scores of subjects who exhibited both cognitive and affective denial were compared with those of the remaining subjects. The mean trait denial score of subjects who denied with regard to the future was not significantly different from that of non-deniers ($t = 0.0784$). Similarly, those who denied with regard to a heart attack did not obtain significantly different trait denial scores ($t = 0.95$). Hypothesis C4, which predicted a positive association between trait and state denial, was therefore unsupported.

Psychiatric History and Denial

Table 9 shows that none of the subjects who reported a definite or suspect psychiatric history exhibited the coping pattern of denial. A Fisher's test indicated that such a configuration of frequencies lies well within the boundaries of chance variation ($p = 0.347$).

Out of interest, a t test was performed on the trait denial scores of subjects with and without a psychiatric history. No significant difference emerged ($t = 0.9307$). The relationship between psychiatric history and denial, suggested in Hypothesis C5, was not detected.

Table 9 Cross Classification of 44 subjects according to Psychiatric History and State Denial

	Psychiatric History	No History	
Deniers	0	8	8
Non Deniers	5	31	36
	5	39	44

Fisher's $p = 0.347$

Educational and Coronary Disease Experience

To gauge the inverse association between educational experience and affect scores predicted in Hypothesis C6, point biserial r analyses were made. Subjects whose formal education had ceased by the age of 15 were designated as having had basic education, whilst those who had continued were classified as having had extended education. As shown in Table 10, none of the obtained correlation coefficients were statistically significant. To test the predicted positive relationship between education experience and appraisal scores Fisher's tests were performed on the data presented in Table 11. All of the p values shown were greater than the required 0.05 level, indicating no significant association between education experience and appraisal.

Similar analyses were conducted to examine the hypothesised negative and positive relationships between previous experience of a coronary and affect and appraisal scores respectively. Tables 12 and 13 contain the obtained correlation coefficients and contingency tables. Although coronary experience was clearly unrelated to appraisal of either the future or a heart attack, it proved to be significantly associated with the depression and hostility scores. However, this association only held for second session scores and was not in the predicted direction.

Life Change and Inaction

To test Hypothesis C7, subjects were classified as to whether they scored above or below the median LCU score of 111 and whether or not they exhibited the coping pattern of inaction. A Fisher's test on these data displayed in Table 14 showed that the predicted association between life change and inaction was not present.

This hypothesis was further investigated by examining the relationships between LCU scores and the affect and appraisal components of the coping pattern. No significant association was found between either first or

Table 10 Point-Biserial Correlation Coefficients between Educational Experience and MAACL Affect Scores

MAACL Subscale		Correlation with educational experience
First session	Anxiety	0.1965
	Depression	0.2404
	Hostility	0.2633
Second session	Anxiety	0.1498
	Depression	0.1384
	Hostility	0.3488

Table 11 Classification of 44 Subjects according to educational experience and appraisal scores

Future appraisal

	Basic education	Extended education	
High appraisal	23	9	32
Low appraisal	9	3	12
	32	12	44

Fisher's $p > 0.29$

Heart attack appraisal

	Basic education	Extended education	
High appraisal	7	1	8
Low appraisal	25	11	36
	32	12	44

Fisher's $p > 0.23$

Table 12 Point-Biserial Correlation Coefficients between Coronary Experience and MAACL Affect Scores

MAACL Subscale		Correlation with coronary experience
First session	Anxiety	0.0562
	Depression	0.0299
	Hostility	-0.0749
Second session	Anxiety	0.1873
	Depression	0.3823*
	Hostility	0.3785*

* $p < 0.05$, df = 30

Table 13 Classification of 44 Subjects according to coronary experience and appraisal scores

Future appraisal

	coronary experience	no coronary experience	
High appraisal	4	28	32
Low appraisal	3	9	12
	7	37	44

Fisher's $p > 0.2$

Heart attack appraisal

	coronary experience	no coronary experience	
High appraisal	3	5	8
Low appraisal	4	32	36
	7	37	44

Fisher's $p > 0.09$

Table 14 Classification of 44 Subjects by Life Change Score and use of the inaction coping pattern

	LCU Score ≤ III	LCU Score >III	
Inaction present	5	3	8
Inaction absent	17	19	36
	22	22	44

Fisher's $p > 0.229$

second session Depression scores and LCU scores (Pearson's $r = -0.179$ and -0.0716 respectively). Mann Whitney U analyses were performed to compare the LCU scores of subjects with high and low appraisals. Subjects with high future appraisal had experienced significantly less life change than those with low future appraisals as predicted by Hypothesis C7 ($U = 127.5$, $z = 1.6996$, $p<0.05$). A significant difference also emerged between the LCU scores of subjects with high heart attack appraisals and those with low appraisals ($U = 84.5$, $z = 2.124$, $p<0.05$). However this second difference was not in the predicted direction. That is to say, subjects with high heart attack appraisal scores had experienced significantly more life change than those with low appraisal scores.

This completes the account of results obtained in the main investigation. In the following chapter an attempt is made to make sense of this mass of findings in the light of the aims of the study.

CHAPTER 8

Following the structure of Chapter 7, results relating to prevalence questions, and to the comparative hypotheses are discussed first, then those findings concerning the hypotheses derived from the theoretical model are considered.

Threat Appraisals

Patients clearly displayed a very positive view of their Coronary Care Unit (CCU). The accuracy of this estimate of patients' appraisals is, of course, open to doubt, but the possible biases which suggest themselves tend to operate in opposing directions. In favour of an overestimate, one could put forward the lack of opportunity to make a graded response, in combination with a social desirability response set. On the other hand, the absence of a forced choice instruction and the assured anonymity would tend to pull scores in the opposite direction. The fact that this positive appraisal of the CCU has been reported in other studies, reviewed in Chapter 4, suggests that the present findings are not wildly inaccurate.

In Chapter 6, it was stated that the aim was to examine a variety of appraisals, rather than the range of intensity of a limited number. Accordingly, responses to individual items of the check lists provide the most interest. Despite the lack of a forced choice instruction, 82% of the subjects appraised the CCU as friendly. This finding is in accord with the pilot study reported in Chapter 4 in once again highlighting the importance of social contact. Not surprisingly, nearly 3/4 of the sample thought the CCU valuable; nor did anyone actively dissent from this view. Just over 60% found the Unit a safe, comforting and reassuring place. This last finding corresponds well with Dominian and Dobson's estimate of 59% of patients who were reassured (1), but is substantially less than Cay's estimate of 80-90% (28). Out of interest, the positive association between reassurance and social class reported by

Dominian and Dobson was analysed on the present data with a confirmatory result (Fisher's $p = 0.043$). The response rates to the remaining adjectives were too low to warrant substantial comment, save that the pattern of positive rather than negative responses remained throughout.

Patients also seemed to view the future in a positive way. No more than 6 subjects (14%) checked any of the negative adjectives. However, it should be noted that the highest response to any positive adjective was only 64%. Perhaps patients found many of the adjectives inappropriate. A more contentious interpretation is that patients had not yet had the opportunity or maybe the desire, to contemplate their future in any detail. Without further data neither one of these alternatives can be accepted with confidence. For those who did respond, the general picture is an optimistic one, with at least 43% seeing the future as important, happy, hopeful, pleasant and good. The low responses to the remainder of both the positive and negative items suggest the irrelevance of these dimensions of meanings for most of the subjects.

If we examine both the curve of the heart attack appraisal scores in Figure 1 (Chapter 7), and the ratio of negative to positive responses for individual items in Table 1 (Chapter 7), it comes as no surprise to find that patients displayed markedly negative appraisals. Over 70% found the experience frightening, painful, worrying and unpleasant. Over half thought a myocardial infarction a dangerous and violent event. The fact that two patients saw a heart attack as painless is quite consistent with the occurrence of so-called silent myocardial infarctions.

It is interesting to speculate as to why the highest response rate was only 77%. The tempting explanation is that the remaining 23% had constructed defensive neutral reappraisals, an interpretation consistent with the operation of denial, discussed later in this chapter. However, a more mundane explanation may be that patients who did not wish to make an extreme response simply did not respond at all. In the case of patients' appraisals of both the future and of a heart attack, the present writer was unable to discover any suitable data for comparison.

Hypothesis B3 predicted that the coronary group would exhibit a more negative job appraisal than would the comparison group. The job appraisal curves were consistent with this hypothesis. Notably more patients than controls scored in the 0-9 range, and fewer patients than controls scored throughout the 70-100 range. However, the difference between the groups just failed to achieve statistical significance. Since this finding could well indicate "noise" generated by the measuring instrument, analysis of the individual items was clearly appropriate.

Only one item, "boring", was checked significantly more frequently by the coronary patients. However the pattern of results was strikingly consistent. With only two exceptions more controls than patients checked positive adjectives, whilst the opposite was true for the negative adjectives. The first exception "pleasant-unpleasant", could well be explained by the working conditions experienced by many of the miners in the comparison group. The second exception, "competitive-non competitive", may simply reflect the difficulty of deciding which is the positive and which the negative adjective.

The pattern of the findings, though generally non-significant, is consistent with other evidence which suggests that the coronary-prone individual tends to experience an unusually high number of work-related problems (75). Caution is necessary though since comparative studies, especially when retrospective in design, encounter various difficulties. One major hazard is the possibility that coronary patients may tend to paint a black picture of their past, especially their job, in search for "stress" causes of their coronary. A second problem is the possibility that factors other than disease state differentiate the coronary and comparison groups. In the present study it was known that the two groups differed significantly in age and religious affiliation. However, analyses of job appraisal, stratifying by age and religion revealed no significant effects. In summary, we may conclude that the present study findings are consistent with the proposition that work experiences may be involved in the development of myocardial infarction.

Threat Reactions

Patients' mean anxiety score of 7.4 was significantly higher than the comparison group's 5.9, which in turn was very close to the U.S. male adult norm of 5.8 quoted by Zuckerman in the MAACL Handbook (108). The handbook also provides mean scores for 3 groups of psychiatric patients. The coronary patients' score just exceeded two of these psychiatric mean scores (7.3 and 7.1), but was notably less than the third (9.1). Thus, the present findings support the conclusion drawn in the literature review, that coronary patients display higher than normal anxiety which may reach levels of psychiatric significance. Such a finding is particularly striking since an unknown number of the coronary group were receiving anti-anxiety medications.

It was possible that the difference found between the coronary and comparison groups could have been produced by their different age structure. Zuckerman reports no significant association between age and MAACL anxiety (108). In the coronary group of the present study age and anxiety were negatively associated ($r = -0.3025$, $p < 0.05$), though no significant association was found in the comparison group. Even if we accept the significance of the former association, such a correlation strengthens the difference found between the groups since the coronary patients were both older and more anxious.

The coronary patients were significantly more depressed than either the comparison group or the U.S. norm. Their mean score of 15.9 was also higher than the 3 U.S. psychiatric means quoted by Zuckerman, which ranged from 13.8 to 15.6. This last point and the bimodal tendency of both the coronary and comparison groups score distributions raises the question of the comparability of British and U.S. samples.

One speculative point which may be significant concerns the scoring system of the MAACL. The affect scores are calculated by adding one for every negative keyed adjective checked and one for every positive keyed adjective unchecked. Some of the positive keyed adjectives in the

depression scale, such as "joyful", may be avoided more by the less emotional Briton than by his North American counterpart. If there is a cultural difference of this sort, the elevated depression scores at and beyond psychiatric levels in the British group may be partly due to artifact. However, with this proviso in mind, the current findings may be seen as supporting the suggestion that coronary patients experience levels of depression higher than normal, and perhaps approaching psychiatric significance. Once again, the apparent inability of psychotropic medications to suppress this difference makes the evidence all the more notable.

Zuckerman reports no significant association between age and MAACL depression, a finding replicated in the present study. It appears that the difference found in depression scores between coronary and comparison subjects could not therefore be explained by their age difference. The lack of association between age and depression supports Hackett and Cassem's position on this subject in opposition to Rosen and Bibring's as described in Chapter 3 (p.52).

Although no significant difference emerged between the mean hostility scores of coronary and comparison subjects, both groups scored significantly higher than the U.S. norm ($t = 2.855$, $p < 0.01$ and $t = 2.21$, $p < 0.05$ respectively). Indeed, their mean scores were slightly higher than those of two of the three psychiatric groups quoted by Zuckerman. Again the possibility of U.S./British differences in test behaviour should be borne in mind. Also, of the three MAACL scales, the hostility scale undoubtedly has the most doubful psychometric properties, as discussed in Chapter 6. These considerations forbid the drawing of any clear conclusions from the present data on hostility.

Type A Behaviour

According to the Standard Situation Interview data only 10% of both the coronary and comparison groups were Type A individuals. This prevalence rate is in marked contrast to the 50% rate reported from

the Western Collaborative Group Study (83). In the coronary group the low rate may be explained by a possible attenuation of the overt pattern due to fatigue. But this explanation does not hold up for the comparison group.

Given the highly subjective nature of the assessment procedure, it may be argued that the investigator was, for some reason, failing to detect the Type A pattern. For example, since every attempt was made to help the subjects relax, the interview may have failed to provide the challenging situation which supposedly elicits Type A behaviour. Or perhaps the ability to detect the behaviour pattern declines over time if no re-training is given. However, in a subsequent study in New Zealand the present writer, using the Standard Situation Interview without any re-training, has found very similar prevalence rates of Type A behaviour to those found in the U.S.A. (121).

The alternative explanation is simply that Type A's are substantially less prevalent in the groups examined in the present study. Other investigations, for example, in Honolulu, have found large variations in the prevalence rate of the pattern (97). Further anecdotal evidence supports this finding. The cardiologists who cooperated in the present study expressed great scepticism as to the existence of the pattern in their patients. Also, the social history of the Stoke area suggests the presence of characteristics more typical of Type B's than of Type A's. For example, the strike as an industrial weapon has been virtually unused in this area so far this century.

But far stronger evidence is provided by the results from the Bortner Rating Scale used in the present study. The mean scores of both groups were significantly lower than those reported by Bortner from the Western Collaborative Group Study ($t = 5.835$, $p < 0.001$). Thus, it seems safe to conclude that the Type A pattern is significantly less prevalent in the present group than in San Franciscan men.

No difference emerged between the coronary and comparison groups on either Type A measure. Intuitively one would expect an inverse

association between Type A behaviour and age, which might have suppressed a possible difference between the coronary group and the younger comparison subjects. There is no clear evidence of such an association from other studies. In the present investigation age and Type A were significantly related in the coronary group ($r = -0.3714$, $p < 0.05$), but not in the comparison group ($r = -0.1665$). Subsequent analysis showed that coronary patients in the 30-40 age group had higher mean Type A scores than did the same age stratum of the comparison group. However the difference was not statistically significant ($t = 0.267$).

The comparison group exhibited greater variation in Type A behaviour than did their coronary counterparts ($F = 1.61$, $p < 0.05$). This was conceivably due to greater variation amongst the younger subjects, or perhaps to some more rigid test response set among coronary patients of the sort described by Van Dijl (122).

The lack of difference between the groups in Type A behaviour may be explained by the relatively low prevalence and intensity of the pattern. Perhaps the pattern only gains its pathogenic force where it exists above a certain level of intensity. Below that level the pattern would cease to be a risk factor for CHD and, thus, there would be no reason to expect a higher prevalence or intensity amongst coronary patients. A final alternative explanation is that perhaps the comparison group contained some undiagnosed CHD cases who were also Type A individuals. But given such low prevalence rates of the pattern in both groups, this seems unlikely.

Trait Denial

The mean trait denial score of the coronary patients was significantly higher than the norm reported in the MMPI handbook. No ready explanation suggests itself. National differences either in the trait itself, or in test behaviour may account for the difference. Alternatively, trait denial scores may be elevated when subjects are placed in threat situations. No data could be found to throw light on these interpretations.

Psychosocial Characteristics

Patients and comparison subjects differed significantly in two respects: age and religious affiliation. The coronary patients were clearly older, a fact which presumably reflects the increasing incidence of CHD with age. In retrospect, it would have been wise to have age-matched the groups, but this proved administratively impossible. Instead, in those analyses where age could have acted as a confounding factor, its effects were removed by stratification.

The fact that significantly more coronary patients than comparison subjects were affiliated to the Church of England was not readily explicable. This was not due to age differences, nor was it clearly reflected in significant social class or educational differences. Although not significant, there was a trend for more coronary than comparison subjects to be in social classes I-IIIN ($\chi^2 = 3.327$). The comparison is muddied by the sampling constraint that only 20% of the comparison sample could be taken from the administrative stratum of the colliery. This constraint could perhaps have restricted the number of subjects from the first three social classes in the comparison group. The evidence relating social class to CHD incidence is a tangle of conflicting data, but, at least in developed industrial societies, there is some indication of a slight positive correlation (95,96). This provides a second possible reason for the higher prevalence of men from the top three social classes in the coronary group.

Recent Life Changes

Although many life change studies have been done it is difficult to compare the prevalence rates of life changes from different investigations. The Schedule of Recent Experience is usually the instrument of choice, but it is typically administered in modified form, according to the interests and hypotheses of the investigator. Thus the actual list of events used, the scoring system and the instructions all tend to vary from study to study. Add to this the varying characteristics of the

populations sampled, and the result is that inter-study comparisons become virtually impossible to interpret.

It is nevertheless interesting to view the present results in the context of Holmes' definitions of life crises (99). He has defined a mild life crisis as one entailing between 150 and 199 LCUs in any one year. A moderate life crisis involves 200-299 LCUs, and a major crisis over 300 LCUs. On these criteria, only 6 coronary subjects had experienced a mild life crisis in the preceding year, 4 a moderate crisis and 1 a major one. The corresponding figures for the comparison group were 3, 3 and 0. Thus only 25% of the coronary sample and 12% of the comparison group reported life change sufficient to warrant the designation "life crisis". This is generally consistent with other findings on life change, which indicate that most life events are experienced by a small minority of the population, as is also the case with disease experience (106).

Hypothesis B2 predicted that the coronary group would report more life change than would the comparison subjects for the preceding year. The results indicated that this was indeed true, even when the item referring to major illness was excluded. The bulk of the difference appeared to be explained by a higher prevalence of work-related events, notably, changing to different lines of work, reported by the coronary group. These results were gratifying since they mirror other findings on both the direction and type of differences in life events reported by coronary and healthy subjects (102,103).

However, as George Brown has pointed out in a recent incisive paper (104), life change studies, particularly retrospective ones, encounter serious methodological problems. Three of these problems should be mentioned in the context of the present study. Coronary patients undoubtedly spend some of their recovery time searching their immediate past for "causes" of their heart attack. Further, Theorell has provided some limited evidence that healthy subjects tend to under-report some types of event (123). Accordingly, part of the difference between the

groups may have been the result of differential under- or over-reporting. In a prospective study, designed to overcome this problem, Theorell found that LCU scores, based on consensus "upset" weightings, did not predict near future myocardial infarction. However, one item, "increased responsibility at work", did significantly predict 10% of future m.i. cases (105).

One problem which even prospective studies cannot fully overcome is that of the direction of the association between life events and myocardial infarction. It has been suggested that as many as 29 of the 43 SRE life events may reflect health changes, for example, changes in sleeping and recreational habits (124, p.131). Perhaps in the months preceding a myocardial infarction the subject experiences a non-specific feeling of ill-health, which in turn leads to lowered efficiency at work and perhaps increasing conflict at home. In this case myocardial infarction would be a risk factor for life changes, not the other way around. The finding that male m.i. patients tend to report increased work changes may simply reflect the fact that men spend a sizeable portion of their waking hours at work. Even a prospective study does not avoid this problem of direction of association, since it is not possible to specify at what point in time the myocardial infarction process begins. So it is not clear just which life events strictly precede, and are thereby uncontaminated by, the disease process.

The third and final problem to be discussed is that of the confounding variable. Various investigators have reported associations between life changes and stable psychosocial and psychological characteristics (125,126). Since some of these characteristics, such as age, are also risk factors for CHD, the problem of confounding arises.

In the present study age was the prime suspect for confounding effects. Analysis of the group difference in LCU totals, stratifying by age, showed that the difference held only in the upper age group 45-60. ($\chi^2 = 7.026$, $p < 0.01$). There appeared to be no age effect on the significant difference found in "Change to different line of work"

(Fisher's p = 0.07). Since there was no significant difference in social class between the two groups this variable was not analysed for confounding effect.

It is of course possible that the two groups in the present study differed in some other unmeasured respect, which could have produced the significant difference in reported life events. But in the absence of other data such a conjecture stops at this point. The evidence presented here supports the implication of life changes in the precipitation of premature myocardial infarction. The elucidation of the nature of this implication must await further, more stringent investigations.

Balance of Power Hypothesis

It was predicted from Lazarus' balance of power principle that the more favourably patients appraised their counterharm resources, that is the CCU, the less threatening they would find a heart attack or the future. This hypothesis was not supported by analysis of the ratio appraisal scores on these three variables, but was confirmed by analyses of the raw appraisal scores.

Although these latter analyses were more powerful they encounter the problem which the ratio scores were originally designed to deal with. That is, patients who produce low scores due to a negative appraisal are indistinguishable from those who do so because they find many of the adjectives irrelevant. This pattern of findings could therefore be explained by consistent response sets whereby subjects tend to produce similar appraisal scores for different threat stimuli by checking similar numbers of adjectives in each case.

Ultimately the balance of power hypothesis remains without clear resolution. Even if the above significant findings are accepted, just which variable influences which is open to question. It could be argued, for example, that the patient's evaluation of the CCU is partly determined by his appraisal of his heart attack, which is in turn determined by the actual infarct severity. Certainly such an interpretation would be

consistent with Dominian and Dobson's report of a negative correlation between infarct severity and the extent to which patients are reassured by the CCU (1).

Coping Patterns

Three coping patterns were detected by the cross-tabulation of appraisal and affect scores. This approach was suggested by Lazarus' definition of coping processes as inferences from certain patterns of threat appraisals and reactions. Each of the three coping patterns can logically be defined in various ways and, thus, various estimates of their prevalence were obtained, as shown in Table 6 in the previous chapter.

Before discussing these prevalence figures the issue of operationally differentiating appraisal and self-report affect must be raised. In the present study the measures of threat appraisals and threat reactions were both adjective checklists. Both measures conflate stimulus properties and subjective reactions to stimuli. For example, consider the reports "X is threatening", derived from an appraisal checklist, and "I feel threatened", derived from an affect checklist. The only difference seems to be that in the latter case we do not know which stimulus is producing the threat reaction. For practical purposes we seem to be measuring the same item of behaviour in both cases. In this case, the division between appraisal and reaction is a contrived one, more in the mind of the investigator than in the experience of the subject.

The consequence of these observations is that in the present study the two sets of data representing threat appraisals and threat reactions were not mutually exclusive. The measures used produced a heterogeneous set of data reflecting a mixture of subjects' cognitive and affective experiences, which could not subsequently be disentangled. If this conclusion is correct, what are the implications for the interpretation of the present results? These are not too serious, since no attempt was made to estimate associations between threat appraisals and reactions: a type of analysis which would certainly necessitate the effective isolation

of appraisal from reaction variables. Rather, the only notable consequence of the overlap was a probable reduction in the accuracy of the estimates of the prevalence of threat appraisals and reactions.

This problem of operationally differentiating threat appraisals and reactions seems to be a fundamental difficulty in investigating hypotheses derived from Lazarus' model. Lazarus recommends the examination of the behavioural and physiological, as well as self-report, threat reactions. Although this is clearly a desirable approach to the investigation of threat behaviour, it seems to do nothing to clarify the problematic distinction between the cognitive and affective components of behaviour so central to Lazarus' model.

Using the most stringent definition of denial, it appeared that 8 (18%) of the coronary patients were denying with regard to the future, and only 3 (7%) with regard to a heart attack. The difference between these two figures is clearly the result of the very few patients who exhibited a positive appraisal of a heart attack. Although patients were asked to appraise a heart attack, undoubtedly many appraised their heart attack. Thus, one stimulus, the heart attack was in the past, whilst the other was "the future". The former is also a relatively unambiguous, clear-cut event, whilst the latter is an extremely complex set of ambiguous phenomena. Both these points would suggest that "the future" would be a more potent threat stimulus, which would thereby be more likely to elicit strategies such as denial.

We may tentatively infer from these data that denial, defined as cognitive repudiation of a heart attack, was far less prevalent in this sample than the 20% rate reported by Croog et. al. (57). Certainly, clinical impressions gained from the medical staff suggested the near total absence of this phenomenon in the Stoke CCU. The low prevalence can perhaps be attributed to weak and rather devious measuring procedures. However, it is striking that all of the reports of denial in coronary patients known to the present writer emanate from U.S. hospitals. Either

British investigators are not looking carefully enough for this phenomenon, or it is simply very rare in this country.

No direct comparison figures were available on denial regarding the future. The figure of 18% is almost certainly an overestimate since it probably included patients who were genuinely not threatened by the future. In general, the prevalence of denial defined in both cognitive and affective control terms seems strikingly lower than the estimates reviewed in Chapter 3.

Using the affective control definition of denial, 10 patients (23%) were classified as deniers. Relaxing the definition still further to encompass only anxiety control, the prevalence of denial became 14 (32%). Once again these figures are probably overestimates due to the inclusion of subjects with low affect scores, who were genuinely untroubled. But they are at least in the same range as Gentry's estimate of 25% which is, of course, subject to the same bias (39). In general, the present data suggest that denial was exhibited by some patients. A tentative conclusion may be drawn that whilst the prevalence of the affective control component of the pattern approached that found in at least one other study, the occurrence of cognitive repudiation was strikingly low.

The following comments on the inaction and anxiety patterns are comparatively brief since the patterns overlap with the depression and anxiety threat reactions already discussed. When inaction was defined in both appraisal and reaction terms 3 (7%) patients showed the pattern concerning the future, and 8 (18%) with regard to a heart attack. Again the difference may be explained by the relatively high number of patients with low heart attack appraisals. When inaction was identified simply with a high depression score the prevalence rate was 23%. This figure is of the same order as the 29% obtained using the Zung Scale (30), and Cay's estimate of 23% (28). As noted earlier, the depression findings from the present study were in general similar to those reported by other investigators.

The anxiety pattern, based on appraisal and affect scores, was exhibited by 5 (11%) patients with respect to the future, and 9 (20%) regarding a heart attack - a similar configuration to the inaction result. Identifying the anxiety pattern solely with high anxiety scores produced a prevalence of 23%. This figure falls between Hackett's estimate of the prevalence of severe anxiety in the CCU and other binary estimates listed in Table 1 of Chapter 3 - a logical positioning. In general, as discussed earlier, the anxiety results were congruent with those from other studies.

The three coping patterns were clearly discernible, estimates of their prevalence varying according to the definition adopted. It was predicted that the anxiety pattern would prove less common than either denial or inaction. Anxiety was less prevalent than denial but equally common as inaction. The hypothesis was thus partly supported. The similar prevalence rates of inaction and anxiety patterns probably reflects the positive correlation which holds between anxiety and depression as measured by the MAACL (108).

No evidence could be found indicating a change in anxiety levels over time. Two possibilities may explain why the downward time trend apparent in other studies did not appear in the present investigation. Firstly, patients were not assessed until the fourth day after admission. By this time the trend may have flattened out. Secondly, as noted earlier, other investigators have discussed the relative insensitivity of objective anxiety scales in detecting changes (42,44). In contrast, depression scores did show a significant drop between days 4-5 and days 6-7. This finding is consistent with other evidence in showing a decline in depression levels over time. Further, if, as Hackett suggests (46), depression peaks several days later than anxiety, it is logical that a belated assessment of both affects would detect a time trend in depression but not in anxiety.

Type A Pattern and Threat Behaviour

No significant associations were found between Type A measures and either threat appraisals or reactions. It appeared that the Type A pattern is not a set of motivations and beliefs which influences threat behaviour in the CCU. The present writer knows of no other data concerning this question.

Certain cautions should however be borne in mind. As noted earlier, the prevalence and intensity of the Type A pattern in this sample were notably low. It is possible that extreme Type A behaviour may have some bearing on psychological reactions in the CCU, but this relationship would not have emerged in this particular study. A second possibility is that Type A behaviour determines psychological reactions during the first few days after admission, but then declines in influence. Again, this effect would have been undetectable in the present study. Finally, there is the possibility that, for some reason, Type A's receive more psychotropic medication than do Type B's, thereby removing any difference in their affective behaviour. No reliable evidence was available to test this hypothesis. Various post hoc hypotheses suggest themselves, but it would be gratuitous to make the list any longer.

Before leaving the relationship between the Type A pattern and threat behaviour, one last point is worthy of comment. Type A's, classified by interview, had consistently lower mean affect scores than did Type B's. But when subjects were classified according to the Type A rating scale results the trend reversed. (Chapter 7, Table 7). None of the differences was statistically significant, but some explanation of this pattern seems necessary. In fact, the configuration is almost certainly due to the high positive correlations between first and second session affect scores, and between the three affect scales. Thus, the consistency of the trend reflects a common factor underlying the affect scores, no more.

Trait and State Denial

To heighten the relationship, if any, between trait and state denial, the most stringent definition of the latter was used. As the results show, no significant relationship emerged. In Chapter 3 the state of the evidence provided by coronary patients was reviewed and found to be suggestive, but not conclusive because of methodological faults. Lazarus too has found that evidence in other fields of stress research does not support the relationship (p.23). Since the trait measured by the instrument used was closely identified with the denial of psychiatric symptoms, it is clearly dangerous to treat it as a completely general predisposition to use denial. With this limitation, the present data do not support the hypothesised relationship between trait and state denial.

Psychiatric History and Denial

It was suggested that weak ego resources may be reflected in a psychiatric history, which may in turn partially predispose subjects to the use of coping processes such as denial (hypothesis C5). The analysis using the stringent classification of denial shows clearly the absence of a relationship. This was undoubtedly one of the weakest operational definitions in this study. Probably many non-psychological factors determine whether a subject consults a psychiatrist or not: the occurrence of acutely stressful events, the availability of psychiatric help, the patient's view of psychiatrists, the general practitioner's view of psychiatrists, and so forth. As noted in Chapter 3, no studies have shown any relationship between any psychological characteristics and state denial, except trait denial. It is of interest to repeat the finding mentioned in the literature review (p.51), that psychiatric history apparently bears no clear relationship to other affective behaviour in the CCU.

Educational and Coronary Disease Experience

Educational experience appears to have no significant influence on

either appraisal or affect scores. There was a non-significant tendency for higher education subjects to produce higher MAACL scores, especially on the hostility scale - the opposite trend to that predicted in hypothesis C6. Such a finding could be artifactual, higher MAACL scores being achieved by those with a more extensive vocabulary. However, Zuckerman provides evidence to show that the MAACL is not sensitive to subjects' educational experience (108). The results are consistent with Hackett's contention that education is not a determinant of psychological reactions in the CCU (34). They also support Lazarus' more general proposition that education plays a non-directional role in threat appraisal.

There was clearly no relationship between m.i. history and appraisal of either future or heart attacks. The MAACL results were mixed. Both second session depression and hostility scores were positively correlated with m.i. history. Again these findings were not in line with hypothesis C6, since patients with coronary experience exhibited higher, not lower, affect scores. The validity of these coefficients must be treated with caution on two grounds. They were not replicated in the first session scores; and the high number of analyses performed makes the 5% significance level a dubious choice. These findings add to the mixture of data reviewed in Chapter 3, and do nothing to clarify the picture. For example, the depression finding agrees with Cay's evidence (28), but conflicts with Stern's (30). These differences between studies presumably reflect the differential operation of confounding variables.

Life Change and Inaction

The final hypothesis C7 was not derived from the theoretical model, but was based on intuition. It was thought of as the "camel's back hypothesis", since it predicted that the more life change patients had experienced, the more likely they would be to exhibit the depressed inaction pattern. This idea of the cumulative nature of life events is of some interest, since it underlies most of the work in life changes.

No such relationship appeared when the inaction pattern itself was analysed. More sensitive analyses of the depression component of the pattern also failed to reveal any relationship with life change. Out of interest, the appraisal component was also analysed separately. From this it appeared that the more life change experienced by the patient, the more negative his appraisal of the future. Although not a test of the life change/inaction hypothesis, this finding does give a little support to the notion that accumulated life changes produce strain, if only in terms of future outlook. But once again, the significance level of 0.05 necessitates caution.

Curiously, subjects with high life change had a more positive picture of a heart attack than did those with low life change. This conflicts with the general hypothesis of accumulated life events producing negative effects. Post hoc hypotheses are not difficult to construct - for example, a practice effect in coping with problems. But these two results are too unsteady, both in terms of significance level, and in the type of appraisal measure used, to bear too much analytic weight. In general, the hypothesised relationship between life change and inaction was not supported by findings from the present study.

CHAPTER 9

With few exceptions, the general pattern of findings relating to both the prevalence questions and to the comparative hypotheses in the present study was consistent with existing evidence. The coronary patients saw both the CCU and their future in a very positive light, in contrast to their very negative appraisal of a heart attack. In comparison to the miners group, the patients saw their jobs as significantly more boring, and, in general, displayed a more negative view of their work.

The coronary patients displayed significantly higher levels of anxiety and depression than did either the comparison or U.S. normative groups. The mean levels of both affects were in the same range as those found in U.S. psychiatric patients. Although no difference was found between the mean hostility scores of the two groups, both were significantly higher than U.S. norms and, again, approached psychiatric significance.

The two exceptional findings in the prevalence and comparative results concerned Type A behaviour and trait denial. Type A behaviour was significantly less prevalent and intense in both groups in comparison to findings from various studies in the U.S.A. No difference was found between the coronary and comparison groups, except that the comparison subjects displayed significantly greater variation in their Type A rating scale scores. The coronary group scored significantly higher than U.S. subjects on trait denial.

Coronary patients and comparison subjects did not significantly differ in marital status, social class or educational experience, the bulk of both groups being married, in social classes IIIM - V and having experienced a basic secondary education. The coronary group was significantly older than comparison subjects, and contained significantly more affiliates of the Church of England. Finally, patients reported significantly more recent life changes than did comparison subjects, especially those events relating to changes at work.

The results relating to hypotheses derived from Lazarus' model gave some indication that patients' view of the CCU was positively related to

their appraisal of the future and a heart attack. However, the evidence was too weak to support a firm conclusion. Three coping patterns: denial, inaction and anxiety were successfully detected. The cognitive repudiation aspect of denial appeared to be far less prevalent than in other studies, whilst the prevalence of the affective control component was similar to that found in one other investigation. Inaction and anxiety appeared as prevalent as in other studies. As predicted, anxiety occurred less frequently than denial, but the prevalence of anxiety did not differ from that of inaction. There was no evidence that the intensity of anxiety changed significantly between the fourth and eighth days after admission. Mean depression scores were however significantly lower on days 6-7 than on days 4-5.

Type A behaviour did not appear to influence threat behaviour. Neither trait denial nor psychiatric history was associated with the use of state denial. There was a non-significant trend for the more highly educated patients to display higher affect scores, but, in general, education did not appear to determine threat behaviour. A significant positive association was found, however, between social class and the tendency to appraise the CCU as reassuring.

There was some evidence that patients with a coronary history were more depressed and hostile than were patients without such a history, but this finding should be treated with caution. Finally, there appeared to be no association between recent life changes and affective behaviour associated with the inaction coping pattern. However, patients who reported many life changes tended to have a more negative appraisal of the future and a more positive appraisal of a heart attack, in comparison to patients who had experienced few changes.

What do these results tell us about the Lazarus model? Most of the specific principles enunciated by Lazarus were supported or untouched. According to the model, the inherent ambiguity of the coronary patient's predicament, and his relative helplessness, would lead to a high degree of threat in many cases. The fact that mean anxiety, depression and hostility

scores were significantly elevated above normal, despite medication, supports these principles. The balance of power hypothesis, namely that appraisal of the harm-producing stimulus and of counterharm resources co-vary also received some limited confirmation.

By definition, the coronary patient cannot locate an agent of harm, has no viable direct action strategies at his disposal, and is subject to situational constraints as to appropriate "patient" behaviour. According to the model, all of these factors would tend to encourage the use of defensive coping strategies such as denial. The result showed that denial was indeed the most prevalent coping strategy detected.

The fact that the Type A pattern did not appear to constitute a set of motivational and belief characteristics which influence threat behaviour does not undermine the general point that this class of variable is important. It only suggests that the Type A pattern in particular does not influence threat behaviour in the CCU.

The non-directional role of education in Lazarus' model was supported by the present study. Neither weak ego resources nor the coping disposition of denial, as defined in this investigation, appeared to increase the probability of the use of state denial. Whilst these last two findings are contrary to hypotheses which are theoretically reasonable in the context of Lazarus' model, neither hypothesis has so far received clear empirical support in other studies.

At a more general level the present study highlights some of the problems involved in attempting to evaluate Lazarus' model. The prime difficulty was that of obtaining a pure measure of appraisal - one of Lazarus' central constructs. The conceptual distinction between appraisal, a cognitive construct, and self-report threat reaction, an affective construct, is not readily translatable into operational terms. The cognitive/affective distinction is more a convenience of psychology text books than an experiential reality. "Pure" cognitions and "pure" affects are rare, if not actually non-existent phenomena. Yet Lazarus' model appears to rely heavily on separating these two types of experience.

This separation allows the development of a linear approach to threat behaviour wherein primary appraisal leads to a coping process which in turn leads to secondary appraisal, leading to a modified coping strategy, and so forth. Clearly, this is an attractive picture since it suggests that we may investigate these phenomena using well-established analytic methods, generally following the dictates of the mechanistic approach to behaviour.

Lazarus' model is undoubtedly a good and useful example of deterministic theoretical structures found in psychology. From certain basic definitions he elaborates a number of principles from which a multitude of testable hypotheses may be derived. The present investigation was conceived and carried out in this theoretical context, and thus perhaps displays a certain internal coherence. Yet the writer's final feelings are of disquiet and dissatisfaction.

From specific difficulties such as separating appraisal and reaction, identifying the stage in the appraisal and coping process at which we are viewing the subject, and separating benign from denied affect, springs a concern as to the general validity of this type of atomistic, linear approach. Many assumptions underlie this approach, two of which are worth reiterating in the present context. Firstly, it is assumed that we can effectively measure one variable independently of another so that their relationship may be studied. Secondly, it is assumed that, given enough ingenuity, we can monitor changes in the variables over time to test out the process hypotheses of a theoretical model.

The first of these assumptions did not fare well in the present investigation, and has already been discussed in sufficient detail. The second leads straight to the dilemma at the heart of psychological measurement. One desirable characteristic of a psychological measure is that it be sensitive to differences in the phenomenon under study. However, the study of behaviour involves an interaction between the investigator and subject. The more sensitive the measure, the more likely it is to detect the effects of this interaction. Further, if repeated

observations are made, as Lazarus' model demands, this effect is heightened. Ultimately the psychologist faces the alarming possibility of precisely measuring the effects of his observing behaviour. This problem of the limits of observation is not, of course, the monopoly of the psychologist. It has been a commonplace of nuclear physics at least since the formulation of Heisenberg's Uncertainty Principle. However the psychologist's version is noteworthy, if only for its ubiquity.

Unfortunately the writer cannot counterbalance these comments on the problematic nature of the conventional approach to behavioural analysis, as represented by Lazarus' model, with ingenious alternatives. Various psychologists are tackling this problem of alternative approaches, for example, John Shotter's notion of psychology as a moral science of action (127). However, such attempts are in their infancy, and it would be inappropriate here to explore these emerging ideas.

It is perhaps unfortunate to end on a note of disenchantment, but it would be hypocritical to do otherwise. The present investigation produced some interesting prevalence data on psychological processes found in the CCU. The negative job appraisals and relatively high prevalence of recent life changes reported by the coronary patient provide more fuel for the continuing debate on the role of these factors in the predisposition to and precipitation of myocardial infarction. The theoretically derived hypotheses were mostly supported or not sufficiently well tested to suggest a clear interpretation of the results. But the feeling persists that somehow the gap between the theoretical model and the phenomena to which it was applied was not successfully bridged. Undoubtedly this is partly due to the inadequacies of the present investigation. However, the suspicion remains that the gap is logically, not empirically, uncrossable; or, to change the metaphor, that the phenomena which were studied cannot ultimately be pressed into this theoretical mould.

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APPENDIX A1

Coronary Group Introduction

I'm Mr. Spicer and I'm conducting a research project in the hospital with Dr. Carson, one of the consultants here. We are interested in various aspects of coronary disease, but at the moment we are trying to find out whether particular types of people are more prone to heart attacks than others. So we are asking a group of people who have had a heart attack and a group who haven't to answer some questions about their interests, their attitudes and their moods. Then we shall look to see if there are any differences between the two groups.

I see patients on two occasions for about half an hour so that they do not become too tired. I should stress that all of the answers to my questions are treated as strictly confidential. No one besides me has access to the information I collect. Could I ask you now whether you would like to help by answering our questions?

Comparison Group Introduction

At the City General Hospital we are trying to find out if there is a connection between coronary disease, the stresses of everyday life and people's attitudes and interests. We have asked a group of coronary patients about their attitudes and interests and the particular stresses which they have experienced.

It is important that we ask the same questions of a group of people without coronary disease to see if there are any differences. So we would be very grateful if you could give about half an hour of your time to answer a number of not too personal questions about your interests, attitudes and stresses.

Everything you say or write will be treated as strictly confidential;

no use will be made of individual names. We believe that the information you give will help to advance medical knowledge, and ultimately contribute towards the prevention of coronary disease.

APPENDIX A2

Appraisal Check Lists

1) Please underline any of the following words which, in your opinion, accurately describe the Coronary Care Unit.

BORING VALUABLE RELAXED DEPRESSING COMFORTING UNPLEASANT
TENSE SAFE WORRYING CHEERING LIBERATING FRIGHTENING
DANGEROUS INTERESTING PLEASANT FRIENDLY RESTRICTING
REASSURING UNFRIENDLY WORTHLESS

2) Please underline any of the following words which accuratly describes how you view the future.

VALUABLE EMPTY IMPORTANT BAD PLEASANT PASSIVE FULL
NEGATIVE GOOD UNPLEASANT THREATENING HOPEFUL POSITIVE
WORRYING SECURE PEACEFUL UNHAPPY HARMLESS REASSURING
ACTIVE UNIMPORTANT WORTHLESS INSECURE HAPPY HOPELESS STORMY

3) Please underline any of the following words which, in your opinion, accurately describe your job.

WORRYING PLEASANT UNIMPORTANT GOOD USEFUL HURRIED
SATISFYING BORING COMPETITIVE STIMULATING FRUSTRATING
UNHURRIED USELESS IMPORTANT TIRING INTERESTING UNPLEASANT
REASSURING NONCOMPETITIVE BAD

4) Please underline any of the following words which, in your opinion, accurately describe a heart attack.

VIOLENT PAINLESS IMPORTANT SAFE THREATENING UNPLEASANT
DANGEROUS WORRYING GENTLE REASSURING PAINFUL UNIMPORTANT
FRIGHTENING PLEASANT HARMLESS COMFORTING

APPENDIX A3

MULTIPLE AFFECT ADJECTIVE CHECK LIST

TODAY FORM

By Marvin Zuckerman
and
Bernard Lubin

Name..... Age..... Sex.....

Date..... Highest grade completed in school.....

DIRECTIONS: On this sheet you will find words which describe different kinds of moods and feelings. Mark an ☒ in the boxes beside the words which describe how you feel now - today. Some of the words may sound alike, but we want you to check all the words that describe your feelings. Work rapidly.

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1 ☐ active
2 ☐ adventurous
3 ☐ affectionate
4 ☐ afraid
5 ☐ agitated
6 ☐ agreeable
7 ☐ aggressive
8 ☐ alive
9 ☐ alone
10 ☐ amiable
11 ☐ amused
12 ☐ angry
13 ☐ annoyed
14 ☐ awful
15 ☐ bashful
16 ☐ bitter
17 ☐ blue
18 ☐ bored
19 ☐ calm
20 ☐ cautious
21 ☐ cheerful
22 ☐ clean
23 ☐ complaining
24 ☐ contented
25 ☐ contrary
26 ☐ cool
27 ☐ cooperative
28 ☐ critical
29 ☐ cross
30 ☐ cruel
31 ☐ daring
32 ☐ desperate
33 ☐ destroyed
34 ☐ devoted
35 ☐ disagreeable
36 ☐ discontented
37 ☐ discouraged
38 ☐ disgusted
39 ☐ displeased
40 ☐ energetic
41 ☐ enraged
42 ☐ enthusiastic
43 ☐ fearful
44 ☐ fine
45 ☐ fit
46 ☐ forlorn
47 ☐ frank
48 ☐ free
49 ☐ friendly
50 ☐ frightened
51 ☐ furious
52 ☐ gay
53 ☐ gentle
54 ☐ glad
55 ☐ gloomy
56 ☐ good
57 ☐ good-natured
58 ☐ grim
59 ☐ happy
60 ☐ healthy
61 ☐ hopeless
62 ☐ hostile
63 ☐ impatient
64 ☐ incensed
65 ☐ indignant
66 ☐ inspired
67 ☐ interested
68 ☐ irritated
69 ☐ jealous
70 ☐ joyful
71 ☐ kindly
72 ☐ lonely
73 ☐ lost
74 ☐ loving
75 ☐ low
76 ☐ lucky
77 ☐ mad
78 ☐ mean
79 ☐ meek
80 ☐ merry
81 ☐ mild
82 ☐ miserable
83 ☐ nervous
84 ☐ obliging
85 ☐ offended
86 ☐ outraged
87 ☐ panicky
88 ☐ patient
89 ☐ peaceful
90 ☐ pleased
91 ☐ pleasant
92 ☐ polite
93 ☐ powerful
94 ☐ quiet
95 ☐ reckless
96 ☐ rejected
97 ☐ rough
98 ☐ sad
99 ☐ safe
100 ☐ satisfied
101 ☐ secure
102 ☐ shaky
103 ☐ shy
104 ☐ soothed
105 ☐ steady
106 ☐ stubborn
107 ☐ stormy
108 ☐ strong
109 ☐ suffering
110 ☐ sullen
111 ☐ sunk
112 ☐ sympathetic
113 ☐ tame
114 ☐ tender
115 ☐ tense
116 ☐ terrible
117 ☐ terrified
118 ☐ thoughtful
119 ☐ timid
120 ☐ tormented
121 ☐ understanding
122 ☐ unhappy
123 ☐ unsociable
124 ☐ upset
125 ☐ vexed
126 ☐ warm
127 ☐ whole
128 ☐ wild
129 ☐ willful
130 ☐ wilted
131 ☐ worrying
132 ☐ young

APPENDIX A4

Standard Situation Interview Schedule

1) What is your occupation? How long have you had it?

2) Are you satisfied with your job? Why not?

3) Does your job carry heavy responsibility? Does it make you fee rushed or under pressure?

4) What irritates you most about your work or your associates?

5) How often are there deadlines in your work? Do they stimulate you?

6) Do you feel any competition in your job? Do you enjoy it?

7) Do you or have you every played competitive games with children? Do you always let them win purposely? Why?

8) When you play any game with persons of your own age do you play mainly to win?

9) Would you describe yourself as hard driving and ambitious in the sense that you wish to get things done in as quick a manner as possible, or do you think you do things in a relatively easy going sort of way? Would your wife agree with you? Has she ever asked you to slow down?

10) Do you think you drive harder to accomplish things than most of your associates?

11) Do people around you know when you are angry or upset? Do you show it?

12) Do you drive a car? If a car in your lane is going too slow for you, what do you do about it? Does it irritate you?

13) Most people get up during weekdays before 9am; what time ..... (Trick question to detect a premature reply).

14) If you have an appointment with someone at 2pm, will you be there on time? If you are kept waiting will you be annoyed? Will you show it?

15) If you see someone doing a job rather slowly and you could do it faster, do you become impatient watching him? Will you intervene?

16) Do you eat rapidly? Do you walk rapidly? After you have finished eating, do you like to sit around the table or get moving straight away?

17) Do you get impatient easily? Do you always feel anxious to get going and finish whatever you have to do?

18) Do you often have the impression that time is passing too quickly for the things you'd like to get done? Do you think you hurry in doing most things?

APPENDIX A5

Bortner Type A Rating Scale

Instructions

Each of us belongs somewhere along the line between these two extremes. For example, most of us are neither the most competititve nor the least competitive person we know. What we would like you to do is to make a vertical line where you think you belong between these two extremes.

Scoring

A subject's score is obtained by measuring, to the nearest sixteenth of an inch, from the beginning of the 'B' end to the subject's mark on each line, and summing the 14 values.

Never late	_____	Casual about appointments
Not competitive	_____	Very competitive
Anticipates what others are going to say (nods, interrupts, finishes for them)	_____	Good listener, hears others out
Always rushed	_____	Never feels rushed, even under pressure
Can wait patiently	_____	Impatient when waiting
Goes "all-out"	_____	Casual
Takes one thing at a time	_____	Tries to do many things at once, thinks about what he's going to do next
Emphatic in speech (may pound desk	_____	Slow, deliberate talker
Wants good job recognised by others	_____	Only cares about satisfying himself, no matter what others may think

Fast (eating, walking etc)	_____	Slow doing things
Easy going	_____	Hard driving
"Sits" on feelings	_____	Expresses feelings
Many interests	_____	Few interests outside work
Satisfied with job	_____	Ambitious

APPENDIX A6

Minnesota Multiphasic Personality Inventory Denial Subscale

Instructions

In front of you is a list of statements. Please read each one and decide whether it is true as applied to you, or false as applied to you. If it is true or mostly true as applied to you, write T in the space opposite the statement; if it is false or not usually true as applied to you write F in the space opposite. Remember to give your own opinion of yourself and not to leave any blank spaces.

1) I like to read newspaper articles on crime. ....
2) I enjoy detective or mystery stories. ....
3) I feel that it is certainly best to keep my mouth shut when I'm in trouble. ....
4) At times I feel like swearing. ....
5) I think a great many people exaggerate their misfortunes in order to gain the sympathy and help of others. ....
6) It takes a lot of argument to convince most people of the truth. ....
7) I think most people would lie to get ahead. ....
8) Some people are so bossy that I feel like doing the opposite of what they request, even though I know they are right. ....
9) Most people will use somewhat unfair means to gain profit or an advantage rather than to lose it. ....
10) Often I can't understand why I have been so cross and irritated. ....
11) I commonly wonder what hidden reason another person may have for doing something nice for me. ....

12) My conduct is largely controlled by the customs of those about me. ....

13) I have often lost out on things because I couldn't make up my mind soon enough. ....

14) I resent having anyone take me in so cleverly that I have had to admit that it was one on me. ....

15) What others think of me does not bother me. ....

16) I frequently have to fight against showing that I am bashful. ....

17) I find it hard to make talk when I meet new people. ....

18) I wish I were not so shy. ....

19) In walking I am very careful to walk over pavement cracks. ....

20) I get angry easily and then get over it soon. ....

21) It is safer to trust nobody. ....

22) When in a group of people I have trouble thinking of the right things to talk about. ....

23) I drink an unusually large amount of water every day. ....

24) I am always disgusted with the law when a criminal is freed through the arguments of a clever lawyer. ....

25) I am likely not to speak to people until they speak to me. ....

26) I can be friendly with people who do things which I consider wrong. ....

APPENDIX A7

Social Readjustment Rating Scale

	EVENT	LCU weighting
1)	Death of spouse	100
2)	Divorce	73
3)	Marital separation	65
4)	Detention in prison or other institution	63
5)	Death of close family member	63
6)	Major personal injury or illness	53
7)	Marriage	50
8)	Fired at work	47
9)	Marital reconciliation	45
10)	Retirement	45
11)	Major change in health of family member	44
12)	Pregnancy	40
13)	Sex difficulties	39
14)	Gain of new family member	39
15)	Major business readjustment (merger, reorganisation etc)	39
16)	Major change in financial status	38
17)	Death of a close friend	37
18)	Change to different line of work	36
19)	Change in number of arguments with spouse	35
20)	Taking on a mortgage for a house, business etc	31
21)	Foreclosure of a mortgage or loan	30
22)	Major change in responsibilities at work (promotion etc)	29
23)	Son or daughter leaving home (marriage, college etc)	29
24)	Trouble with in-laws	29

	EVENT	LCU weighting
25)	Outstanding personal achievement	28
26)	Wife begin or stop work outside the home	26
27)	Begin or end school	26
28)	Major change in living conditions	25
29)	Revision of personal habits (dress, manners, associations)	24
30)	Trouble with employer	23
31)	Change in work hours or conditions	20
32)	Change in residence	20
33)	Change in schools	20
34)	Major change in recreation (type or amount)	19
35)	Change in church activities	19
36)	Change in social activities	18
37)	Mortgage or loan for a car, T.V. etc	17
38)	Change in sleeping habits	16
39)	Change in number of family get-togethers	15
40)	Change in eating habits	15
41)	Vacation	13
42)	Christmas	12
43)	Minor violations of the law	11

APPENDIX B1

CWT Data Sheet 1

A. General

Card ID number [ ][ ][ ][ ] 1-4 Unit Number [ ][ ][ ][ ][ ][ ] 6-11

1. Name.....

2. Age 13-14 [ ][ ]

3. Religion:

RC	1	Other	4
CE	2		
NC	3		

16 [ ]

4. Marital status:

Married	1	Widowed	4
Single	2	Other	5
Divorced	3		

18 [ ]

5. Home situation:

Parental	1	Isolate	4
Conjugal	2	Other	5
Sibling	3		

20 [ ]

6. Number of residents excluding self: 22 [ ]

7. Socio-economic group: (1-17) 24-25 [ ][ ]

8. Social class:

I	1	IIIM	4
II	2	IV	5
IIIN	3	V	6

27 [ ]

9. Hospital experience: Yes 1 No 2 29 [ ]

10. CCU experience: Yes 1 No 2 31 [ ]

11. Self in CCU: Yes 1 No 2 33 [ ]

12. Psychiatry history:

Yes	1	Possible	3
No	2		

35 [ ]

13. Educational level:

Primary	1	Tertiary	4
Secondary 14/15	2	Secondary+	5
Secondary 17/18	3		

37 [ ]

CWT DATA SHEET 2

B. Psychological Data

1. MAACL:

		ANX.		DEP		HOS.
					40-41	
a. Days seen:						
b. Session 1:	44-5		47-8		50-1	
c. Session 2:	53-4		56-7		59-60	

2. Type A interview: 63-4

BEGIN NEW CARD

Card/patient number 1-4

Unit number 6-11

3. Type A rating scale:

13-26

27-40

4. Trait denial: 43-44

BEGIN NEW CARD

Card/patient number 1-4

Unit number 6-11

5. Life changes:

	Event	LCU			Event	LCU		
13-16					42-45			
17-20					46-49			
21-24					50-53			
25-29					54-57			
30-33					58-61			
34-37					62-65			
38-41					66-69			

		Event				LCU		
Totals:	71-72				74-76			

CWT DATA SHEET 3

B. Psychological Data (cont.)

BEGIN NEW CARD

Card/patient number 1-4 [ ][ ][ ][ ]

Unit number 6-11 [ ][ ][ ][ ][ ][ ]

6. Appraisal scores: checked 1 not checked 0

(CCU)

A 13-22	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10
A 23-32	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20

(Future)

B 34-47	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14
B 48-60	I15	I16	I17	I18	I19	I20	I21	I22	I23	I24	I25	I26	I27	

BEGIN NEW CARD

Card/patient number 1-4 [ ][ ][ ][ ]

Unit number 6-11 [ ][ ][ ][ ][ ][ ]

6. Appraisal scores: (cont)

(Job)

C 13-22	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10
C 23-32	I11	I12	I13	I14	I15	I16	I17	I18	I19	I20

(Heart attack)

D 34-49	I1	I2	I3	I4	I5	I6	I7	I8	I9	I10	I11	I12	I13	I14	I15	I16

END

APPENDIX B2

Coronary Group Raw Data

The number at the top of each column corresponds with the appropriate data item number on the data sheets which appear as Appendix B1.

Except for data item B2, X indicates missing data.

Ala	1b	2	3	4	5	6	7	8	9	10	11	12	13	Bla	1b	1b	1b	1c	1c	1c	2
1M01	E20946	55	2	1	2	2	02	2	1	1	2	2	2	56	05	11	07	06	16	05	X5
1M02	X07187	58	1	1	2	2	09	4	1	2	2	2	2	67	09	18	07	07	18	08	B4
1M03	E21163	57	2	1	2	1	09	4	1	2	2	2	2	56	00	00	02	01	01	02	B4
1M04	E21168	45	2	1	2	3	09	4	2	2	2	2	2	48	11	19	11	10	15	08	B3
1M05	Q04131	41	2	3	1	2	12	2	1	1	2	1	2	56	13	21	10	07	17	08	A1
1M06	N01288	43	2	1	2	2	09	4	1	2	2	2	2	67	10	20	12	10	20	12	B3
1M07	W05684	57	2	1	2	1	06	3	2	2	2	2	2	78	08	16	08	09	16	09	X5
1M08	E17020	43	2	1	2	3	09	4	2	2	2	2	2	67	10	20	09	09	20	08	B4
1M09	E21396	48	2	1	2	3	05	2	1	1	2	2	2	78	08	17	05	04	14	05	B3
1M10	Y09492	59	2	1	2	1	02	2	1	1	2	2	4	67	10	21	13	07	20	10	B4
1M11	M04876	55	2	1	2	2	09	4	1	1	2	2	2	78	04	18	05	07	17	08	B4
1M12	D99812	59	3	1	2	1	08	4	1	2	2	2	2	57	06	16	09	06	11	05	B3
1M13	E35491	58	2	1	1	1	09	4	1	1	2	1	2	68	04	18	06	04	17	06	B3
1M14	E35587	44	2	1	2	2	10	5	1	2	2	2	2	56	10	20	12	07	18	11	B3
1M15	D98837	41	2	1	2	3	04	4	1	2	2	2	5	56	02	08	06	02	10	06	A1
1M16	E40243	49	2	1	2	1	10	5	2	2	2	2	2	45	06	18	07	05	16	06	B4
1M17	J34544	47	2	1	2	3	09	4	1	1	2	3	5	45	12	19	08	05	15	09	X5
1M18	U08177	59	2	1	2	1	09	4	1	1	1	2	2	45	07	09	04	09	18	06	B4
1M19	E43088	55	2	1	2	2	13	2	1	2	2	2	2	5X	02	11	02	XX	XX	XX	B4
1M20	E43091	48	2	1	2	3	12	4	2	2	2	2	2	6X	09	20	10	XX	XX	XX	B4
1M21	D69638	58	3	1	2	3	09	4	1	2	2	2	2	5X	07	15	11	XX	XX	XX	B4
1M22	V03635	56	2	1	2	1	11	6	1	1	1	2	2	56	04	14	05	04	16	06	B4
1M23	F06400	43	2	1	2	5	08	4	1	1	1	3	2	46	12	22	10	10	20	10	B4
1M24	V01556	53	2	1	2	1	12	3	1	2	2	2	2	4X	04	19	05	XX	XX	XX	A2
1M25	E35122	59	2	1	2	1	06	3	1	1	1	2	2	6X	01	15	05	XX	XX	XX	X5
1M26	E05868	58	3	1	2	1	05	2	1	2	2	2	5	56	10	19	08	09	19	08	B3
1M27	E35380	47	2	1	2	2	08	4	1	1	1	2	2	67	11	19	12	09	17	06	A1
1M28	E43296	46	2	1	2	4	09	4	1	2	2	2	2	45	16	21	12	13	18	10	B4
1M29	E43297	49	2	1	2	2	09	4	1	2	2	2	2	45	03	07	06	04	12	08	A2
1M30	D40751	57	3	1	2	1	05	2	1	2	2	2	5	57	10	19	10	15	20	10	B3
1M31	E52939	56	2	1	2	1	09	4	1	2	2	2	5	57	08	20	11	09	17	11	X5
1M32	E52954	46	3	1	2	2	01	2	1	2	2	1	5	57	09	19	10	10	18	13	B4
1M33	Z06469	50	2	1	2	1	06	3	1	2	2	2	2	46	03	11	02	09	10	01	B3
1M34	E52203	58	2	1	2	1	06	5	1	1	2	2	2	46	06	11	09	04	09	08	B4
1M35	W02727	36	2	1	2	4	10	5	1	2	2	2	5	46	11	20	12	09	20	10	B3
1M36	D80341	60	2	4	4	0	06	3	1	2	2	2	2	57	06	17	08	06	14	08	B4
1M37	A08727	51	2	1	2	2	09	4	1	2	2	2	2	5X	04	13	07	XX	XX	XX	B3
1M38	A05681	47	1	1	2	3	10	5	1	2	2	2	2	5X	13	18	08	XX	XX	XX	B3
1M39	C08481	51	2	1	2	2	02	2	1	1	1	2	5	5X	11	25	07	XX	XX	XX	B3
1M40	S01121	48	2	1	2	1	09	4	1	2	2	2	2	4X	02	06	05	XX	XX	XX	B4
1M41	E52663	46	2	1	2	2	02	4	1	1	2	2	2	5X	02	11	04	XX	XX	XX	X5
1M42	P06941	49	2	1	2	2	10	5	1	1	1	2	2	4X	10	20	09	XX	XX	XX	B4
1M43	Q04197	53	2	1	2	1	10	5	1	1	2	2	2	7X	06	11	04	XX	XX	XX	B3
1M44	V 64	55	2	1	2	1	5	2	1	2	2	2	4	5X	08	16	08	XX	XX	XX	X5
1M45	T09807	40	2	3	4	0	06	3	1	2	2	2	5	4X	08	17	10	XX	XX	XX	B3
1M46	J65064	60	2	1	2	1	11	6	1	1	2	2	2	7X	09	20	14	XX	XX	XX	B4
1M47	T07424	53	2	1	2	1	01	2	2	2	2	2	5	4X	05	14	09	XX	XX	XX	B4
1M48	D83287	52	1	1	2	6	9	4	1	2	2	2	2	5X	04	10	03	XX	XX	XX	B3
1M49	E61574	58	2	1	2	1	10	5	1	2	2	2	2	4X	13	20	11	XX	XX	XX	B4
1M50	D71931	44	2	1	2	3	11	6	1	1	1	2	2	78	07	06	07	12	30	13	X5

		B3 -	B4
2M 1	E20946	191707131711151214161217121 3	15
2M 2	X 7187	2209022201030122020202021203	17
2M 3	E21163	2204021418232304131301020109	16
2M04	E21168	1324021223230112140201112202	05
2M05	Q04131	2023001301242108232324241613	17
2M06	N01288	1221041201120103021212201220	13
2M07	W05684	2121031303122111212103031202	13
2M08	E17020	1603061601130213111004120212	12
2M09	E21396	2322030302032204232204211902	15
2M10	Y09492	2412012205030202140512011100	16
2M11	M04876	2301010203220301221103231422	18
2M12	D99812	2411091201180513141406060500	13
2M13	E35491	2412132400120000241213130000	17
2M14	E35587	2323001204211412021812022301	23
2M15	D98837	2323001204211412021812022301	18
2M16	E40243	1905161301220320161001030202	23
2M17	J34544	2424040422181203232322230222	18
2M18	U08177	2323131122130102121201221201	13
2M19	E43088	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	13
2M20	E43091	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	19
2M21	D69638	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	19
2M22	V03635	0122030023010202230001242301	15
2M23	F06400	1211011112231103231101231211	07
2M24	V01556	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	15
2M25	E35122	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	14
2M26	E05868	2216041102201615241213222312	19
2M27	E35380	1810200300232223232204070915	11
2M28	E43296	2010061102131405151311111502	19
2M29	E43297	1812040601240212201823122412	16
2M30	D40751	1915091207151606111015090916	15
2M31	E52939	2312121616171716071417040412	17
2M32	E52954	2406011620222307161100030011	21
2M33	Z06469	2207070106237108011506002303	10
2M34	E52203	2110031512071509031206051003	14
2M35	W02727	1318170816212104171812030917	24
2M36	D80341	2418030701160303231212120212	14
2M37	A08727	1912012203120203221202221201	16
2M38	A05681	2015070917121712111913171212	13
2M39	C08481	2117031201181512181613080812	18
2M40	S01121	2202081101190512201905161706	18
2M41	E52663	2019051502142010181904021004	18
2M42	P06941	2212030322041103182208022002	10
2M43	Q04197	2211021121242201022401011201	10
2M44	V 64	2423110000242412152324000012	15
2M45	T09807	2010071113111110141009191611	18
2M46	J65046	XXXXXXXXXXXXXXXXXXXXXXXXXXXX	16
2M47	T07424	2112031201060311121211071904	16
2M48	D83287	2005060208202007021607012106	10
2M49	E61574	1602030801230103231303201001	14
2M50	D71931	1823101304162111211804232122	21

		B5		B5	B5
3M01	E20946	05631539411342 12	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	127
3M02	X07187	05634113421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	088
3M03	E21163	06531836226411 3	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	140
3M04	E21168	16381836193536 18	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	139
3M05	Q04131	06531144183620 31	3120341936183816421 2XXXXXXXXXXXXXXXXXXXXX	09	249
3M06	N01288	16381836203130 23	3120381642 12XXXXXXXXXXXXXXXXXXXXXXXXXXXX	07	176
3M07	W05684	05631539173726 26	3519391541134212431 1XXXXXXXXXXXXXXXXXXXXX	09	235
3M08	E17020	30234212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	035
3M09	E21396	18362329312041 13	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	110
3M10	Y09492	23294212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	041
3M11	M04876	06531144163818 36	2825322042 12XXXXXXXXXXXXXXXXXXXXXXXXXXXX	07	228
3M12	D99812	06534212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	065
3M13	E35491	05631836421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	111
3M14	E35587	06392229421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	080
3M15	D98837	11441439193522 29	2528282529243419361837173915411342 12XXXX	13	308
3M16	E40243	4212XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	01	012
3M17	J34544	11442329361838 16	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	119
3M18	U08177	10451836229226 26	3618381642 12XXXXXXXXXXXXXXXXXXXXXXXXXXXX	07	182
3M19	E43088	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	-1
3M20	E43091	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	-1
3M21	D69638	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	-1
3M22	V03635	06533618421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	083
3M23	F06400	06531144163820 31	3717421 2XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	06	195
3M24	V01556	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	-1
3M25	E35122	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	-1
3M26	F05868	22292528421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	069
3M27	E35380	06531935203127 25	3220421 2XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	06	176
3M28	E43296	23294212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	041
3M29	E43297	05631339163818 36	2528371739154015421 2XXXXXXXXXXXXXXXXXXXXX	09	263
3M30	D40751	13392031322034 19	3519421 2XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	06	140
3M31	E52939	37174212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	029
3M32	E52954	06531539351942 12	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	123
3M33	Z06469	13391836391542 12	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	102
3M34	E52203	08471836401542 12	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	110
3M35	W02727	06531737421243 11	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	113
3M36	D80341	18362229312040 15	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	112
3M37	A08727	4212XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	01	012
3M38	A05681	20312429302336 18	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	113
3M39	C08481	06531539183622 29	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	169
3M40	S01121	18364212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	048
3M41	E52663	4212XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	01	12
3M42	P06941	23292626421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	067
3M43	Q04197	16382031213042 12	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	111
3M44	V00064	15392329302335 19	4212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	05	122
3M45	T09807	15391836421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	087
3M46	J65064	XXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	XX	-1
3M47	T07424	05631339421 2XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	114
3M48	D83287	16382229411342 12	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	092
3M49	E61574	4212XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	01	012
3M50	D71931	06531638173725 28	4015421243 11XXXXXXXXXXXXXXXXXXXXXXXXXXXX	07	194

		B6A -	B6B -
4M01	E20946	010010110000000010000	001010001010110000000000100
4M 2	X 7187	010010010000000010100	101010001000100010000000100
4M03	E21163	011010010110011110100	101010101000100110000000111
4M04	E21168	011111111111111111100	101011111010101010100000100
4M05	Q04131	010010000000000010000	101000000000000000001000100
4M06	N01288	010000000000000000000	001000000000000000000000000
4M07	W05684	010000000000000000100	000000001000101000001000100
4M08	E17020	010000000000000010100	100010000010000000000000000
4M09	E21396	000000000000000000100	100000000000000100000000100
4M10	Y09492	010000010000000001000	000000000000100000000000000
4M11	M04876	010010000000001110100	000000000000000100000000000
4M12	D99812	000000000001000000000	101010000000000100000000100
4M13	E35491	010010000000000010100	000000000010100000000000000
4M14	E35587	001000000000000010000	101000000000000000000000000
4M15	D98837	011010010001010111100	101010101000110000011000001
4M16	E40243	010010010000000010100	000000000000100000001000100
4M17	J34544	010010010100010101100	001000101000100110000000000
4M18	U08177	011010010000001110000	010000010000000100000000011010
4M19	E43088	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
4M20	E43091	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
4M21	D69638	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
4M22	V03635	000101000000000000000	000000000100000000000000000
4M23	F06400	000100010000000010000	000000000000001000000000000
4M24	V01556	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
4M25	E35122	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
4M26	E05868	011010010010001101100	101010101000100000000000000
4M27	E35380	110011000010010010100	101010001000010100011000100
4M28	E43296	010000000000000010100	101000000000000000000001000
4M29	E43297	011010010111101110100	101010101000110110011000100
4M30	D40751	111000000001011110000	001000000101101000000001000
4M31	E52939	001010010000000010100	001010000000000100000000000
4M32	E52954	001000000000000010000	000010000001000000000000000
4M33	Z06469	010010111001010010100	001010001010110110110000100
4M34	E52203	011010010110011110100	101010010101001100000000100
4M35	W02727	001000010000000010000	001000000000000000000000100
4M36	D80341	010010010100011110100	100000100000100100001000000
4M37	A08727	010010010000011110100	101010101000000110011000100
4M38	A05681	101000011000000000000	000000000000110000000000000
4M39	C08481	111010010000001011100	101010001010110010000000100
4M40	S01121	010010010000011110100	101010001000100010001000100
4M41	E52663	011010010110000110100	101010101010110010011000100
4M42	P06941	010010000000000000000	000000000010000000000000100
4M43	Q04197	001010010000000010000	001010000000000010100000100
4M44	V 64	110010010000011111000	000010001010110000000000100
4M45	T09807	111000010000000010100	001000000000000000000000001
4M46	J65064	XXXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXX
4M47	T07424	000100010000000010000	001000000000000000000000100
4M48	D83287	010010010100011110100	101010001000100000001000100
4M49	E61574	010010000010010010000	010000000000000000000001001
4M50	D71931	011010010100011110100	101010101010010010001000000

		B6C -	B6D -
5M 1	E20946	0101000000100100010	0000111100101000
5M 2	X 7187	0101001000000101000	1010111100101000
5M03	E21163	0111101000000101000	1010111100101000
5M04	E21168	0001100000000101100	1000011100101000
5M05	Q04131	1100001010000000010000	0100011000001000
5M06	N01288	0000000000000000010000	0000000100000000
5M07	W05684	1100001000000000010010	0000000000000000
5M08	E17020	0000010000100000000	1000010000100000
5M09	E21396	0000100000000000010000	1000000000001000
5M10	Y09492	0101101001000101000	1000011100101000
5M11	M04876	1000000100100000000	1000010100101000
5M12	D99812	1101100000000000010000	0000011100101000
5M13	E35491	0000101010000000110000	0000010000100000
5M14	E35587	1000000000000000000	0000000000100000
5M15	D98837	1000111000100111110010	0000111100101000
5M16	E40243	0001000000010100000	0000011100101000
5M17	J34544	1000000000100011000	0000011100101000
5M18	U08177	1000101010100111010	1000111100101000
5M19	E43088	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
5M20	E43091	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
5M21	D69638	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
5M22	V03635	0010000000000000000	0000000000001000
5M23	F06400	0000000000000000000	0000011100001000
5M24	V01556	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
5M25	E35122	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
5M26	E05868	1101101000001010000	1000111100101000
5M27	E35380	1010000100100000010	1010010000101000
5M28	E43296	0100001000000010000	1000010000100000
5M29	E43297	0101101011010101010100	1000111100101000
5M30	D40751	0101101010000111000	1000111100101000
5M31	E52939	0100101000000010000	0000010100100000
5M32	E52954	0000001000000101000	0000010000001000
5M33	Z06469	1101111101100011101	1000111100101000
5M34	E52203	0101001110010101010100	0010111100101000
5M35	W02727	0000001001100001001	0000000100001000
5M36	D80341	0010000100111000001	0000101100101000
5M37	A08727	0101101000000101010	1000011100101000
5M38	A05681	1000000100100000000	1000001000101000
5M39	C08481	0001100110110101000	0110111100001000
5M40	S01121	0100101000001000000	1000010100101000
5M41	E52663	0101101000010111000	0000111100101000
5M42	P06941	0000001000000101000	0000000100101000
5M43	Q04197	0101101000000010000	0000000100101000
5M44	V 64	1010010000100010000	0000111100100000
5M45	T09807	0100101000100000000	1000111100101000
5M46	J65064	XXXXXXXXXXXXXXXXXXXX	XXXXXXXXXXXXXXXX
5M47	T07424	1000001011100011000	1000000100100000
5M48	D83287	0101000100010000000	1010111100101000
5M49	E61574	0000100000000101000	1000111000001000
5M50	D71931	1000100100000010010	1010111100101000

Ala	Alb	2	3	4	5	6	7	8	9	10	11	12	13	Bla	lb	lb	lb	lc	lc	lc
1C01	XXXXXX	52	1	1	X	X	06	5	X	X	X	X	2	XX	09	16	08	XX	XX	XX
1C02	XXXXXX	44	3	1	X	X	04	1	X	X	X	X	5	XX	02	05	03	XX	XX	XX
1C03	XXXXXX	41	1	1	X	X	09	4	X	X	X	X	2	XX	07	15	07	XX	XX	XX
1C04	XXXXXX	57	4	1	X	X	08	4	X	X	X	X	2	XX	04	09	06	XX	XX	XX
1C05	XXXXXX	48	4	1	X	X	08	4	X	X	X	X	2	XX	03	09	06	XX	XX	XX
1C06	XXXXXX	41	2	1	X	X	08	4	X	X	X	X	2	XX	07	14	10	XX	XX	XX
1C07	XXXXXX	43	3	1	X	X	05	3	X	X	X	X	2	XX	06	13	09	XX	XX	XX
1C08	XXXXXX	42	4	1	X	X	01	2	X	X	X	X	2	XX	05	15	08	XX	XX	XX
1C09	XXXXXX	38	2	1	X	X	03	1	X	X	X	X	5	XX	04	06	05	XX	XX	XX
1C10	XXXXXX	55	2	1	X	X	09	4	X	X	X	X	2	XX	05	17	03	XX	XX	XX
1C11	XXXXXX	56	4	1	X	X	06	3	X	X	X	X	2	XX	06	13	08	XX	XX	XX
1C12	XXXXXX	38	4	1	X	X	08	4	X	X	X	X	2	XX	07	16	08	XX	XX	XX
1C13	XXXXXX	35	2	2	X	X	10	5	X	X	X	X	2	XX	04	08	08	XX	XX	XX
1C14	XXXXXX	43	1	1	X	X	08	4	X	X	X	X	2	XX	03	12	08	XX	XX	XX
1C15	XXXXXX	39	1	1	X	X	08	4	X	X	X	X	2	XX	05	11	08	XX	XX	XX
1C16	XXXXXX	41	3	1	X	X	08	4	X	X	X	X	2	XX	00	05	04	XX	XX	XX
1C17	XXXXXX	37	3	1	X	X	08	4	X	X	X	X	2	XX	02	05	02	XX	XX	XX
1C18	XXXXXX	33	4	2	X	X	04	1	X	X	X	X	5	XX	03	06	08	XX	XX	XX
1C19	XXXXXX	54	3	1	X	X	09	4	X	X	X	X	2	XX	10	19	10	XX	XX	XX
1C20	XXXXXX	37	2	1	X	X	09	4	X	X	X	X	2	XX	06	14	07	XX	XX	XX
1C21	XXXXXX	46	4	1	X	X	08	4	X	X	X	X	2	XX	05	15	05	XX	XX	XX
1C22	XXXXXX	30	2	1	X	X	09	4	X	X	X	X	2	XX	11	20	13	XX	XX	XX
1C23	XXXXXX	44	2	1	X	X	04	1	X	X	X	X	4	XX	07	16	09	XX	XX	XX
1C24	XXXXXX	35	3	1	X	X	10	5	X	X	X	X	2	XX	04	07	08	XX	XX	XX
1C25	XXXXXX	38	1	1	X	X	09	4	X	X	X	X	2	XX	05	15	09	XX	XX	XX
1C26	XXXXXX	47	2	1	X	X	09	4	X	X	X	X	2	XX	02	08	07	XX	XX	XX
1C27	XXXXXX	40	4	1	X	X	01	2	X	X	X	X	5	XX	09	18	09	XX	XX	XX
1C28	XXXXXX	47	4	1	X	X	09	4	X	X	X	X	2	XX	08	18	11	XX	XX	XX
1C29	XXXXXX	52	4	1	X	X	09	4	X	X	X	X	2	XX	03	10	06	XX	XX	XX
1C30	XXXXXX	51	1	1	X	X	08	4	X	X	X	X	2	XX	07	15	09	XX	XX	XX
1C31	XXXXXX	52	2	1	X	X	06	5	X	X	X	X	2	XX	04	13	08	XX	XX	XX
1C32	XXXXXX	41	3	1	X	X	08	4	X	X	X	X	3	XX	08	16	11	XX	XX	XX
1C33	XXXXXX	46	4	1	X	X	09	4	X	X	X	X	2	XX	08	13	08	XX	XX	XX
1C34	XXXXXX	46	4	1	X	X	10	5	X	X	X	X	2	XX	09	06	04	XX	XX	XX
1C35	XXXXXX	56	2	1	X	X	09	4	X	X	X	X	5	XX	09	18	12	XX	XX	XX
1C36	XXXXXX	51	4	1	X	X	09	4	X	X	X	X	2	XX	00	08	04	XX	XX	XX
1C37	XXXXXX	57	1	1	X	X	09	4	X	X	X	X	2	XX	05	14	09	XX	XX	XX
1C38	XXXXXX	53	2	1	X	X	8	4	X	X	X	X	2	XX	06	15	08	XX	XX	XX
1C39	XXXXXX	37	2	1	X	X	08	4	X	X	X	X	2	XX	06	08	05	XX	XX	XX
1C40	XXXXXX	32	1	1	X	X	09	4	X	X	X	X	2	XX	10	11	05	XX	XX	XX
1C41	XXXXXX	42	3	1	X	X	01	2	X	X	X	X	5	XX	05	13	10	XX	XX	XX
1C42	XXXXXX	49	2	1	X	X	10	5	X	X	X	X	2	XX	03	06	04	XX	XX	XX
1C43	XXXXXX	53	3	1	X	X	9	4	X	X	X	X	2	XX	07	17	04	XX	XX	XX
1C44	XXXXXX	30	4	1	X	X	09	4	X	X	X	X	2	XX	10	24	12	XX	XX	XX
1C45	XXXXXX	56	1	1	X	X	08	4	X	X	X	X	2	XX	07	16	09	XX	XX	XX
1C46	XXXXXX	45	2	2	X	X	10	5	X	X	X	X	2	XX	06	18	06	XX	XX	XX
1C	XXXXXX	48	2	1	X	X	09	4	X	X	X	X	2	XX	08	13	10	XX	XX	XX
1C48	XXXXXX	41	4	1	X	X	09	4	X	X	X	X	2	XX	09	11	07	XX	XX	XX
1C49	XXXXXX	35	2	1	X	X	09	4	X	X	X	X	2	XX	11	23	11	XX	XX	XX
1C50	XXXXXX	56	2	1	X	X	10	5	X	X	X	X	2	XX	02	08	08	XX	XX	XX

2
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X5
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B4

APPENDIX B2

Miners Group Raw Data

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2C03  XXXXXX  211201140123010122220312230 2   XX
2C04  XXXXXX  190301181818070419151413050 4   XX
2C05  XXXXXX  231300230118020315161121040 2   XX
2C06  XXXXXX  122405210211121220071216001 7   XX
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2C08  XXXXXX  241304160003110212121101120 1   XX
2C09  XXXXXX  232200191220000619191814021 2   XX
2C10  XXXXXX  221105110810021807150918050 4   XX
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2C13  XXXXXX  221001241222021423130224110 1   XX
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2C15  XXXXXX  131406151413051518150815070 4   XX
2C16  XXXXXX  230505231212000612120105040 2   XX
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3C02	XXXXXX	056311441439232 9	26264212XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	06	213
3C03	XXXXXX	163820312626282 5	3220371741134212XXXXXXXXXXXXXXXXXXXXXXXX	08	182
3C04	XXXXXX	25284212XXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	02	040
3C05	XXXXXX	4212XXXXXXXXXXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	01	012
3C06	XXXXXX	3717411342 12XXXX	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	03	042
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3C17	XXXXXX	18362229312037 17	39154015421 2XXXXXXXXXXXXXXXXXXXXXXXXXXX	07	144
3C18	XXXXXX	3220391541134212	XXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXXX	04	060
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