ILLNESS BEHAVIOUR ASSOCIATED WITH CHEST DISCOMFORT AND NO SIGNIFICANT CARDIAC DISEASE: A COGNITIVE-BEHAVIOURAL APPROACH

By

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A Thesis
Submitted to the School of Graduate Studies in Partial Fulfillment of the Requirements for the Degree Doctor of Philosophy

McMaster University

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ILLNESS BEHAVIOUR:

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ABSTRACT

Illness behaviour is formulated within the context of the Disease Illness Distinction Model (Cott, 1987a, 1987b), a cognitive-behavioural model that is an extension of earlier disease/illness concepts. The thesis is comprised of two studies that focus on illness behaviour associated with chest discomfort and no significant cardiac disease. In the first study, the Retrospective Chest Pain Study, the incidence, nature and degree of illness behaviour were documented in 134 individuals with chest pain that was unlikely to be of cardiac origin. Results indicated a high level of disability that was attributed to chest pain, as measured by limitations on activities, changes in employment, cardiac medication intake, and visits to physicians. The nature of the disability was consistent with that reported in previous research investigating the degree of illness in individuals with chest pain and normal coronary arteries. Three conclusions were drawn from the results: Patient attributions for chest pain mediate illness behaviour and cognitions. Medication prescriptions and ingestion facilitate disease attributions and related illness behaviour. Physicians are often unaware of symptoms and related illness behaviour in their patients.

The second study, the Chest Discomfort Intervention Study, examined the utility of cognitive-behavioural interventions, based on the Disease Illness Distinction Model, in decreasing the degree of illness behaviour reported by individuals with chest discomfort and normal coronary arteries (n = 14) or mitral valve prolapse (n = 90). A second
purpose was to examine the role of cognitions in illness behaviour. The cognitive-behavioural interventions were applied in both individual and group education formats, and were compared to self-monitoring attention control and wait list control groups. Results indicate that the cognitive-behavioural interventions were successful in reducing self-reported disability attributed to chest discomfort and limitations on routine daily and exercise activities relative to control groups. The interventions were also more successful in shifting locus of control toward "internal," compared to controls. Finally, the data indicate that while symptoms and illness behaviour appear to be related, improvements in symptoms are not necessary for reducing disability in these individuals. It was argued that the relationships identified between symptom measures and other measures of illness are mediated through cognitions regarding the significance of symptoms (e.g., "hurt" versus "harm"), rather than being the direct result of subjective characteristics of symptoms.
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Chapter 1

GENERAL INTRODUCTION

A substantial proportion of individuals with unexplained chest discomfort exhibit significant and unnecessary illness behaviour, despite a good medical prognosis and reassurance by physicians (Ockene, Shay, Alpert, Weiner, and Dalen, 1980; Retchin, Fletcher, Earp, Lamson, and Waugh, 1986). From a morbidity standpoint, these individuals are at risk because there is no widely accepted and proven treatment to deal with their illness behaviour. While cardiac rehabilitation programmes are generally used to treat cardiac illness behaviour, individuals with unexplained chest discomfort typically do not have access to these programmes because they do not have significant, defined cardiac disease (Greenland and Chu, 1988).

Two studies are presented in this thesis. The Retrospective Chest Pain Study documents the incidence, nature and degree of illness behaviour in individuals with chest pain that is unlikely to be of cardiac origin. The Chest Discomfort Intervention Study demonstrates the utility of cognitive-behavioural (CB) interventions for decreasing the degree of illness behaviour reported by individuals with chest discomfort and normal coronary arteries or mitral valve prolapse. The Disease Illness Distinction Model (Cott, 1987a, 1987b), described in Chapter 2, provides a conceptual basis for understanding the development and
maintenance of illness behaviour. The model also provides the basis for the CB interventions used in the intervention study.

In this thesis, the term "illness behaviour" (IB) refers to responses that are disproportionate to or discrepant with that which can be accounted for by the degree of detectable disease (Blackwell and Gutmann, 1984; Fedoravicius, 1980; Pilowsky, 1969). Cardiac IB may include the belief in the presence of cardiac disease, self-imposed limitations on activities, ingestion of cardiac medications, and frequent visits to hospital emergency rooms and physicians for chest pain and discomfort (Levenkron, Goldstein, Adamides, and Greenland, 1985). This type of IB exists in both individuals with and without significant defined cardiac pathology or disease (Klein, Dean, Wilson, and Bogdonoff, 1965). The latter population is the focus of the research described in this thesis.

The focus of the majority of relevant studies has been on individuals with chest pain who underwent cardiac catheterization, the definitive diagnostic test for coronary artery disease, and were found to have normal coronary arteries (NCA) and thus to be disease-free (Lavey and Winkle, 1979; Ockene et al., 1980). This diagnostic procedure involves the injection of dye into the coronary arteries to determine the degree of blockage present. The medical prognosis of individuals with normal coronary arteries is excellent as studies have shown that coronary artery disease is unlikely to develop in adults having normal coronary arteries (Marchandise, Bourassa, Chaitman, and Lesperance, 1978). Reports of frequency of NCA diagnoses range from 10-33% of all those
undergoing cardiac catheterization (Marchandise et al., 1978; Proudfit, Shirey, and Sones, 1966). Approximately half of patients with NCA are female (Isner, Salem, Banas, and Levine, 1981; Proudfit et al., 1966).

Studies examining the degree of IB in individuals with chest pain and NCA suggest that physicians may be unaware of the severity of their patients' symptoms and IB (Ockene et al., 1980). Furthermore, it appears that reassurance from physicians and the negative results of objective laboratory tests are not always effective in decreasing the unnecessarily high degree of morbidity in these individuals (DeMaria, Lee, Amsterdam, Low, and Mason, 1980; Lavey and Winkle, 1979; Ockene et al., 1980; Pasternak, Thibault, Savola, DeSanctis, and Hutter, 1980).

Results of one study suggest that approximately 50% of patients having chest pain and NCA remain unnecessarily limited in employment and routine daily activities following diagnosis. Ockene et al. (1980) studied a group of 57 chest pain patients on whom catheterization was performed as part of the diagnostic process. No definite organic cause of pain was found in any of the patients. Ockene et al. state that all of the patients "...were told that their hearts were normal, that their pain was non-cardiac, and that no limitation on activity was necessary" (1980, p. 1249). At follow-up, an average of 16 months post-catheterization, 47% of these patients continued to describe their activity as limited by chest pain; 51% indicated that they were still unable to work; 44% continued to believe that they had heart disease as opposed to 74%, 62% and 79% pre-catheterization, respectively. Despite these figures, the number of additional medical consultations was
significantly reduced following catheterization (p < .001). During the follow-up period, none of the patients died or showed any evidence of myocardial infarction.

Lavey and Winkle (1979) completed a similar study on a group of 45 patients who had undergone cardiac catheterization because of chest pain. Results of all medical tests were normal. Subjects were followed up an average of 3 1/2 years post-catheterization. Despite reports of a lessening or absence of chest pain by 66% of patients at follow-up, 79% of those originally limited by chest pain continued to report limitations on activities; 82% saw physicians on a regular basis for cardiac symptoms; 56% reported taking cardiac medications; 67% reported emergency hospital visits; 27% reported hospital admissions for suspected heart attack, of which none received a positive diagnosis; and, 9% underwent a second catheterization at which time all were again found to be disease-free.

Cardiac IB has also been reported in children. Bergman and Stamm (1967) examined cardiac status and morbidity levels in a group of 7th, 8th, and 9th grade children reported by parents to have had heart problems at some time. Investigation revealed no identifiable disease in 75 (81%) of 93 children. Based on child and parent interviews, 40% of this no-disease group were found to be restricted in activities or psychologically restricted; that is, treated differently by parents as a result of worry and concern about their children's hearts. Restrictions on activities included not being allowed to attend school and/or not being allowed to participate in social or physical activities.
Restrictions on activities were found to be more common and more severe in children in the no-disease group than in children with confirmed cardiac disease.

Additional studies investigating similar patient populations have examined continued symptomatology and medication intake only. In a review of seven NCA studies, Isner et al. (1981) stated that the number of individuals with chest pain and NCA who reported continued chest pain at follow-up ranged from 52 to 100% of the original study samples. Reported ingestion of cardiac medication at follow-up ranged from 24% to 75% of the NCA subject samples (Bemiller, Pepine, and Rogers, 1973; Waxler, Kimbiris, and Dreifus, 1971).

Chest symptomatology and related IB have also been reported in individuals with mitral valve prolapse (MVP) (Barlow and Pocock, 1979; Grass and Williams, 1986; Retchin et al., 1986). MVP is a condition of the mitral valve, located in the left chamber of the heart, in which the valve does not close properly because it is either too large or structurally abnormal (Jeresaty, 1979). MVP is believed to occur in approximately 5% of the general population (Barritt, 1981). However, the prevalence has been found to be higher in younger women (17% for women aged 20-29 years) than in older women (4.4% for women aged 60-69 years) or men of any age (0.7-4.4% for ages 20-80 years) (Savage, Garrison, Devereux, et al., 1983). It is also believed to have a genetic basis (Devereux, Brown, Kramer-Fox, and Sachs, 1982; Weiss, Mimbs, Ludbrook, and Sobel, 1975).
Until recently, MVP has been viewed primarily as a disease or an abnormal condition (Aranda, Befeler, El-Sherif, Castellanos, and Lazzara, 1976; Pocock and Barlow, 1971). However, current research suggests that it may be more meaningful to view MVP as a variant of the normal heart when the MVP is not severe or is not secondary to other known disorders (Retchin et al., 1986; Wynne, 1986). In such cases, its prognosis is excellent and no different than that of the general population (Mills, Rose, Hollingsworth, Amara, and Craige, 1977; Nishimura et al., 1985).

Several researchers have suggested that there is a causal relationship between MVP and the specific chest symptoms and IB that have been reported to be associated with it (Jeresaty, 1979; Crowe, Pauls, Kerber, and Noyes, 1981; Venkatesh et al., 1980). However, more recent research indicates that these relationships may be more a function of biased sampling and the high prevalence of MVP in the general population, than of the prolapsed mitral valve itself (Devereux et al., 1982; Retchin et al., 1986). Results of numerous studies have shown that chest symptomatology and panic disorder are no more common in individuals with MVP than in those without the diagnosis (Devereux et al., 1986; Mavissakalian et al., 1983; Savage, Devereux, Garrison et al., 1983; Savage, Levy, Garrison et al., 1983; Shear, Devereux, Kramer-Fox, Mann, and Frances, 1984).

In the one study in which IB was examined directly as a function of MVP (Retchin et al., 1986), it was concluded that the organic condition (prolapsed heart valve) was not important as a determinant of
IB. In a group of 158 individuals suspected of having MVP who were referred for echocardiography (the diagnostic test used most often to diagnose MVP), prevalence of chest symptomatology, limitations on work, exercise and routine daily activities, and frequency of use of the health care system were no greater in individuals with MVP on echocardiogram than in those without at follow-up, an average of 26 months following echocardiography. Among subjects both with and without diagnosed MVP, symptoms and IB were commonly attributed to MVP.

In summary, there exists a population of individuals with unexplained chest pain and MVP or NCA who exhibit IB as measured by cardiac medication ingestion, visits to physicians made on the basis of chest pain, and reported limitations in routine, exercise and work activities. Reassurance from physicians and results of objective diagnostic tests do not appear to be effective in eliminating this unnecessary IB. In the following chapter, the Disease/Illness Distinction Model (Cott, 1987a, 1987b) is presented. The model provides a theoretical basis for the development of IB in populations both with and without defined organic disease. The determinants of IB in individuals with unexplained chest symptomatology are discussed in Chapter 3.
Chapter 2

DISEASE ILLNESS DISTINCTION MODEL

Conceptual Model

The Disease Illness Distinction (DID) Model (Cott, 1987a, 1987b; Cott and Gandz, 1984), an extension of earlier disease/illness concepts (Barondess, 1979; Eisenberg, 1977), offers a theoretical framework for defining and understanding the development and maintenance of IB. At an applied level, the model offers a means to measure IB, and facilitates an interdisciplinary treatment programme that addresses the multidimensionality of IB. The description of the DID model is based upon that of Cott (1987a).

Definitions of disease and illness. In the DID model, disease refers to actual organic dysfunction, the observable or inferred physical condition resulting from any sort of lesion, insult or infection, or any other imbalance of body chemistry. Illness state refers to responses: the whole array of subjective states, complex cognitive responses, and other overt responses and behaviours that are presented by individuals as disabling or disruptive to their normal lives and are attributed to a disease.

Subjective states consist of sensations, perceptions, and motivational and emotional states, such as fear, anxiety, pain. Cognitions refer to attributions and belief systems relating to health
and disease. Overt behavioural responses include the range from "involuntary," reflexive physiological and classically conditioned responses to "voluntary" responses that are a result of operant conditioning. Consistent with the requirement of a disease attribution is that individuals tend to look to medicine for a solution and believe that their condition is beyond their control.

Given the above definitions of disease and illness, it is argued that the degree of illness varies considerably for a given disease determinant, and that in certain cases, disease and illness are independent (Barondess, 1979; Beecher, 1956; Fedoravicius, 1980; and Mechanic, 1962). Significant disease can exist concurrently with little or no illness and a high level of functioning, just as little or no disease can exist with excessive amounts of illness and a low level of functioning. Level of functioning is defined as the degree to which one engages in "normal" routine activities and meets the demands of one's employment, family and social obligations. Furthermore, because disease and illness may be independent of each other, successful treatment of one does not necessarily result in elimination or improvement in the other.

For example, two individuals with the same degree of disease may respond very differently. One individual who has experienced a myocardial infarct may quit his job, avoid physical exercise and social obligations. A second individual may deny that there has been an infarct and continue on with all activities. These are two extreme responses to an infarct. However, they do make the point that disease and illness are
distinct and that there does not exist a simple, direct, causal relationship between the two.

**Determinants of illness.** Illness is viewed as being caused by an interaction of many determinants, including disease, conditioning and learning, dispositional variables, social or environmental variables, intervening cognitions and beliefs, and other behavioural responses (Fordyce, 1976; Mechanic, 1977; Melzack and Wall, 1982). Disease, then, is viewed as one of many potential determinants of IB. Each disease process has its own set of operating principles, such as the conditions of optimal treatment, and the behavioural limitations and contraindications (i.e., activities known to aggravate the disease process). From a practical standpoint, this means that medical practitioners should be able to identify, for a given disease process, whether patients are under optimal medical management (i.e., all medical procedures known to modern medical science which are appropriate for the elimination, control or reduction of the identified disease have been employed), and what behaviours will and will not aggravate the disease process. The classes of non-disease determinants along with specific examples are presented in Table 1.

**Formulations of illness responses.** Formulations of illness responses that are based on classical conditioning are useful when dealing with responses that are generally viewed as being involuntary and/or mediated by the autonomic nervous system. These include respondent pain responses, skeletal and smooth muscle spasms, cardiac (e.g., palpitations) and cardiovascular responses including hypertension,
Table 1

The Non-disease Determinants of Illness

<table>
<thead>
<tr>
<th>Category</th>
<th>Examples</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responses that can be a result of classical conditioning</td>
<td>[pain, cardiac responses (e.g., increased or irregular heart rate)]</td>
</tr>
<tr>
<td>Responses that can be a result of operant conditioning</td>
<td>(response to injury)</td>
</tr>
<tr>
<td>Dispositional variables (age, physical condition)</td>
<td></td>
</tr>
<tr>
<td>Intervening cognitive responses such as beliefs and appraisals [e.g., relating to locus of control (Rotter, 1966) and self-efficacy (Bandura, 1977)]</td>
<td></td>
</tr>
<tr>
<td>Psychological variables (e.g., depression, thought disorder)</td>
<td></td>
</tr>
<tr>
<td>Environmental/situational variables (e.g., behaviour of family, physicians, employers, financial contingencies)</td>
<td></td>
</tr>
<tr>
<td>Behavioural responses (e.g., coping skills)</td>
<td></td>
</tr>
<tr>
<td>Internal, external stimuli (e.g., body chemicals, drug states)</td>
<td></td>
</tr>
</tbody>
</table>

Operant formulations are relevant for the following responses: operant pain behaviour and avoidance and escape responses relating to conditioned emotional responses and fear [e.g., verbal complaints of pain, medication intake, visits to physicians, invalid-like guarding responses (e.g., limping)]; those responses for which biofeedback interventions have been found to be useful such as specific central nervous system dysfunctions (e.g., migraine and muscle tension headache, and epilepsy) (Bakal, 1982; Black, Cott, and Pavloski, 1977; Cott, Pavloski, and Black, 1979); and culturally specific sick role behaviours (Mechanic, 1972; Parsons, 1951; Zborowski, 1952; Zola, 1966).

Initially, symptoms are respondents or reflexive responses that arise from internal or external stimuli. Such symptoms may be subject to both classical and operant conditioning, and in this way, could persist long after the initial stimulus has subsided or the injury has healed. Similarly, other pain behaviours (e.g., limping) may function initially as respondents, and occur reflexively in response to antecedent stimuli arising from the site of body damage. These same behaviours may come under the influence of reinforcing consequences in the environment (e.g., attention from spouse) (Fordyce, 1976).

Cognitive-behavioural formulations are useful when dealing with responses relating to complex psychosocial issues, beliefs and
attributions, appraisals and expectations, culturally specific issues, and coping and problem solving (Fordyce, 1976; Lazarus, 1986; Meichenbaum, 1977; Nisbett and Ross, 1980; Parsons, 1951; Turk, Meichenbaum, and Genest, 1983). Within cognitive-behavioural formulations, beliefs and attributions are considered to have an influence on certain types of illness behaviour and cognitions such as help-seeking, avoidance, locus of control (Rotter, 1966, 1975), and self-efficacy (Bandura, 1977).

For example, anticipatory cognitions are believed to be important in the development and maintenance of avoidance learning (Fordyce, Shelton, and Dundore, 1982). One example of an anticipatory cognition is: "I'll experience pain if I play tennis, so I won't play." Fordyce et al. (1982) suggested that these types of cognitions may act as the discriminative stimuli in avoidance behaviour, because the ability to anticipate consequences allows individuals to engage in avoidance behaviour before the pain is actually experienced. Although at an earlier time, the subjective experience of pain may have been paired with some activity, continued avoidance of the activity, which is maintained by the anticipatory cognitions, does not allow the individual to determine whether that behaviour continues to be associated with pain.

A clinical example of a cognitive-behavioural formulation operationally applied to a "cognitive" determinant of illness is the "hurt/harm distinction" (Cott, 1987a). This is a conceptual distinction applied to the interpretation or significance of symptoms. A symptom may indicate danger or threat of physical damage ("harm"), or it may be
associated with discomfort only ("hurt") and no accompanying physiological damage.

The significance of the hurt/harm distinction from a behavioural point of view is that a "harm" interpretation often leads to fear and the cessation and future avoidance of activity, along with decreased tolerance of physical activity. A "hurt" interpretation is more likely to lead to continuation or only temporary cessation of activity. For example, head pain may be interpreted as "harm" (e.g., a brain tumor) and lead to cessation of activity, visits to physicians and requests for medication and diagnostic tests. On the other hand, head pain may be interpreted as "hurt" only (e.g., a muscle tension headache), in which case it would more likely lead to continuation with or temporary cessation of activity, and possibly medication intake.

**Intervention Model**

The operational definitions of disease and illness described in the previous section allow for clear delineation of medical and non-medical issues and roles. The primary goal of medical science is to diagnose (i.e., identify) and treat (i.e., control, reduce or eliminate) the unlearned aspects of illness that are attributable to disease determinants. The goal of the behavioural sciences is to modify the other, learned aspects of illness that are a result of non-disease determinants.

According to the model, intervention is treatment-oriented for disease issues, and educative for non-disease, non-medical issues.
Clinical strategies based on the medical model can, and often do, unintentionally lead to or facilitate the development of an external locus of control (Rotter, 1966, 1975) and victim-like, passive responses in patients (Cott, 1987b; Linkin, 1980). An educative focus is considered to have greater utility when dealing with the non-disease determinants of illness because clinical strategies that are educative emphasize skill acquisition and problem solving, shifting the onus of decision making onto the patient, thereby encouraging the use of active coping behaviours and an internal locus of control (Cott, 1987a, 1987b; Turk et al., 1983).

The objectives of intervention are to change behaviours and cognitions away from dependency and passive, invalid roles toward more independent roles, problem solving, increased activity levels and physical activation. While symptom reduction is usually a goal of intervention, it is not considered necessary for improvement in day to day functioning, because changes in illness behaviours and cognitions may occur independently of symptom changes (Fordyce, 1976). The cognitive-behavioural intervention strategies are aimed at "demedicalization," a reattribution process (Nisbett and Valins, 1972) in which an individual's attributions are altered from those of a purely medical nature (i.e., disease process) toward more useful non-medical formulations. Changes in behaviour are considered necessary as a means of altering individuals' perceptions, cognitive appraisals and beliefs.

A final goal of intervention is for individuals to consolidate changes, generalize them and lay the foundation for maintaining them
(Turk et al., 1983). In order to reach this goal, individuals must be aware that change is occurring and must attribute it to themselves. Their sense of self-efficacy must improve (Bandura, 1977; 1980). In order for this to occur, individuals must come to believe in themselves and their ability to exercise control over events to accomplish desired goals; this is accomplished through the experience of success when implementing newly acquired skills (Wood and Bandura, 1989). Individuals must also be prepared for recurrences of symptoms and related illness responses. It is important that they learn that relapses are signals or cues to implement new skills, not evidence of failure.

Choice of intervention strategies depends on the nature of the illness response. For responses that are considered respondent, counter-conditioning techniques are implemented such as desensitization. For responses that are believed to be the result of operant conditioning, intervention strategies include extinction of existing illness responses and application of reinforcement for behaviours associated with wellness. For cognitive illness responses, the following strategies are used: demedicalization through education and reappraisal techniques (e.g., hurt/harm distinction), self-monitoring, alterations in environment, and incompatible response strategies (e.g., exercise, relaxation). Specific strategies used to decrease illness responses are described below.

One important strategy for altering disease attributions is to provide the patient with a behavioural formulation that can account for some or all aspects of their discomfort and related disability. This
allows for reattribution of discomfort and disability in terms of
cognitive, learned behavioural and environmental causes.

A second strategy used to decrease illness cognitions and
behaviours is education with regard to the hurt/harm distinction.
Individuals are given clear information about the significance of their
symptoms to facilitate reinterpretation of symptoms and increased
physical activity levels. In cases of "harm," avoidance of risks and
specific activities is advised. In cases of "hurt," individuals are
educated in the use of symptom control and reduction strategies and
techniques, primarily relaxation training (Turk et al., 1983). While
symptom reduction is often a desired goal of the patient, it is not
considered necessary in order for illness cognitions and behaviours to
decrease.

Physical exercise is an important component of CB interventions
aimed at decreasing illness behaviour. Its primary use is as an
incompatible response strategy. For example, it is difficult to be able
to run thirty minutes daily and maintain the belief that one is still
"sick" or "frail" (Cott, 1987b). Regular physical activity also
increases exercise tolerance, and over time allows the individual to do
more with less effort (Eichner, 1983).

Graded and quota-based exercise programmes, in which there are
systematic increases in the amount or duration of exercise performed, are
the most effective for several reasons (Dolce, Crocker, Moietteire and
Doleys, 1986; Turk et al., 1983). These types of programmes eliminate
pain-contingent behaviour because individuals work until they have
reached their daily quota of exercise rather than stopping when pain occurs or increases in intensity. Graded exercise programmes also have been shown to enhance self-efficacy as one's sense of physical competency and expectations of capability and control increase (Dolce et al., 1986). Furthermore, these types of programmes are believed to result in greater compliance because they are based on the behavioural principles of shaping and realistic goal setting (Turk et al., 1983). The programmes begin with a level of exercise that is easily accomplished and proceed to higher levels over time as muscle strength and endurance develop. Finally, increases in physical activity in chronic pain patients have been shown to be related to decreases in pain ratings and discrete illness behaviours, such as complaints of pain (Fordyce et al., 1981).

Relaxation training is a useful incompatible response strategy and an effective symptom control strategy, because it reduces the amount of pain that is presumed to be caused directly by tense muscles (Linton, 1986; Turk et al., 1983). The state of relaxation is viewed as incompatible with tension and considered to be essential in breaking the pain-tension cycle (Turk et al., 1983). According to Turk et al. (1983), the pain-tension cycle begins with a nociceptive stimulus or organic insult to which the body's response is muscle tensing in the surrounding area. This tensing further antagonizes the insult and increases pain, which often results in muscle tension in neighboring muscle groups, which further increases pain. It follows that the pain-tension cycle is "quite capable of perpetuating the pain itself" (Turk et al., 1983, p. 268), long after the injury has healed. This view of relaxation is consistent
with data from several studies showing relaxation to be effective in producing decreases in ratings of pain level (McCauley, Thelen, Frank, Willard, and Callen, 1983; Sanders, 1983a; Turner, 1982).

During intervention, individuals are taught to use relaxation at the onset of discomfort and also encouraged to practice it regularly on a proactive basis. Relaxation is also used in systematic desensitization where it is paired with images of situations and activities that in the past were associated with pain or anxiety. When used as a coping skill, relaxation is also reported to enhance self-efficacy (Bandura, 1977), because it provides the individual with a behavioural coping skill to use in situations in which adaptive coping is required. Practice is believed to strengthen the individual's "sense of having some control over periods of stress and pain, and reduce feelings of helplessness" (Turk et al., 1983, p. 267).

The self-monitoring procedure (Nelson, 1977) is used in cognitive-behavioural interventions to obtain more reliable and detailed information with regard to medication intake, symptom frequency and intensity, activity level and avoidance behaviour patterns. It is also useful in identifying the antecedents and consequents of these behaviours. Furthermore, the self-monitoring procedure can result in greater awareness of one's own behaviour and its effect on others, as well as the effect that the environment has on one's own behaviour (Nelson, 1977).

**Dependent measures.** Dependent measures of illness include the following: reflexive and conditioned physiologic responses, for example,
cardiac responses; operant behavioural responses such as medication intake, physician visits, activity pattern, changes in employment activities or status, or reported ability to carry out work, routine, and leisure exercise activities; subjective responses such as symptom frequency and intensity, energy and activity level, and cognitions of illness including attributions with respect to the believed cause of symptoms, and perceptions of disability and limitations.

In summary, the Disease Illness Distinction Model is a model of illness behaviour that can account for the respondent, operant, and cognitive elements of the illness response. Interventions based on the model are interdisciplinary. Medical strategies are implemented in a treatment format to deal with the unlearned, disease components of the illness response. Classical and operant conditioning, and cognitive-behavioural strategies are implemented in an integrated, educative format to deal with the learned components of illness. The focus of the educative, cognitive-behavioural interventions is away from the patient role and more on individual ownership and responsibility for problem solving and decision making. Details of the intervention model are provided in Chapter 6, Methods section.
Chapter 3

RETROSPECTIVE CHEST PAIN STUDY

Introduction

Illness behaviour associated with unexplained chest pain was discussed in Chapter 1. In Chapter 2, a model to account for IB was presented. In the Retrospective Chest Pain (RCP) Study described below, the incidence, nature and extent of IB were examined further in a group of individuals with chest pain and no defined cardiac disease.

In a cognitive-behavioural analysis, patient cognitions, such as symptom appraisals, and physician behaviours, such as the prescribing of medications, are believed to be important in the development and maintenance of IB (Cott, 1987b; Turk et al., 1983). Many researchers have suggested that these two factors contribute to IB in individuals with unexplained chest pain (Fedoravicius, 1980; Fordyce, 1976; Turk et al., 1983). However, little data have been reported to support this belief. Consequently, the roles of patient cognitions and physician behaviours in IB were examined in the Retrospective Study. In the section below, it will be shown how these factors are believed to relate to IB.

Typically, chest discomfort can lead to disability which is characterized by fear and avoidance behaviour (Cott, 1987b). This is likely related more to the fear of cardiac complications (myocardial infarct, sudden death) and the confusion over the significance of
symptoms than to the actual severity of the pain. These cognitions can result in well-established patterns of avoidance behaviour (e.g., low activity levels, refusal to work) that are not easily extinguished, and the continuing tendency to seek a medical attribution for the cause of one's behaviour (lower level of functioning). (Cott, 1987a; 1987b).

One type of cognition that is important in the development of fear and avoidance behaviour is chest discomfort attributions (the beliefs that one holds regarding the cause of one's chest discomfort) (Weiner, 1974). As discussed in Chapter 2, disease attributions, in particular, "harm" attributions, are more likely to lead to unnecessary illness behaviour than are "hurt" or non-disease attributions. Disease attributions may result from a medical diagnosis, such as cardiac attributions following a myocardial infarct. This type of labelling by physicians (termed "diagnostic labelling") may also contribute to other aspects of illness behaviour. For example, individuals who are given a diagnostic label may search for and experience physical symptoms that are consistent with the label (Leventhal, Nerenz, and Strauss, 1982). Many individuals with MVP, a benign condition in the majority of cases, view themselves as having "heart problems" and consequently limit themselves in their activities (Jeresaty, 1979).

Factors other than medical diagnoses are involved in disease attributions for chest discomfort. In the Ockene et al. (1980) study, cardiac attributions were reported by 44% of subjects despite being told that their hearts were normal. Furthermore, in the Retchin et al. (1986) study of individuals suspected of having MVP but in whom a definitive
diagnosis had not been made, 62% of subjects who had stopped working attributed their need to change jobs to MVP or some cardiac condition.

Other factors that are believed to be relevant to chest discomfort attributions are previous experience and beliefs, and patient-physician communications (Fedoravicius, 1980). For example, Weilgosz and Earp (1986) found that belief in a "vulnerability to serious heart disease" was related to continued pain in NCA's at a one-year follow-up.

The attitudes and behaviours of physicians also may encourage disease attributions and related illness behaviour (Fedoravicius, 1980; Katon, Ries & Kleinman, 1984; Lipkin, 1980). In individuals with chest discomfort that can not be accounted for by identifiable disease, this is believed to occur as a result of inadequate and unclear communication between patient and physician, and assessment and treatment procedures prescribed by the physician (Cott, 1987a, 1987b; Lavey and Winkle, 1979; Ockene et al., 1980). For example, the experience of a series of diagnostic tests followed by a prescription for cardiac medication suggests to patients that they must have a cardiac disorder.

Failure to explain to patients the nature and prognosis of their diagnosis may give rise to unrealistic fears and a refusal to return to work (Klein et al., 1965). In the Bergman and Stamm (1967) study of school age children suspected of having cardiac disease, 70% of parents of children in the no-disease group (see Chapter 1) who had imposed restrictions on their children's behaviour or activities, "expressed doubt and confusion" over their understanding of their child's condition. Despite this, 63% of parents of children in this group
reported that they believed their children had heart disease.

Similarly, failure to give patients a clear message about the meaning of their chest discomfort and how they are to respond to it may also result in unnecessary limitations (Cott, 1987b). For example, it is not uncommon that physicians fail to make the hurt/harm distinction clear to patients, and apparently many physicians are unaware of its importance (Kleinman, Eisenberg, and Good, 1978; Lipkin, 1980). When this occurs, the patient may be told to "let pain be your guide" or "stop when it starts to hurt." As a result, many individuals limit themselves unnecessarily. This leads to a feedback loop of increasingly diminished activity, lowered tolerance of physical activity, and an increased likelihood of fatigue and symptoms with even minimal exertion (Fardyce, 1976). The subsequent occurrence of symptoms concurrent with or following activity serve to reinforce the belief that physical activity should be avoided.

In the absence of a definitive diagnosis, many physicians apparently lack confidence and are reluctant to declare a clean bill of health (Klein et al., 1965). Uncertainty by the physician may affect subsequent advice that further promotes inactivity in the patient, such as "take it easy," "don't overdo it." In the Lavey and Winkle (1979) study, 27% of NCA's were rehospitalized for chest pain. The authors attributed this to continued concern on the part of physicians about myocardial infarction, despite negative diagnostic tests.

Physicians may also find it easier to continue to regard NCA's as "...limited by cardiac disease rather than to admit prior diagnostic
error and spend the time necessary for continued support, reassurance, and exploration of other, non-medical factors that may play a part in the patient's discomfort" (Ockene et al., 1980, p. 1252). In the Bergman and Stamm (1967) study, physician advice to parents regarding restrictions of their children's activity was concluded to be the most important determinant of imposed restrictions on children's activities. Fifty-three percent of parents of children in the no-disease group, who had imposed restrictions on their children's activities, reported that they received "definite advice" from a physician to restrict their children's activities at the time of the original investigation.

Furthermore, physicians may "hedge" their recommendations and give conflicting advice and information to patients without a positive diagnosis. For example, patients may be told that "your heart is normal, but we'll have to keep an eye on that symptom," (Katon et al., 1984; Lipkin, 1980). Other patients are given prescriptions for cardiac medication, despite negative diagnostic tests (Isner et al., 1981). For example, all patients in the Ockene et al. (1980) study were told that their hearts were normal, yet at least 25% were continued on cardiac medications. This may be interpreted by the patient that the physician is unsure of the diagnosis, and that they may, in fact, have heart disease.

In cases of positive cardiac diagnoses, physicians may also take a conservative stance, such as "avoid strenuous activity," or neglect to identify the presence of illness behaviour. For example, Klein et al. (1965) found that some physicians focussed on their
patients' chest pain following myocardial infarction, despite the presence of other symptoms such as anxiety and depression.

Finally, physicians may simply be unaware of their patients' symptoms and IB. Results of the Ockene et al. (1980) study indicated that physicians underestimated the severity of their patients' chest pain at follow-up, when compared to patient reports.

Elaborate diagnostic workups, hospitalizations, and medical treatments can also increase the likelihood of illness behaviour, as they encourage disease attributions and related IB in patients (Eisenberg, 1977; Fedoravicius, 1980; Katon et al., 1984; Lipkin, 1980; Smith, Monson, and Ray, 1986). In order to rule out all cardiac disease possibilities, multiple diagnostic procedures are often prescribed, some of which require hospitalization (Ockene et al., 1980). Cardiac medication is often used as a diagnostic tool (Kemp, Vokonas, Cohn, and Gorlin, 1973), the rationale being that if decreases in symptoms are reported, it may imply or confirm for the physician that the problem is cardiac-related.

In summary, physician behaviour and patient cognitions, in particular, cardiac disease attributions for chest discomfort, are believed to be important in the development and maintenance of illness behaviour. While these conclusions are logically consistent with cognitive-behavioural principles, there is an absence of empirical evidence to support them.

In the Retrospective Chest Pain Study, illness behaviour data were collected from a sample of patients who had been investigated for
chest pain at a hospital coronary care unit. All subjects had received a diagnosis of "chest pain not yet diagnosed," indicating that positive cardiac diagnoses and other medical causes of chest pain could not be confirmed. Given the low false-negative diagnostic rates in cardiology (Proudfit, Albert, Bruschke, and Sones, 1980), the existence of cardiac disease was considered highly unlikely in this population. The chest pain experienced by these individuals, then, posed no significant risk to them from a statistical or clinical standpoint. The purpose of the study was to permit an in depth analysis of the nature of illness behaviour in individuals with chest pain and no defined disease.

Based on reports of research conducted in the United States and clinical reports from practicing physicians in Southern Ontario, it was suspected that a population of individuals existed with no defined cardiac disease who report disabling and limiting chest pain which they attribute to their heart.

It was hypothesized that patient cognitions and physician behaviours contribute to the IB reported by these individuals.
Method

Subjects

Subjects were 246 patients who had been discharged from the Coronary Care Unit at St. Joseph’s Hospital, Hamilton, Ontario between September, 1979 and August, 1981, with the diagnosis "chest pain not yet diagnosed" (CPNYD). Names were obtained from the screening records of a multicentre, randomized, prospective controlled trial of antiplatelet drugs in unstable angina. These individuals had been screened, but did not meet the criteria, for the unstable angina study. A diagnosis of CPNYD was made after cardiac and other medical causes of chest pain had been ruled out. Other diagnoses that were ruled out included acute myocardial infarction, unstable angina, arrhythmia, ischemic pain, congestive heart failure, and gastro-intestinal pain. Subjects ranged in age from 27-82 years (M = 53.1, SD = 11.3); 135 (54.9%) were male, and 111 (45.1%) were female.

Procedure

Addresses and telephone numbers of 214 potential subjects were obtained from the Hamilton telephone book. This information was unavailable for 32 subjects, who were not contacted. Letters of introduction were mailed to the 214 individuals between October and December, 1981. This letter informed the patients that they would be contacted by telephone to obtain information regarding how they were feeling, and whether additional visits to hospital or physicians had been made for chest pain (see Appendix A, Letter to Prospective Subjects).
Individuals were informed that their responses would in no way affect any future treatment at St. Joseph's Hospital.

Within one to three weeks, a staff nurse telephoned the subjects to request their consent to conduct a telephone interview (see Appendix A, Telephone Script of Introduction to Study). Subjects who refused to participate (N = 17 or 6.9% of total subject sample) were thanked and again informed that their refusal would in no way affect future treatment at St. Joseph's Hospital. Subjects who agreed to participate were asked in a standard format 16 questions related to the subjects' chest pain. Each subject was informed that the interview would be stopped if there were any objections to the questions. The questions pertained to the individual's chest pain and associated behaviour (see Appendix A, Subject Questionnaire). The interview took about 15-20 minutes.

Further attempts were made between December, 1982 and February, 1983 to collect data from 12 subjects who had been previously identified as non-English speaking, through the use of translators obtained from the St. Joseph's Hospital translator pool. These subjects were a subset of the 214 who had been contacted by mail between October and December, 1981, but who could not complete the questionnaire because of language difficulties.

A letter of introduction to physicians and a physician questionnaire (see Appendix A, Physician Questionnaire) was mailed to the family physicians of all subjects. Data from physicians were collected to enable comparisons between patient self-reports and and physician
reports of similar variables (e.g., presence of continued pain, medication intake). Attempts were made to obtain unreturned questionnaires through follow-up letters and telephone calls.

Screening records from the unstable angina study were reviewed in November, 1982 to determine whether any subjects had received a cardiac diagnosis subsequent to the original CPNYD diagnosis.

Illness behaviour data were obtained from 134 of the total subject sample (N = 246). Mean age of the participant sample (n = 134) was 51.93 years, SD = 10.78; 55.6% were male, and 44.4% were female. Reasons for non-participation are presented in Table 2. Data obtained directly from subjects and from the diagnostic update of the unstable angina records indicated that 42 individuals had received cardiac diagnoses subsequent to the original CPNYD diagnosis. These subjects were excluded from analyses. Of the ten deaths since the original CPNYD diagnosis, only one was cardio-vascular related. As shown in Table 3, mean age and gender distributions did not differ among the total, participant, non-participant, and defined disease/deceased samples. Mean follow-up time between the original CPNYD diagnosis and data collection was 16 months (range: 3-42 months).

Physician data were collected on 194 of the 246 subjects. Data from both patients and their physicians are available on 92 subjects.
Table 2

Subject Status: Retrospective Chest Pain Study

<table>
<thead>
<tr>
<th>Status</th>
<th>N</th>
<th>% of total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Participant</td>
<td>134</td>
<td>54.5</td>
</tr>
<tr>
<td>Non-Participant</td>
<td>60</td>
<td>24.4</td>
</tr>
<tr>
<td>Refused</td>
<td>17</td>
<td>6.9</td>
</tr>
<tr>
<td>Couldn't be reached</td>
<td>32</td>
<td>13.0</td>
</tr>
<tr>
<td>Couldn't complete questionnaire</td>
<td>7</td>
<td>2.8</td>
</tr>
<tr>
<td>In psychiatric hospital</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>&quot;Never in CCU&quot;</td>
<td>2</td>
<td>0.8</td>
</tr>
<tr>
<td>Defined cardiac disease</td>
<td>42</td>
<td>17.1</td>
</tr>
<tr>
<td>Decedced</td>
<td>10</td>
<td>4.0</td>
</tr>
<tr>
<td>Total</td>
<td>246</td>
<td>100.0</td>
</tr>
</tbody>
</table>

* Two subjects indicated that they had never been in the coronary care unit at St. Joseph's Hospital.

The basis for these responses was not pursued.
Table 3
Age and Sex Distributions of Total, Participant, Non-participant, and Defined Disease/Deceased Subject Samples of Retrospective Chest Pain Study

<table>
<thead>
<tr>
<th>Variable</th>
<th>Total</th>
<th>Participant</th>
<th>Non - a</th>
<th>Defined cardiac disease/deceased</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Demographic</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Age in years</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>53.1</td>
<td>51.9</td>
<td>52.6</td>
<td>56.9</td>
</tr>
<tr>
<td>SD</td>
<td>11.3</td>
<td>10.8</td>
<td>11.9</td>
<td>11.7</td>
</tr>
<tr>
<td>N</td>
<td>266</td>
<td>134</td>
<td>60</td>
<td>42</td>
</tr>
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<td>Gender</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>Female</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>111</td>
<td>60</td>
<td>27</td>
<td>24</td>
</tr>
<tr>
<td>%</td>
<td>45.1</td>
<td>44.8</td>
<td>45.0</td>
<td>47.1</td>
</tr>
<tr>
<td>Male</td>
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<td></td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>135</td>
<td>74</td>
<td>33</td>
<td>28</td>
</tr>
<tr>
<td>%</td>
<td>54.9</td>
<td>55.2</td>
<td>55.0</td>
<td>52.9</td>
</tr>
</tbody>
</table>

Non-participant = refused to participate, couldn't be reached, couldn't complete questionnaire, in nursing home/psychiatric hospital, "never in coronary care at St. Joseph's Hospital."

Mean age, SD and N of defined disease sample only (deceased excluded).
Dependent Measures

Self-report measures of illness include the following:

1. Medication use for chest pain including cardiac and non-cardiac medications. Examples of non-cardiac medication are analgesics and tranquilizers; cardiac medications include nitrates, beta-blocking agents, calcium antagonists, and digoxin.

2. Estimated number of visits to physicians made for all reasons and those made on the basis of chest pain in the six months prior to data collection.

3. Job change since the onset of chest pain ("gone to lighter duties" and "stopped working") made for all reasons and those made on the basis of chest pain.

4. Absenteeism for all reasons and because of chest pain in the month prior to data collection.

5. Limitations attributed to chest pain on three types of activities: house/yard work, exercise/sports, and social activities.


Illness measures derived from physician questionnaire data were:

1. Number of visits to the family physician for any reason subsequent to the initial CPNYD diagnosis;

2. Presence of continued pain in patient;
3. Number of additional hospital admissions for chest pain since the time of the original CPNYD diagnosis.

Data analysis

Chi-square tests of independence were computed to examine the utility of the variables identified as potential predictors of illness (see below). Relationships between subject and physician data on the presence of continued pain also were examined using chi-square tests of independence.

The variables that were examined as potential predictors of illness included age, gender, frequency of chest pain, medication intake and attributions for chest pain. The relationships between cardiac medication ingestion, on the one hand, and chest pain frequency and attributions, on the other, were also examined to address the hypothesis that the taking of medications encourages cardiac attributions and other forms of illness behaviour. For analyses, variables were categorized as follows.

Subject questionnaire data:
1. Age: six categories of ten years each beginning with age 26-35 years and ending with age 76-85 years;
2. Gender: male, female;
3. Medication ingestion: ingestion of cardiac medication, no cardiac medication ingestion;
4. Chest pain attributions: cardiac attributions, other (non-cardiac) attributions;
5. Chest pain frequency: (a) at least once a day, (b) more than once a week but less than daily, (c) more than once a month but less than once a week, (d) more than once every six months but less than once a month, (e) no chest pain;

6. Physician visits in the six months prior to data collection: one or more visits, no visits;

7. Limitations on activities: "not at all limited," "a little/very much limited";

8. Job change: put on lighter duties/stopped working, no/other change.

Physician questionnaire data:

Results

Illness Behaviour: Patient Questionnaires

Illness behaviour data are presented in Table 4 from the 134 subjects who completed the telephone questionnaire. The majority of these patients (81 or 60.4%) indicated that they continued to experience chest pain since their discharge from hospital. Thirty (22.4%) reported having chest pain more than once per week.

Medications: Forty-eight (35.8%) respondents indicated that they were taking medications for their chest pain. Of these, 14 (29.2%) stated that they were taking analgesics or tranquilizers, and 39 (81.3%) reported taking cardiac medication (one or more of nitroglycerin, beta-blocking agents, isordil, or digoxin). Five (12.8%) of the users of cardiac medications also reported taking analgesics or tranquilizers. Of the 39 who were ingesting cardiac medications, 19 (48.7%) reported being on one medication, 12 (30.8%) on two medications, and eight (20.5%) on three or more medications.

Physician visits: Nearly all (117 or 87.3%) of the respondents indicated that they had been to a physician in the previous six months, with 53 (45.3%) of these reporting at least one visit made on the basis of chest pain.

Reports of limitations attributed to chest pain: Overall, 87 (64.9%) of the respondents reported that chest pain had "affected their life." Fifty-two (38.8%) indicated that chest pain had affected their ability to perform house or yard work; 47 (35.1%) reported effects on
### Table 4

**Frequency Distributions: Retrospective Chest Pain Study Subject**

**Questionnaire**

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>1. How often are you having chest pain?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>More than daily</td>
<td>16</td>
<td>(11.9)</td>
</tr>
<tr>
<td>More than once per week</td>
<td>14</td>
<td>(10.5)</td>
</tr>
<tr>
<td>More than once per month</td>
<td>27</td>
<td>(20.1)</td>
</tr>
<tr>
<td>More than once per six months</td>
<td>24</td>
<td>(17.9)</td>
</tr>
<tr>
<td>Never</td>
<td>53</td>
<td>(39.6)</td>
</tr>
<tr>
<td><strong>2. Are you taking any medication now for your chest pain?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>48</td>
<td>(35.8)</td>
</tr>
<tr>
<td>No</td>
<td>86</td>
<td>(64.2)</td>
</tr>
<tr>
<td><strong>3. If yes, what medications are you taking and how often do you take them?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>86</td>
<td>(64.2)</td>
</tr>
<tr>
<td>Analgesic</td>
<td>6</td>
<td>(4.5 )</td>
</tr>
<tr>
<td>Tranquilizer</td>
<td>8</td>
<td>(6.0 )</td>
</tr>
<tr>
<td>Nitroglycerin</td>
<td>28</td>
<td>(20.9)</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>22</td>
<td>(16.4)</td>
</tr>
<tr>
<td>Isordil</td>
<td>13</td>
<td>(9.7 )</td>
</tr>
<tr>
<td>Digoxin</td>
<td>5</td>
<td>(3.7 )</td>
</tr>
<tr>
<td><strong>4. How much has your chest pain affected your life?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Not at all</td>
<td>47</td>
<td>(35.1)</td>
</tr>
<tr>
<td>A little</td>
<td>62</td>
<td>(46.2)</td>
</tr>
<tr>
<td>Very much</td>
<td>25</td>
<td>(18.7)</td>
</tr>
<tr>
<td><strong>5. What do you think is causing your chest pain?</strong></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Don't know</td>
<td>67</td>
<td>(50.0)</td>
</tr>
<tr>
<td>Heart problems</td>
<td>25</td>
<td>(18.7)</td>
</tr>
<tr>
<td>Stress/nerves</td>
<td>22</td>
<td>(16.4)</td>
</tr>
<tr>
<td>Other</td>
<td>20</td>
<td>(14.9)</td>
</tr>
</tbody>
</table>
6. About how many visits have you made to doctors in the past six (6) months?

| None     | 17 (12.7) |
| 1-2      | 38 (28.3) |
| 3-5      | 28 (20.9) |
| 6 or more| 51 (38.1) |

7. How many of these visits were related to your chest pain?

| N/A       | 17 (12.7) |
| None      | 64 (47.8) |
| 1-2       | 31 (22.1) |
| 3-5       | 7 (5.2)   |
| 6 or more | 15 (11.2) |

How much does your chest pain keep you from doing:

8. House or yard work?

| Not at all | 82 (61.2) |
| A little   | 34 (25.4) |
| Very much  | 18 (13.4) |

9. Exercise or sports?

| Not at all | 87 (64.9) |
| A little   | 23 (17.2) |
| Very much  | 24 (17.9) |

10. Social activities?

| Not at all | 92 (68.7) |
| A little   | 28 (20.9) |
| Very much  | 14 (10.4) |

11. Has something about your job changed since your chest pain started?

<p>| N/A                  | 40 (29.9) |
| Put on lighter duties| 11 (8.2)  |
| Stopped working      | 17 (12.7) |
| No                   | 66 (49.2) |</p>
<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>12. Has this change occurred because of your chest pain?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>106</td>
<td>(79.1)</td>
</tr>
<tr>
<td>Yes</td>
<td>21</td>
<td>(15.7)</td>
</tr>
<tr>
<td>No</td>
<td>7</td>
<td>(5.2)</td>
</tr>
<tr>
<td>13. How many days of work did you miss in the last month?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>57</td>
<td>(42.5)</td>
</tr>
<tr>
<td>None</td>
<td>55</td>
<td>(41.0)</td>
</tr>
<tr>
<td>1-2</td>
<td>9</td>
<td>(6.7)</td>
</tr>
<tr>
<td>3-5</td>
<td>6</td>
<td>(4.5)</td>
</tr>
<tr>
<td>6-10</td>
<td>1</td>
<td>(0.8)</td>
</tr>
<tr>
<td>11 or more</td>
<td>6</td>
<td>(4.5)</td>
</tr>
<tr>
<td>14. How many of these days missed were because of your chest pain?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>N/A</td>
<td>112</td>
<td>(83.5)</td>
</tr>
<tr>
<td>None</td>
<td>18</td>
<td>(13.6)</td>
</tr>
<tr>
<td>1-2</td>
<td>2</td>
<td>(1.5)</td>
</tr>
<tr>
<td>3-5</td>
<td>1</td>
<td>(0.8)</td>
</tr>
<tr>
<td>6-10</td>
<td>0</td>
<td>(0.0)</td>
</tr>
<tr>
<td>11 or more</td>
<td>1</td>
<td>(0.8)</td>
</tr>
<tr>
<td>15. Are you happy with the medical care you received for your chest pain?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>120</td>
<td>(89.6)</td>
</tr>
<tr>
<td>No</td>
<td>14</td>
<td>(10.4)</td>
</tr>
<tr>
<td>16. Is there anything further you would like to have done about your chest pain?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>43</td>
<td>(32.1)</td>
</tr>
<tr>
<td>No</td>
<td>91</td>
<td>(67.9)</td>
</tr>
</tbody>
</table>
sports and exercise activities; and, 42 (31.3%) reported effects on social activities.

**Employment**: Ninety-four (70.1%) subjects were working prior to the onset of chest pain. Of these, 28 (29.8%) reported that they had gone to lighter duties or stopped working since the onset of chest pain. The majority (21/28 or 75.0%) indicated that the change was made on the basis of chest pain. Of those individuals working during the month prior to being interviewed (n = 77), 22 (28.6%) reported missing at least one day of work. Four (5.2%) attributed their absenteeism to chest pain.

**Chest pain attributions**: Half of the respondents (67 or 50.0%) indicated that they did not know the cause of their chest pain. Other frequent attributions for chest pain were "heart" in 25 or 18.7% of subjects, and "stress" or "nerves" in 23 or 17.2% of subjects.

**Medical care**: The majority of the respondents (120 or 89.6%) reported that they were satisfied with the medical care that they had received for their chest pain. However, 43 (32.1%) indicated that they would like something further done about the pain.

In summary, a significant and seemingly unnecessary amount of illness behaviour was reported by the subject sample, as measured by reports of continued chest pain, cardiac medication ingestion, visits to physicians made on the basis of chest pain, changes in employment, and limitations on activities. In the next section, the relationships among measures of illness and certain demographic variables are examined. These analyses were conducted in order to determine what variables are associated with illness behaviour and to determine whether those
variables identified are consistent with The Disease/Illness Distinction Model.

Relationships among Measures: Predictors of Illness Behaviour

Chi-square tests of independence were performed to determine possible predictors of illness behaviour. In Tables 5-10, frequency distributions of illness measures are presented as a function of frequency of cardiac medication use, attributions for chest pain, frequency of chest pain, gender and age.

Cardiac medication use was related to self-reported illness (see Table 5). Individuals taking cardiac medication for their chest pain were more likely than those not taking cardiac medications to report job changes, limitations on household, exercise and social activities, and visits to physicians, both general and those made on the basis of chest pain.

Analyses also revealed that subjects taking cardiac medications were significantly more likely than subjects not taking cardiac medications to report cardiac attributions for chest pain, $X^2 (1) = 29.36, p < .001$. Of subjects using cardiac medications, almost half ($n = 18$ or 46.2%) indicated cardiac attributions for chest pain. Only seven or 7.4% of those subjects not using cardiac medications attributed their chest pain to heart problems.

Finally, analyses of medication data revealed that subjects taking cardiac medications were more likely to report chest pain that occurred at least once a week (including "more than once a day" and "more
Table 5

Frequency Distributions of Illness Measures by Cardiac Medication Use

<table>
<thead>
<tr>
<th>Cardiac medication use</th>
<th>Job change</th>
<th>House/yard work</th>
<th>Sports/exercise</th>
<th>Social activities</th>
<th>For all reasons</th>
<th>For chest pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>On cardiac medication</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td>Not on cardiac medication</td>
<td>Yes (10)</td>
<td>No (12)</td>
<td>Yes (26)</td>
<td>No (13)</td>
<td>Yes (25)</td>
<td>No (14)</td>
</tr>
<tr>
<td>x²</td>
<td>4.28</td>
<td>16.36</td>
<td>18.60</td>
<td>17.75</td>
<td>6.19</td>
<td>5.79</td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>p</td>
<td>.05</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>.01</td>
<td>.025</td>
</tr>
</tbody>
</table>

Job change measure includes data from only those subjects working for income prior to the onset of chest pain (n = 94), whereas all other measures include data from all participants (n = 134). Job change = gone to lighter duties, stopped working since onset of chest pain.

Visits made in the six months prior to data collection.
than once a week but less than daily") than those not taking cardiac medications, \(X^2(1) = 5.05, p < .025\). Of those taking cardiac medications for chest pain, 14 (35.9\%) reported chest pain at least once a week, whereas only 16 or 16.8\% of those not taking cardiac medications for chest pain reported pain of comparable frequency.

The data also indicated that both chest pain attributions and frequency of chest pain were related to self-reported illness (see Tables 6 and 7). Subjects with cardiac attributions were significantly more likely than subjects with non-cardiac attributions to report limitations on household, exercise and social activities, and visits to physicians made on the basis of chest pain. Approximately 80\% of individuals with cardiac attributions reported limitations on house/yard, sports/exercise, or social activities compared to approximately 24\% of subjects who either did not know the cause of their chest pain or attributed it to stress or nerves. Similarly, subjects with more frequent chest pain were more likely to report limitations on the three types of activities and physician visits made on the basis of chest pain than subjects with less frequent chest pain. In addition, frequency of chest pain was also positively related to job changes since the onset of chest pain.

Analyses revealed that proportionately more females than males reported limitations on house/yard work and exercise/sports activities (see Table 8). Women were also more likely to be on cardiac medications than men, \(X^2(1) = 5.29, p < .025\) (see Table 9). However, women were no more likely than men to report chest pain, \(X^2(1) = 3.15, \text{n.s.}\), nor were they more likely than men to have more frequent chest pain, \(X^2(4) = 8.91\),
<table>
<thead>
<tr>
<th>Symptoms</th>
<th>Job change</th>
<th>House/yard work</th>
<th>Sports/exercise</th>
<th>Social activities</th>
<th>For all reasons</th>
<th>For chest pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a</td>
<td>b</td>
<td>b</td>
<td>b</td>
<td>b</td>
<td>b</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Pain</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Heart</td>
<td>4</td>
<td>7</td>
<td>21</td>
<td>4</td>
<td>20</td>
<td>5</td>
</tr>
<tr>
<td>Other</td>
<td>24</td>
<td>59</td>
<td>31</td>
<td>72</td>
<td>27</td>
<td>82</td>
</tr>
<tr>
<td>X²</td>
<td>0.51</td>
<td>24.90</td>
<td>25.88</td>
<td>27.40</td>
<td>1.84</td>
<td>5.13</td>
</tr>
<tr>
<td>df</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>p</td>
<td>n.s.</td>
<td>.001</td>
<td>.001</td>
<td>.001</td>
<td>n.s.</td>
<td>.025</td>
</tr>
</tbody>
</table>

a Job change measure includes data from only those subjects working for income prior to the onset of chest pain (n = 94), whereas all other measures include data from all participants (n = 134). Job change = gone to lighter duties, stopped working since onset of chest pain.

b Visits made in the six months prior to data collection.

c "Other" = "stress/ nerves," "don't know," "smoking," and "lack of exercise."
Table 7

Frequency Distributions of Illness Measures by Chest Pain Frequency

<table>
<thead>
<tr>
<th>Frequency of chest pain</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Job change</td>
<td>House/yard work</td>
</tr>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>&gt;= once per day</td>
<td>5</td>
<td>4</td>
</tr>
<tr>
<td>&gt;= once per week</td>
<td>4</td>
<td>7</td>
</tr>
<tr>
<td>&gt;= once per month</td>
<td>9</td>
<td>8</td>
</tr>
<tr>
<td>&gt;= once per 6 months</td>
<td>5</td>
<td>15</td>
</tr>
<tr>
<td>Never</td>
<td>5</td>
<td>32</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>χ²</th>
<th>df</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>12.35</td>
<td>4</td>
<td>.01</td>
</tr>
<tr>
<td>42.47</td>
<td>4</td>
<td>.001</td>
</tr>
<tr>
<td>39.78</td>
<td>4</td>
<td>.001</td>
</tr>
<tr>
<td>27.03</td>
<td>4</td>
<td>.001</td>
</tr>
<tr>
<td>8.16</td>
<td>4</td>
<td>n.s.</td>
</tr>
<tr>
<td>4.09</td>
<td>4</td>
<td>.001</td>
</tr>
</tbody>
</table>

a Job change measure includes data from only those working for income prior to the onset of chest pain (n = 94), whereas all other measures include data from all participants (n = 134).

b Job change = gone lighter duties, stopped working since onset of chest pain.

Visits made on the six months prior to data collection.
Table 8

Frequency Distributions of Illness Measures by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Job change</th>
<th>House/yard work</th>
<th>Sports/exercise</th>
<th>Social activities</th>
<th>For all reasons</th>
<th>For chest pain</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td></td>
<td>(%)</td>
<td>(n)</td>
<td>(%)</td>
<td>(n)</td>
<td>(%)</td>
<td>(n)</td>
</tr>
<tr>
<td>Female</td>
<td>8</td>
<td>20</td>
<td>32</td>
<td>28</td>
<td>27</td>
<td>33</td>
</tr>
<tr>
<td>Male</td>
<td>20</td>
<td>46</td>
<td>20</td>
<td>54</td>
<td>20</td>
<td>54</td>
</tr>
</tbody>
</table>

\[ \chi^2 \]

0.00      10.30    4.76      3.50      1.11     2.02

df       1         1         1         1         1         1

p         n.s.      .005      .05       n.s.      n.s.      n.s.

a
Job change measure includes data from only those subjects working for income prior to the onset of chest pain (n = 94), whereas all other measures include data from all participants (n = 134). Job change = gone to lighter duties, stopped working since onset of chest pain.
Table 9

Frequency Distributions of Continued Reported Pain, Frequency of Pain, and Cardiac Medication Status by Gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Continued chest pain</th>
<th>Frequency of chest pain</th>
<th>Cardiac medication</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>&gt;= once per day (n)</td>
</tr>
<tr>
<td>Female</td>
<td>41</td>
<td>19</td>
<td>10</td>
</tr>
<tr>
<td>Male</td>
<td>40</td>
<td>34</td>
<td>6</td>
</tr>
</tbody>
</table>

\[x^2\] = 3.15 (Female), 8.91 (Male), 5.29 (Cardiac)

df = 1 (Female), 4 (Male), 1 (Cardiac)

p = n.s. (Female), n.s. (Male), .025 (Cardiac)
n.s. Age was not related to any of the illness measures as shown in Table 10.

In summary, four factors were associated with reported illness behaviour as measured by limitations on activities and/or physician visits for chest pain. These factors were cardiac medication use, cardiac attributions for chest pain, frequency of chest discomfort, and gender. Cardiac medication was also related to the presence of cardiac attributions for chest pain and frequency of chest pain.

Physician Questionnaires

Results of the Physician Questionnaire are presented in Table 11. The majority of physicians (86.6%) reported having seen their respective patients since the time of admission to coronary care and diagnosis of CPNYD. Of those, fewer than half (44.0%) reported continued chest pain in their patients. Sixteen percent of patients were reported by their physician to have been admitted to hospital again for chest pain.

In order to compare patient reports of continued pain with physician opinions, a measure of association was computed using the phi coefficient (Anderson and Scolve, 1978). Results are presented in Table 12. The data indicate a weak association between patient and physician reports, $\phi = .215$. Physician reports of continued chest pain in their patients' were not a good predictor of patient reports of continued pain. Forty-one percent (38 of 92) of physicians were incorrect in their estimation of continued pain in their patients.
Table 10

Frequency Distributions of Illness Measures by Age

<table>
<thead>
<tr>
<th>Age in years</th>
<th>Job change</th>
<th>House/yard work</th>
<th>Sports/exercise</th>
<th>Social activities</th>
<th>For all reasons</th>
<th>For chest pain</th>
</tr>
</thead>
<tbody>
<tr>
<td>26-35</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td>36-45</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td>46-55</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td>56-65</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td>66-75</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
<tr>
<td>76-85</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
<td>Yes (n)</td>
<td>No (n)</td>
</tr>
</tbody>
</table>

\[ \chi^2 = 8.07, 9.99, 7.65, 8.50, 4.96, 9.56 \]

<table>
<thead>
<tr>
<th>df</th>
<th>4 5 5 5 5 5</th>
</tr>
</thead>
<tbody>
<tr>
<td>p</td>
<td>n.s. n.s. n.s. n.s. n.s. n.s.</td>
</tr>
</tbody>
</table>

a  
Job change measure includes data from only those subjects working for income prior to the onset of chest pain (n = 94), whereas all other measures include data from all participants (n = 134). Job change = gone to lighter duties, stopped working since onset of chest pain.

b  
Visits made in the six months prior to data collection.
Table 11

Frequency Distribution: Retrospective Chest Pain Study Physician Questionnaire

<table>
<thead>
<tr>
<th>Question</th>
<th>N</th>
<th>(%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Have you seen him/her since that date?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Yes</td>
<td>168</td>
<td>(86.6)</td>
</tr>
<tr>
<td>No</td>
<td>18</td>
<td>(9.3)</td>
</tr>
<tr>
<td>No record of patient</td>
<td>8</td>
<td>(4.1)</td>
</tr>
<tr>
<td>2. If yes, in your opinion, what is her/her current state of health?</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Excellent</td>
<td>16</td>
<td>(9.5)</td>
</tr>
<tr>
<td>Very good</td>
<td>43</td>
<td>(25.6)</td>
</tr>
<tr>
<td>Good</td>
<td>73</td>
<td>(43.4)</td>
</tr>
<tr>
<td>Fair</td>
<td>26</td>
<td>(15.5)</td>
</tr>
<tr>
<td>Poor</td>
<td>8</td>
<td>(4.8)</td>
</tr>
<tr>
<td>Missing</td>
<td>2</td>
<td>(1.2)</td>
</tr>
</tbody>
</table>
| 3. Since the above hospitalization date, does this person continue to report chest pain?
| Yes                                                                      | 74   | (44.0) |
| No                                                                       | 93   | (55.4) |
| Missing                                                                  | 1    | (0.6)  |
| 4. How often has (patient’s name) been admitted to hospital again for chest pain?  |
| Don’t know                                                               | 5    | (3.0)  |
| None                                                                     | 136  | (80.9) |
| 1-2 times                                                                | 21   | (12.5) |
| 3-5 times                                                                | 5    | (3.0)  |
| 6 or more times                                                          | 0    | (0.0)  |
| Missing                                                                  | 1    | (0.6)  |
Table 12

Frequency Distribution Comparing Physician and Subject Reports of Continued Chest Pain

<table>
<thead>
<tr>
<th>Continued pain as reported by physician</th>
<th>Continued pain as reported by subject</th>
</tr>
</thead>
<tbody>
<tr>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Yes</td>
<td>31</td>
</tr>
<tr>
<td>No</td>
<td>28</td>
</tr>
<tr>
<td></td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>23</td>
</tr>
</tbody>
</table>

$\phi = .215$
Discussion

The results of this study suggest that there is a significant degree of illness behaviour in patients whose chest pain is not likely to be of cardiac origin, and which poses no significant risk to the patient from a statistical or clinical standpoint. Several variables were found to be related to level of illness: cardiac medication use, chest pain attributions, chest pain frequency, and gender. These data provide support for the Disease Illness Distinction Model and the role of learning and cognitions in the development and maintenance of IB. More specifically, the data suggest three conclusions: Patient attributions for chest pain mediate illness behaviour and cognitions. Physician behaviour, specifically cardiac medication prescriptions, often facilitates disease attributions and related illness behaviour. Finally, the data suggest that physicians are often unaware of symptoms and related illness behaviour in their patients.

Illness behaviour data from this study were comparable in most respects to those collected in the Ockene et al. (1980) and Lavey and Winkle (1979) studies (see Table 13). However, findings of the present study differ from those of the Ockene et al. (1980) study in one respect. Despite similar follow-up times between the two studies (mean = 16 months), reported frequency of medical consultations at follow-up differed. In the Ockene et al. study (1980), visits to physicians decreased significantly after coronary angiography had been performed, from a mean of 3.3 visits in the year prior to angiography, to 1.6 in the
Table 13
A Comparison of Disability Data from three Studies of Individuals with Chest Pain That was Unaccounted for by a Disease Process

<table>
<thead>
<tr>
<th>Disability measure</th>
<th>Retrospective study</th>
<th>Lavey and Winkle (1979)</th>
<th>Ockene et al. (1980)</th>
</tr>
</thead>
<tbody>
<tr>
<td>% of S's</td>
<td>% of S's</td>
<td>% of S's</td>
<td></td>
</tr>
<tr>
<td>Continued pain</td>
<td>60%</td>
<td>87%</td>
<td>70%</td>
</tr>
<tr>
<td>Cardiac attributions for pain</td>
<td>19%</td>
<td>---</td>
<td>44%</td>
</tr>
<tr>
<td>Medication for chest pain</td>
<td>36%</td>
<td>56%</td>
<td>---</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>16%</td>
<td>29%</td>
<td>25%</td>
</tr>
<tr>
<td>Nitrates</td>
<td>21%</td>
<td>33%</td>
<td>25%</td>
</tr>
<tr>
<td>Limitation on routine daily activities</td>
<td>39%</td>
<td>40%</td>
<td>74%</td>
</tr>
<tr>
<td>Limitations on work activities for income</td>
<td>a</td>
<td>b</td>
<td>b</td>
</tr>
</tbody>
</table>

Note. (---) indicates that data were not reported.

a Went to lighter duties/stopped work because of chest pain.
b Complete inability to work at follow-up.
year before follow-up. While pre-admission data were not available in the present study, subjects reported a mean of 7.0 visits to physicians in the year prior to data collection, more than four times that reported in the Ockene et al. (1980) study.

Individuals in the Ockene et al. (1980) study had undergone the definitive test for coronary artery disease and had been told their hearts were normal. It follows that these individuals may have felt more hesitant to go to their physician about chest pain following negative angiographic results. On the other hand, in this study, coronary angiography had not necessarily been performed. While the feedback delivered to the patients regarding their conditions and prognosis are unknown and likely varied considerably, the tendency on the part of the patient to continue to seek medical advice until a definitive diagnosis is provided is not surprising. Furthermore, subjects in the present study lived in Ontario, Canada where medical care is covered under a health insurance plan, whereas subjects in the Ockene et al. (1980) study lived in the United States where health care is generally paid for by the individual.

In the Lavey and Winkle (1979) study, 82% of subjects reported that they continued to see a physician "regularly" for chest pain complaints, and 93% of subjects reported at least one hospital admission or emergency room visit in the follow-up period. Differences between results of the Ockene et al. (1980) and Lavey and Winkle (1979) studies may be attributable to a longer mean follow-up time in the Lavey and Winkle (1979) study (3 1/2 years) and to possible differences in patient
treatment following catheterization. Subjects in the Ockene et al. (1980) study were reportedly told that their hearts were normal and that there was no reason for limitations on activities. The post-catheterization message to patients in the Lavey and Winkle (1979) study was not described, but the authors state that it was not consistent across subjects. It is possible that with the passage of time and the continued experience of chest pain, an individual's inclination to seek medical care increases regardless of previous reassurance, as suggested by the Lavey and Winkle (1979) data.

A third factor that might account for these differences is source of data. Data on the use of medical facilities from this study and those of Lavey and Winkle (1979) were self-report and may have been inflated as a result of memory bias (Verbrugge, 1980). In the Ockene et al. (1980) study, it is not clear whether physician data were obtained from self-report or from medical records, in which case data may be more valid.

The primary conclusions drawn from the present study are that beliefs and attitudes held by patients and physicians are important in the development and maintenance of illness cognitions and behaviour. The data support the role of patient cognitions in illness behaviour in three ways. First, patients with chest pain and a diagnosis of "chest pain of uncertain etiology" do not have a clear understanding of the cause of their chest pain and, given continued pain, are likely to persist in their efforts to understand the nature of their chest pain through subsequent visits to physicians. In this study, approximately 65% of
subjects with continued pain reported repeat visits to physicians for chest pain following the initial diagnosis of chest pain of uncertain etiology.

Second, avoidance behaviour and self-imposed limitations on activities are believed to have a reinforcing effect through decreases in fear and anxiety and related symptoms. Over fifty percent (50-63%) of those with continued pain reported limitations on routine daily, exercise-sports, or social activities; 30% of subjects working reported job changes since the onset of pain.

Third, cardiac attributions are believed to facilitate the development of IB because of the common belief that limitations on activities are indicated given a diagnosis of cardiac disease. In this study, subjects reporting cardiac attributions for chest pain were more likely to report limitations on activities, job changes, and physician visits made on the basis of chest pain, than those with other types of attributions. It is difficult to assess how these results compare to data collected by Ockene et al. (1980) and Lavey and Winkle (1979) because in those studies, illness behaviour was examined only as a function of continued pain, and not as a function of cardiac attributions or other cognitive variables.

Data from the present study also indicate that reported symptom frequency may be a determinant of illness behaviour. Subjects with more frequent chest pain were more likely to report limitations on activities and visits to physicians than those with less frequent pain. Furthermore, frequency of chest pain also was related positively to use
of cardiac medication. While it follows that a prescription for cardiac medication may lead to the belief that one has a "heart condition" and related fears which may result in decreased activity, the relationship between use of cardiac medication and chest pain frequency remains unclear.

The results suggest two possible explanations. The first is that cardiac medications may be prescribed on the basis of symptom frequency in individuals with unexplained chest pain, despite the absence of evidence for heart disease. Second, the data suggest that the medications are not effective, assuming that they were prescribed for the purpose of decreasing pain. These explanations are consistent with previous research indicating that cardiac medication prescriptions are common for individuals with unexplained chest pain (Bemiller et al., 1973; Kemp et al., 1973; Lavey and Winkle, 1979; Waxler et al., 1971). Furthermore, the efficacy of cardiac medications used to treat individuals with unexplained chest pain has not been established. Results of the one controlled test of the efficacy of propranolol, a beta-blocking agent, in treating chest pain in NCA's, indicated that only 23% of patients reported improvement in their chest pain (Amsterdam, Gorlin, and Wolfson, 1969).

Results of the present study suggest that physician management may contribute to IB in two ways. The first is through cardiac medication prescriptions and the second is through inadequate communication with patients. Cardiac medication prescriptions and intake are believed to confirm for patients that they have cardiac disease, and
reinforce subsequent fear and avoidance behaviour. The data are consistent with these assumptions. Subjects taking cardiac medications for chest pain were more likely than those not taking cardiac medications to report cardiac attributions for chest pain, visits to physicians, and limitations on work, household, exercise and social activities.

The data also suggest that physicians may be unaware of their patients' chest pain and related disability. Consistent with the results of Ockene et al. (1980), physician and patient reports of continued pain were discrepant in the present study. Only half of those who reported chest pain were believed to have pain by their physician. Furthermore, it seems likely that physicians who are unaware of their patients' symptoms are also unaware of and therefore cannot address, associated illness behaviour.

In summary, results of the study indicate that there exists a population of individuals with no defined cardiac disease who report unnecessary illness behaviour associated with chest pain, as measured by inappropriate medication use and visits to physicians, reported job changes and limitations on activities. The data also suggest several determinants of illness behaviour in this population including symptom frequency and cardiac attributions, and medication ingestion. Three primary conclusions were drawn. First, the behaviour of these individuals is influenced by their cognitions and beliefs, specifically attributions relating to cardiac causes for symptoms. Second, it appears that illness cognitions and behaviours reported by these individuals are influenced by physician behaviour, primarily through medication
prescriptions. Third, physicians may also be contributing to illness behaviour by their lack of awareness of symptoms and related disability reported by their patients.
Chapter 4
INTRODUCTION
CHEST DISCOMFORT INTERVENTION STUDY

The Chest Discomfort Intervention Study was designed to examine the applicability of the Disease Illness Distinction Model. One purpose of the study was to test the efficacy of cognitive-behavioural interventions, presented in group education and individual treatment formats, when compared to two control conditions, a self-monitoring attention control and a wait list control. A second purpose was to examine the role of cognitions in illness behaviour. The aim of the cognitive-behavioural interventions was to decrease cardiac illness behaviour exhibited by individuals with chest discomfort and either MVP and no other known cardiac abnormalities, or NCA and no objective evidence of ischemic heart disease or MVP. It was hypothesized that both the individual and group cognitive-behavioural programmes would produce significantly greater decreases in illness behaviour compared to the wait list control and the self-monitoring attention control.

Cardiac illness behaviour is typically treated in exercise-oriented cardiac rehabilitation programmes (Amsterdam, Wilmore, and DeMaria, 1977; Naughton, Bruhn, and Lategola, 1968). While the illness behaviour displayed by individuals with MVP and NCA is similar to that of individuals with significant, defined, cardiac disease, it is generally
the latter population (e.g., individuals who have had a myocardial infarction) who have access to rehabilitation programmes (Greenland and Chu, 1988). These programmes are based on the assumption that physical fitness training improves cardiovascular health and that once fit, individuals will feel healthier and as a result resume social and routine daily activities (Levenkron et al., 1985). Within the past fifteen years, cardiac rehabilitation programmes have incorporated additional components such as cardiac education and psychosocial counselling (Bloom, 1979).

In a review of 80 cardiac rehabilitation programmes, Greenland and Chu (1988) concluded that participation in exercise-oriented programmes increases exercise capacity 15-25% over that which would occur spontaneously. This was the only benefit that was consistently reported. Support was not found for the utility of other components of cardiac rehabilitation programmes, such as cardiac education and psychosocial support and counselling. It is difficult to determine from these studies whether MVP's or NCA's would benefit from cardiac rehabilitation programmes. However, the Disease Illness Distinction Model would predict that physical exercise alone may not necessarily be sufficient to decrease the degree of IB in these populations, because it would not deal adequately with many of the beliefs and attributions relating to symptom appraisal.

A review of the IB literature revealed no studies which examined the efficacy of cognitive-behavioural interventions applied to cardiac IB. Because individuals with chest discomfort are considered a
subset of individuals with chronic pain, studies that examined the utility of cognitive-behavioural interventions with other chronic pain populations will be discussed. Interventions that are based on operant learning principles are also of interest because of their reported efficacy in dealing with IB associated with chronic pain (Blackwell, Galbraith, and Dahl, 1984; Fordyce et al., 1973). Cognitive-behavioural interventions for chronic pain have typically been implemented in group formats in outpatient settings (Herman and Baptiste, 1981; Turner, 1982), while operant interventions are generally carried out in individual formats in inpatient settings (Fordyce et al., 1973). Levenkron et al. (1985) reported a case study of an operant approach to cardiac IB (see below).

Typical cognitive-behavioural programme components include education regarding the physiology of pain, identification of pain-related behaviours, pain reinterpretation techniques, relaxation training, problem solving, goal setting, and assertiveness training (Herman and Baptiste, 1981; Large, 1985; Moore and Chaney, 1985, and Turner, 1982). Examples of outcome measures used to evaluate the efficacy of cognitive-behavioural interventions are presented in Table 14.

Results of controlled studies evaluating cognitive-behavioural interventions indicate decreases in subjective pain ratings and improvements in scores on the Beck Depression Inventory (Beck, Ward, Mendelson, Mock, and Erbaugh, 1961), and the Depression Scale of the Minnesota Multiphasic Personality Inventory (MMPI) (Hathaway and
<table>
<thead>
<tr>
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</tr>
</thead>
<tbody>
<tr>
<td>VAS pain ratings*</td>
<td>VAS pain ratings*</td>
<td>VAS pain ratings</td>
<td>VAS pain ratings*</td>
<td></td>
</tr>
<tr>
<td>Beck Depression Inventory*</td>
<td>Beck Dep. Inven.*</td>
<td>Beck Dep. Inven.</td>
<td>NHPI Depression,*</td>
<td>Hypochondriasis*, Hysteria* scales</td>
</tr>
<tr>
<td>Medication intake</td>
<td>Medication intake</td>
<td>Medication intake</td>
<td>Medication intake</td>
<td></td>
</tr>
<tr>
<td>Locus of control scale</td>
<td>Sickness Impact Profile*</td>
<td>Illness Behaviour Questionnaire</td>
<td>Medication intake</td>
<td></td>
</tr>
<tr>
<td>Self-reported &quot;up time&quot;</td>
<td>Self-ratings of improvement (11 areas)</td>
<td>State-trait anxiety Questionnaire</td>
<td>Physician visits/ hospital admits for all reasons</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Eysenck Personality Inventory</td>
<td>Sicknes Impact Profile</td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td>Illness Self-concept Repertory Grid*</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* denotes significant pre-post differences between or within groups (Herman and Baptiste, 1981; Large, 1985; Moore and Chaney, 1985; Turner, 1982).
McKinley, 1940) (Moore and Chaney, 1985; Turner, 1982). Pain medication intake is generally the only behavioural measure of illness that is collected routinely. In two of the four studies reviewed, reported medication intake did not change from pre to post intervention (Herman and Baptiste, 1981; Large, 1985). In the remaining two studies, medication intake was not analyzed either because it was so "slight" (Turner, 1982) or because of the discrepancies among subject and physician reports of medication use, and pharmacy records (Moore and Chaney, 1985).

Inpatient, operant-based programmes have been found to be effective in reducing pain medication intake and increasing activity level. This conclusion was based on a review of 29 behavioural programmes for chronic pain patients (Linton, 1986). Typical programme components include withdrawal of positive reinforcement of illness behaviours, introduction of positive reinforcement for "well" behaviours, quota-based exercise programmes, and skills training in areas of behavioural deficits (Fordyce et al., 1973). With the exception of subjective pain ratings, dependent measures tend to be more behavioural than those used in CB interventions. Measures of pain medication intake, activity level, and use of medical care facilities are used routinely (Anderson, Cole, Gullickson, Hudgens, and Roberts, 1977; Fordyce et al., 1973; White and Sanders, 1985).

Levenkron et al. (1985) reported a case study in which an individual with disabling chest pain and no defined disease (NCA) was successfully treated in an inpatient, operant-based rehabilitation
programme. A behavioural analysis was first carried out to determine the relationship between the patient's illness behaviour and the reinforcing consequences. The patient then underwent six weeks of behaviourally-oriented, inpatient rehabilitation. The patient reportedly returned to work and remained "free from disability" at a one year follow-up. Only two episodes of chest pain were reported by the patient in the one year following treatment. Increases in activity level which occurred over the course of treatment were reportedly maintained at a one year follow-up. Depressive symptoms, sleep disturbance and "cognitive impairments" were reported to have "resolved" (Levenkron et al., 1985). However, it is not clear how these variables were measured or operationally defined.

In summary, there appears to be only one report in the literature of the success of an inpatient, operant-based intervention applied to cardiac IB in a patient with no defined disease. The efficacy of traditional, exercise-oriented cardiac rehabilitation programmes in treating cardiac IB without significant cardiac disease is unknown. Results of chronic pain interventions were examined for two reasons. One, there is a lack of outcome data on interventions applied to individuals with cardiac IB and no significant disease; and two, this population is considered a subset of chronic pain populations.

While results of relevant studies suggest improvements in IB following intervention, the outcomes are difficult to compare because of differences in the types of dependent measures used. Data from studies evaluating cognitive-behavioural interventions for chronic pain suggest that there are improvements in subjective report measures of illness,
such as pain level and mood. In contrast, outcome data from operant programmes indicate changes in more overt behavioural measures of illness behaviour, such as medication intake and activity level. There are at least three reasons why these differences occurred. The differences in types of outcome measures may reflect differences in goals of the two types of interventions. Goals of operant-based interventions tended to be behavioural change, and goals of cognitive-behavioural programmes, while not explicitly stated in the studies reviewed, tended to be changes in cognitions and subjective states. It is also possible that the results of the cognitive-behavioural and operant programmes were similar, but that the instruments used did not measure the relevant changes. A third and more likely explanation is that the differences in behavioural measures found in the operant programmes were a result of the greater degree of experimenter control allowed in inpatient programmes, in which there is more control over the subjects' environment than in outpatient interventions.

In a cognitive-behavioural analysis, both cognitions and behaviours are considered to be important indices of improvement. Measures of both illness cognitions and behaviours are used in the Chest Discomfort Intervention Study for three reasons: (a) to test the efficacy of specific, applied, cognitive-behavioural and operant strategies, (b) to enable comparisons with other studies in which one or the other type of measure is used, and (c) to examine the relationships between illness cognitions and behaviours. With regard to (c), previous research has focussed on two issues: the reliability of self-reported behavioural
data, and the relationship between what individuals say about their symptoms (how severe and limiting they are) and what they do in response to them (Fordyce et al., 1981, 1984; Linton, 1985).

It has been argued that individuals are not necessarily objective about their own behaviour (Cott, 1987a, 1987b; Nisbett and Ross, 1980). In applied research, this suggests that self-report measures, particularly those obtained from interviews and questionnaires, should not be assumed to provide reliable information about behaviour.

One method of investigating the reliability of self-report measures is to examine them in relation to more objective data obtained from observers, medical records, and automated devices. The data provide support for the argument that self-report measures are not as accurate as other, more objective measures. Self-report and objective data from other sources have been found to be discrepant for medication intake (Moore and Chaney, 1985; Ready, Sarkis and Turner, 1982), physician visits (Verbrugge, 1980), and activity level (Kremer, Block, and Gaylor, 1981; Sanders, 1983b).

A second method of examining the reliability of self reports is to compare interview or questionnaire data to self-monitoring data. While data from both sources are based on self-report, self-monitoring (SM) is generally believed to provide more reliable information than questionnaires (Q) because it relies less on long term memory (Nelson, 1977; Verbrugge, 1980). In a review article on self-monitoring, Verbrugge (1980) concluded that individuals underestimate symptom frequency in interviews compared to self-monitoring. No data were found
comparing questionnaire/interview and self-monitoring data on medication intake, activity level, or physician visits.

In the Chest Discomfort Intervention Study, an attempt to validate the self-report data obtained from questionnaires was made through the collection of comparable data from self-monitoring. Fordyce et al. (1984) state that self-monitoring records provide a viable alternative when more objective data from observers are not feasible. These comparisons also provided information relating to the relationships among symptom, cognitive, and behaviour factors in IB.

Most chronic pain patients attribute their limitations on physical activity to pain and the belief that activity will increase pain (Fordyce et al., 1981). Similarly, there is a common belief in rehabilitation medicine that pain intensity is related to degree of functional or physical limitation and activity level (Fordyce et al., 1984). However, data from recent chronic (back) pain studies suggest that what individuals say about their pain is not related to how they respond to it (Fordyce et al., 1981; Linton, 1985; Maliboff, Cohen, Swanson, Bonebakker, and McArthur, 1985). In other words, reports of pain severity and statements about how limiting pain is are unrelated to measures of illness behaviour such as activity level, medication intake, and visits to physicians.

Reported pain level (primarily back pain) has been found to be positively related to ratings of degree of limitations or interference with activity; however, neither ratings of pain level nor ratings of limitations on activities have been found to be related to amount of time
spent on work, household and recreational activities, or on physical ability, such as performance on an "endurance walk" (Fordyce et al., 1984; Naliboff et al., 1985). Similarly, Linton (1985) found that pain ratings were related to ratings of ability to participate in daily activities, but were not related to frequency of specific activities or activity level as recorded in self-monitoring. Furthermore, pain ratings were also found to be unrelated to medication intake data from self-monitoring, and health care utilization as measured by patient reports of number of years of treatment, visits to emergency rooms, and pain-related hospitalizations (Fordyce et al., 1984).

The finding of the absence of a relationship between level of reported pain and related behaviour is not inconsistent with a cognitive-behavioural formulation of illness. As suggested in Chapter 3, the meaning or significance of symptoms may be more important to an individual's response than the perceived level of pain.

Fordyce et al. (1981) suggest that learning factors can account for the discrepancies between what individuals say and do about their pain. They state that the two may be related initially following the nociceptive stimulus, but that the relationship may change over time as observable or "activity" behaviours come under the influence of other factors such as environmental contingencies (Fordyce et al., 1981).

Changes in beliefs may also account for these discrepancies, as beliefs about pain and how limiting it is are also likely under the influence of environmental determinants, such as physician advice and behaviour, as suggested in Chapter 3. For example, individuals who are
told to "take it easy" or "stop when pain occurs" may be more likely to perceive their pain as more intense and more limiting because they interpret these recommendations to mean that pain means harm or threat of physical damage. Similarly, with respect to observable behaviour, Linton (1985) suggested that avoidance of activities may be more related to fear and anxiety about pain than to a direct relationship between pain and activity.

In Results 3 (see Chapter 8), the relationships between symptom variables, and illness cognitions and behaviours are examined in a chest discomfort population. It was anticipated that illness cognitions, such as beliefs about limitations, would be related to illness behaviours, such as medication intake. Furthermore, it was anticipated that symptom variables, such as frequency and intensity, would not necessarily be related to illness behaviours, because (a) it is the interpretation of symptoms that is believed to be more important to one's response, rather than symptom characteristics themselves, and (b) changes in behaviours and cognitions may occur independently of changes in the subjective experience of symptoms (Fordyce et al., 1981)

The Chest Discomfort Intervention Study, described in Chapters 4-8, is a test of the efficacy of cognitive-behavioural interventions applied to IB with chest discomfort and no significant cardiac disease. Group education and individual treatment formats were compared to determine whether one format was more effective. Turk et al. (1983) stated that group and individual cognitive-behavioural interventions are equally effective. While an individual format allows for more attention
and a programme tailored to the individual, group formats may be more efficient and cost effective in terms of therapist time. The group format may also allow for greater self-disclosure, public commitment, possibility of group cohesiveness, and group pressure to change beliefs, attitudes, and behaviours (Herman and Baptiste, 1981).

The cognitive-behavioural interventions used in the study are educative rather than treatment oriented. As discussed in Chapter 2, the learned, non-medical components of IB are more effectively dealt with using interventions that are educative because they encourage the individual to examine alternative, non-medical explanations for their behaviour, while emphasizing an internal locus of control (Rotter, 1966), skill acquisition and problem solving. The locus of control construct is a generalized expectation for control over reinforcement. It involves the perception that the positive and/or negative events in one's life are either a consequence of one's behaviour and under personal control (an internal locus of control), or the perception that events are independent of one's own behaviour, and beyond personal control (an external locus of control) (Rotter, 1966; Rotter, 1975). The significance of the concept from a behavioural point of view is that "internals" are more likely than "externals" to engage in problem-solving and goal-oriented behaviour as a result of their belief in their ability to control their environment.

The focus of the interventions is to train behavioural and cognitive skills that lead to changes in respondent and operant illness behaviour, and cognitive structures (e.g., belief systems and attributions related to chest discomfort). Goals of intervention include
changes in activity level and pattern such as decreased avoidance behaviour, and increased ability to carry out routine daily, work and exercise activities; and changes in cognitions and affect relating to chest discomfort such as changes in disease attributions for chest discomfort, decreased fear, and levels of perceived illness.

Unlike the Retrospective Chest Pain Study, specific medical screening criteria were employed. Two populations reporting the presence of disabling chest discomfort were investigated: (a) individuals with diagnosed mitral valve prolapse (MVP) and no other identified cardiac abnormality, and (b) individuals with normal coronary arteries and no objective evidence of cardiac disease or MVP. These two populations were selected because in both, high levels of illness behaviour have been documented that are not accounted for by the degree or presence of disease (Lavey and Winkle, 1979; Ockene et al., 1980; Retchin et al., 1986). In neither population are there any behaviours that are contraindicated from a disease standpoint. Therefore, any illness behaviour reported by these individuals is unnecessary. While chest discomfort is a potentially life-threatening symptom and may easily lead to "harm" attributions and related illness behaviour, it is typically indicative of "hurt" only in these populations. The potential for learning and cognitive factors to intervene in the development of illness behaviour is therefore great.
Control procedures. The self-monitoring attention control condition controlled for the demand characteristics of being in such a study, attention, and the beneficial effects of self-monitoring (Nelson, 1977). The wait list control condition (Moore and Chaney, 1985; Turner, 1982) controlled for motivation to participate in the study and the effects of spontaneous improvement.

Hypotheses

There is no difference in the efficacy of cognitive-behavioural interventions in reducing the degree of illness behaviour, symptomatology, and related disability when applied to individuals having chest discomfort with (a) mitral valve prolapse and no other known cardiac disease (MVP) or (b) normal coronary arteries and no known cardiac disease (NCA).

Furthermore, there are no differences in the efficacy of group education and individual cognitive-behavioural interventions in reducing illness behaviour, symptomatology, and related disability in individuals having chest discomfort with MVP or NCA.

Finally, the cognitive-behavioural interventions are more effective than the control conditions at reducing illness behaviour, symptomatology, and related disability in individuals having chest discomfort and MVP or NCA.
Chapter 5

METHOD

CHEST DISCOMFORT INTERVENTION STUDY

Research Design

The design of the study was a 2 (population: MVP vs NCA) x 4 (treatment) x 2 (repeat: pre vs post) repeated measures factorial design. The four levels of the treatment factor were (a) "individual treatment" (IT), (b) "group education" (GE), (c) "self-monitoring attention control" (SMAC), and (d) "wait list control" (WLC). For ethical reasons, WLC subjects were crossed over into individual treatment following completion of the wait list period.

Instruments

In the Pre Intervention and Post Intervention Questionnaires (see Appendix B), the following information was collected: (a) demographic information, (b) data pertaining to subjects' chest discomfort (type and frequency), (c) medication use (type and frequency), (d) use of health care services (visits to physicians and hospital admissions), (e) physical activity level, and (f) perceived limitations on activities and disability attributed to chest discomfort.

The Sessional Questionnaire (see Appendix B) was used to collect information on a weekly basis throughout the course of
intervention. The data requested in the Sessional Questionnaire were similar to that obtained in the Pre and Post-intervention questionnaires, with the exception of the demographic information.

The Health Locus of Control Scale (Wallston, Wallston, Kaplan, and Maides, 1976; see Appendix B) is a psychometric tool consisting of 11 items in a 6-point Likert format (Likert, 1932), pertaining to generalized expectancies regarding locus of control (Rotter, 1966) related to health. High scores are presumed to be indicative of greater externality, and "generalized expectancies that the factors that determine health are ones over which individuals have little control (i.e., external factors such as luck, fate, chance, or powerful others)" (Wallston and Wallston, 1981, p. 193). Low scores are presumed to be indicative of the belief that "the locus of control for health is internal and that one stays or becomes 'healthy or sick as a result of his or her own behaviour'" (Wallston and Wallston, 1981, p. 193).

The Physician Questionnaire (see Appendix B) was used to collect data before and after intervention from family doctors about their patients' chest discomfort, diagnosis, medication intake, use of health care services, and perceived degree of disability in patients that was attributable to chest discomfort.

The self-monitoring booklets (see Appendix B) were used to collect data before and after intervention on subjects' chest discomfort (type, intensity, duration), activity pattern, energy level, and medication intake. The procedure was also used as a clinical tool in the
GE, IT, and SMAC conditions to collect information pertaining to individuals’ symptoms and related behaviour.

**Subjects**

Subjects were 19 men and 85 women from Hamilton and Toronto, Ontario, reporting the presence of disabling chest discomfort. Age and duration of chest discomfort are presented in Table 15. Employment status is presented in Table 16. Subjects were recruited from the following sources over a three and a half year period, between November, 1982 and March, 1986: (a) physicians (N = 40), (b) self (responded to advertisement and radio requests) (N = 40), (c) hospital laboratories (catheterization lab: N = 7, echocardiogram lab: N = 13), and (d) other sources (N = 4).

**Subject criteria**

1. Disability: Reports of limiting or disabling chest discomfort (i.e., chest pain, pressure, palpitations, shortness of breath); degree of limitation / disability quantified by a composite measure derived from the 11 "disability and limitation" visual analogue scales in the Pre-intervention Questionnaire (Appendix B, see questions #20, 21, 23). Minimum criteria for acceptance into the study was a composite score of 110 or greater (i.e., average of at least 10 per scale). End points on the 100 mm scales were: 0 - not disabled/limited, 100 - totally disabled/limited;
Table 15

Pre-intervention Descriptive Statistics on Age and Duration of Chest Discomfort

<table>
<thead>
<tr>
<th>Statistic</th>
<th>a Duration of chest discomfort (years)</th>
<th>b Age in years</th>
<th>All subjects</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Males</td>
<td>F-males</td>
<td></td>
</tr>
<tr>
<td>N</td>
<td>102</td>
<td>19</td>
<td>84</td>
</tr>
<tr>
<td>Mean</td>
<td>4.8</td>
<td>36.7</td>
<td>42.8</td>
</tr>
<tr>
<td>SD</td>
<td>3.7</td>
<td>11.0</td>
<td>12.2</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.3</td>
<td>18</td>
<td>18</td>
</tr>
<tr>
<td>Maximum</td>
<td>10.8</td>
<td>61</td>
<td>67</td>
</tr>
<tr>
<td>Median</td>
<td>4.0</td>
<td>36</td>
<td>43</td>
</tr>
</tbody>
</table>

Data are missing on two subjects. Data are missing on one subject.
Table 16

Employment Status Before Intervention (N = 104)

<table>
<thead>
<tr>
<th></th>
<th>Working for Gainful Employment</th>
<th>Not Working*</th>
<th>Non-working</th>
</tr>
</thead>
<tbody>
<tr>
<td>Full-Time</td>
<td>39</td>
<td>21</td>
<td>4</td>
</tr>
<tr>
<td>Part-Time</td>
<td>21</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>60</td>
<td>4</td>
<td>40</td>
</tr>
<tr>
<td>% of Total</td>
<td>(38)</td>
<td>(20)</td>
<td>(38)</td>
</tr>
</tbody>
</table>

*Not Working = laid off, on temporary or permanent disability.
2. Attributions: Primary attribution regarding limitation or disability was chest discomfort (i.e., not other symptoms or medical condition);

3. Medical:

Diagnostic status: A clearly defined medical status of either (a) diagnosed mitral valve prolapse on 2-dimensional echocardiogram and no other known cardiac condition except benign arrhythmias, or (b) normal coronary arteries on coronary catheterization, normal 2-D echocardiogram and no known cardiac abnormalities except benign arrhythmias;

Optimal cardiac investigation: Chest discomfort assessed by a minimum of one cardiologist or internist;

Optimal medical treatment: Any and all non-cardiac medical conditions for which individual has been diagnosed and/or treated were under optimal medical treatment for a period of six months (e.g., diabetes mellitus, hypertension);

Medication: Stabilization must have been achieved if on any prescription medications (e.g., cardiac, psychiatric, gastro-intestinal or any that may have potential effects on chest discomfort);

Psychiatric care: If relevant, must have been ongoing for at least six months prior to entry into study;

Concurrence of family physician with participation in the study;

4. Language: Ability to read, write, and converse in English (i.e., correctly read aloud consent forms, read and complete screening questionnaires, and respond verbally to screening questions to the
screener's satisfaction);

5. Compliance: Completed two weeks of baseline self-monitoring.

Subject compliance. In order to increase compliance, subjects were given one Wintario lottery ticket for each two weeks of self-monitoring completed and handed in at the pre and post data collection periods. A similar procedure was employed with success by Norman, McFarlane, Streiner, and Neale (1982). This contingency was not in effect for self-monitoring that was completed during intervention.

Subject treatment. Treatment of subjects was in accordance with the ethical standards of McMaster University/University of Toronto and affiliated hospitals, Canadian Psychological Association and the American Psychological Association.

Procedure

Study protocol. A general overview of the study protocol is presented in Figure 1.

Recruitment protocols. Physician-initiated referrals: One source of patient entry was through family physician and specialist referrals. The initial step in obtaining physician-initiated referrals was the establishment of a network of physicians who were familiar with the study objectives and subject criteria. This was accomplished primarily through lectures and research seminars. All physicians in the Hamilton area were sent a brief description of the study and subject criteria, and a script to be followed when presenting the study to
Figure 1.

Study protocol.
Study Protocol

Initial contact
Purpose of study
(2-3 weeks) Obtain physician consent

Screening 1
Consent form
Medical release
Standard behavioural interview
Pre questionnaire
Pre self-monitoring
(1 week)

Screening 2
Self-monitoring review
Pre psychometric tests

[Medical review by cardiologist consultant]

(Pre self-monitoring collected) Additional medical tests (if necessary)

[Approve or reject subject Group assignment]

Contact re approval/rejection
(1-8 weeks)*

Intervention /
wait list period (16 - 32 weeks)

End intervention /
wait list period
questionnaire
Post psychometric tests self-monitoring

Wait list subjects into Individual Treatment questionnaire
Pre psychometric tests self-monitoring

Individual treatment (16 - 32 weeks)

Treatment ends
questionnaire
Post psychometrics self-monitoring

* S's begun Individual Treatment and Self-Monitoring Attention Control interventions within 1-3 weeks; Group Education S's waited until adequate numbers approved to fill group.
identified individuals (see Appendix C, Description of Study for Physicians, and Physician Script).

Referrals occurred in two ways: (a) Physicians first discussed the study with identified individuals and subsequently referred them to the study, or (b) physicians referred individuals to the study without having introduced the study to them. In the case of specialist referrals, concurrence from the family physician was obtained prior to any contact with the patient. In both cases, referrals were then contacted by telephone and a brief description of the study was read to them (see Appendix C, Script of Study Description for Physician-initiated Referrals) to determine their willingness to attend an informational and screening session. In the case of (b), individuals were first informed that their doctor had recommended them for the study.

Hospital laboratory referrals: The echocardiogram and cardiac catheterization laboratories of St. Joseph’s Hospital, McMaster University Medical Centre, the Hamilton General Hospital, and the Henderson General Hospital, all of Hamilton, and Toronto Western Hospital, Toronto, were either contacted by phone or visited on a regular basis to obtain the names of patients with either MVP or NCA diagnoses and their physicians. Potential MVP subjects were obtained from echocardiogram laboratories and NCA subjects, from coronary catheterization laboratories. Physicians of potential subjects were contacted to determine whether: (a) the patient met the medical criteria of the study, and (b) the physician would support participation in the study. If responses to both (a) and (b) were positive, an invitation to participate
in the study was made to the patient by either the physician or
investigator (see Appendix C, Script of Invitation to Participate in
Study for Laboratory Referrals). Concurrence with the patient's
participation in the study from the family doctor was required before any
contact was made with the patient. This method of recruitment was
discontinued May, 1985 because it failed to provide sufficient numbers of
subjects.

Direct recruitment through community promotion: Radio
advertisements and public service announcements, television interviews
with the investigator, and newspaper articles were used to inform the
general public of the study (see Appendix C, Community Promotion
Materials). Interested individuals were requested to call by telephone
for more information about the study. At the initial contact, a brief
description of the subject criteria and the study were read (see Appendix
C, Script of Study Description for Self-referrals). Names of family
physicians were obtained from those interested individuals who either
stated that they met the basic study criteria (e.g., had been diagnosed
MVP or NCA) or thought that they did, but were not certain. Physicians
were then contacted to ensure that the individual met the medical
criteria and to obtain agreement to proceed with the subject screening.

For all interested individuals, an appointment was arranged for
an informational screening session.

Screening. Session 1: The initial appointment took place
within three weeks of recruitment and was one and one half hours in
duration. Individuals were first informed of the experimental nature and
conditions of the study (see Appendix D, Script of Conditions of Study). The screening session ended at this point for individuals who indicated that they were no longer interested in participating in the study.

Individuals who agreed to proceed with the screening session signed consent and medical release forms (see Appendix D). A structured behavioural interview was conducted to obtain information regarding each individual's current level of functioning, general behavioural profile and symptom pattern, and response to symptoms (see Appendix D, Structure Behavioural Interview). Potential subjects provided demographic and illness behaviour data in the Pre-Intervention Questionnaire (see Appendix B) and were instructed to complete two weeks of baseline self-monitoring (see Appendix B, self-monitoring package). Baseline monitoring consisted of recording at hourly intervals the subjective magnitude of chest discomfort and energy level, and various aspects of behaviour during a normal or routine period. Subjects were requested to refrain from monitoring during periods of illness or when on vacation away from home or work because these were not considered to be representative of routine periods. The self-monitoring procedure was standardized for pre and post monitoring: all subjects received similar instructions and were asked to record similar types of information (see Appendix D, Self-monitoring Instructions, and Sample Data). If baseline self-monitoring was not completed, individuals were excluded from further participation in the study.

Individuals were informed that for the duration of the study, they were required to indicate any change in cardiac or medical status,
or any chest discomfort consultations and their outcomes, such as a change in medication regime. In order to facilitate compliance, subjects were reminded of this aspect of the protocol periodically throughout the course of intervention.

Session 2: One week after the initial screening appointment, a second screening session was conducted to inspect the first week of self-monitoring for compliance and proper recording, and to administer the psychometric test (Health Locus of Control Scale, see Appendix B). Duration of the session was about one hour. The purpose of the psychometric test and the administrative instructions were explained in both oral and written form using a standard script (see Appendix D, Script of Psychometric Test Instructions).

Individual errors and difficulties with self-monitoring which were observed after the first week of monitoring were identified and instructions provided for correction. If the first week of monitoring was not completed correctly, subjects were asked to begin again to obtain two consecutive weeks of baseline data. Subjects were required to return completed monitoring to the investigator by mail. A self-addressed, stamped envelope was provided. If the monitoring was not received within three weeks, the subjects were telephoned and requested to mail their books. Individuals who did not complete two weeks of baseline monitoring as requested were excluded from further participation in the study.

Medical screening: A standard letter of request (see Appendix D, Letter of Request to Physicians), signed medical release form, and Physician Questionnaire were sent to physicians. The information
requested from the physician included consultation notes regarding evaluation of chest discomfort, and diagnostic test reports of echocardiograms and/or coronary angiograms, and exercise stress tests. Medical information and questionnaires were collected by return mail. If the information was not returned within two weeks of the initial request, two telephone requests were made by the study secretary. If these were not successful, the information was collected by courier.

The cardiology consultant reviewed the relevant medical information to determine whether each subject met the medical criteria. If necessary, additional medical investigations were ordered to complete the diagnostic workup and ensure that the entrance criteria were met. Concurrence from the family physician was obtained prior to any additional medical investigations.

Within the next four to ten weeks, after all screening material was collected and reviewed, individuals were informed as to whether they had been accepted or rejected for participation in the study.

Subject assignment. Individuals meeting the inclusion criteria and willing to participate were assigned to one of the four conditions. Allocation to the four conditions, by diagnosis, was random with the following exceptions. Initially, subjects were randomly assigned to the GE, IT and SMAC conditions only. Assignment to the WLC condition was delayed because there was a question of whether adequate numbers of subjects could be recruited to fill the four cells; the other three groups were considered more important in addressing the hypotheses in question. At GE start-up times, consecutive subjects were assigned to
the GE condition because continuing with the standard procedure at those
times would have resulted in delaying the group start up for 12 months or
longer until adequate numbers \( n = 15 \) minimum were identified. This
procedure also was employed by Rush and Watkins (1981) in a study
comparing group and individual cognitive-behavioural therapy for
depression.

In the final stages of recruitment, subjects were no longer
allocated to the GE, IT, or WLC conditions because these cells had been
filled. Because of the high proportion of dropouts in the SMAC
condition, the final three subjects were assigned non-randomly to that
condition.

**Intervention format.** The IT and GE interventions were both
cognitive-behavioural in approach. The format of the IT intervention was
individual therapy; the GE intervention was educational (i.e., lectures
and tutorials) delivered in group format. Subjects assigned to the IT
and SMAC conditions met with a behaviour therapist on a weekly basis for
one hour sessions, for a maximum of 16 and a minimum of 10 sessions. The
minimum of ten sessions was established in order to decrease attrition
because subjects whose illness behaviour or disability had decreased to a
satisfactory level after the tenth session could not be expected to
attend the full 16 sessions. Minimum duration of intervention was four
months; maximum duration was eight months, with six exceptions (the
longest 12 months) due to appointment cancellations and holidays.

The GE intervention involved 16 weekly sessions consisting of
eight three-hour lectures interspersed with eight small group, two-hour
tutorials. Sessions followed a standard format. Course schedule, lecture outlines, and tutorial agendas are described in detail in Appendix E. Lectures were delivered by registered behavioural psychologists, a general internist, and a kinesiologist. Tutorial sessions were conducted by professionals trained in Behavioural Medicine. Individual contact with subjects was kept to a minimum. Three GE groups were run: two at St. Joseph's Hospital in Hamilton, and a third group at Toronto Western Hospital. Course format, lecturers and tutorial leaders were identical for all locations.

Self-monitoring during intervention was a necessary condition for continued participation in the study for subjects in the IT, GE and SMAC conditions; it was not used to obtain dependent measure data, and was maintained for clinical purposes only.

At the beginning of each session, subjects in the GE, IT and SMAC conditions handed in completed self-monitoring booklets and filled out Sessional Questionnaires to obtain illness behaviour data for the previous week. At the final session (session 16 for GE; 10-16 for IT and SMAC), the following post-intervention data were completed: the Post Questionnaire and the Health Locus of Control Scale (Wallston et al., 1976). Initially, two post intervention self-monitoring books were distributed with stamped return envelopes, to be mailed in following completion. Unreturned books became a significant problem and the procedure was changed. Books were distributed at the 15th session (or the next to last session) and the final session was scheduled for two weeks later, when the monitoring books were completed.
Following the completion of intervention, subjects in the GE, IT, SMAC were requested to visit their family physicians to allow for completion of the post Physician Questionnaire.

Subjects assigned to the WLC condition were informed that they were put on a waiting list because no vacant positions were available, and that they would be contacted in four to six months time to begin intervention. The length of the wait period was determined by a yoked control procedure (Underwood and Shaughnessy, 1975). Individual wait list periods were matched with durations of interventions of subjects in the IT condition. When recontacted, subjects repeated completion of the Pre-Intervention Questionnaire, the Health Locus of Control Scale and two weeks of self-monitoring. Subjects were provided the rationale that sufficient time had elapsed to allow for changes in medications, symptoms, their pattern, and the subjects' response to them, as well as their activity pattern. Subjects then received the IT intervention.

**Intervention content.** Group Education and Individual Treatment:

Since the comparison of GE and IT was to test the efficacy of two types of delivery (i.e., group vs. individual), an effort was made to ensure that the content of the two interventions was identical and that they differed in format only. Therapeutic programmes in both formats were derived from the Disease Illness Distinction Model, and similar to those described by Blackwell and Gutmann (1984) and Turk et al. (1983). A general description of the CB interventions is presented below. Details of the GE sessions are found in Appendix E.

The strategic principles of the cognitive-behavioural
interventions included: (a) identifying environmental stimuli (via interviews and self-monitoring) that were systematically related to their complaints; (b) training subjects in strategies for altering their environment effectively; (c) training subjects in techniques for altering stimulus-response relationships such as desensitization, counterconditioning of incompatible responses (e.g., relaxation, recreational activities), and extinction; (d) prescribing positive control procedures such as shaping, setting of appropriate goals and response reinforcer strategies, principles of reinforcement and delay of reinforcement; and e) cognitive restructuring of attributions regarding chest discomfort.

Subjects were informed that there were no contraindications regarding activity, that there was no further medical intervention that could help them, and that there was no reason from a medical standpoint why they could not lead a "normal" unrestricted life. This was achieved primarily through the demedicalization or reattribution component (Nisbett and Valins, 1972) described in Chapter 2.

Subjects were provided with a behavioural formulation of the cause of their discomfort and related disability. This allowed for reattribution of discomfort and disability in terms of cognitive, behavioural and environmental causes. The behavioural education and demedicalization components were carried out concurrently. This was intended to lead to more effective problem-solving strategies that were both useful and face-saving for the individual. Patients were informed that their discomfort might not change, but that behaviour and responses
to the discomfort could change. Individuals were encouraged to view their symptoms or problems as specific and solvable, rather than vague and overwhelming.

Through the use of self-monitoring, subjects were educated in data collection and interpretation in order that they become more objective observers of their own behaviour and cognitions. Subjects collected data on chest discomfort and related behaviours for the purpose of facilitating understanding and acceptance of the "new" conceptualization (conditioning and learning model) which was presented to them.

Self-monitoring completed during intervention was standardized with the exception of the specific symptoms being monitored. Subjects were asked only to record data on those symptoms which they experienced. This was in contrast to the procedure used during pre and post intervention data collection in which all subjects were asked to record data on all four types of chest discomfort. The rationale for the change in procedure during intervention was that continuous monitoring of symptoms that subjects did not experience would in all likelihood decrease the probability of ongoing compliance.

Validity of self-monitoring data is an issue, particularly when subjects are expected to monitor for an extended period of time (Verbrugge, 1980) as in the GE, IT, and SMAC conditions. To deal with this, self-monitoring books were checked by the investigator on a regular basis and information was corroborated (if possible) by self-report and Sessional Questionnaire data. Books were checked for obvious signs that
indicated that recording was not being carried out as instructed (e.g.,
several hours or days of monitoring completed in one sitting). Examples
of these signs included use of the same pen and similar handwriting over
the course of one day's recording, similar routine or activity and
symptom patterns over the course of more than two days. If the
experimenter suspected that a subject was not filling out his book as
instructed (an infrequent problem), the issue was discussed and evidence
for concern was provided. Details of instructions were provided again
and the subject was encouraged to continue monitoring. The matter was
monitored in future sessions. Subjects receiving intervention who either
monitored on a very irregular basis (e.g., three days out of seven) or
stopped monitoring altogether were reminded that monitoring was a
condition of inclusion in the study, and that their continued
participation was dependent upon future monitoring.

A comprehensive, three-phase exercise programme was offered to
subjects in both interventions. The three phases of the program were
flexibility, muscle strength and endurance, and aerobic training. The
goals of the programme included: (a) increased cardiovascular fitness
through aerobic training, (b) increased exercise tolerance, (c) changes
in cognitions from invalid to healthy through the use of exercise as an
incompatible response (for example, "I must be healthy if I can jog 30
minutes daily"), and (d) an increased understanding of behavioural
strategies and their implementation through the concrete example of
designing and carrying out an exercise programme. A description of the
program and subject handouts are included in Appendix F. Involvement in
the program was strongly encouraged but not mandatory.

Subjects were trained in progressive muscle relaxation in order that they learn a response that is incompatible with tension and anxiety, and also are provided with a coping skill to be used in situations that require adaptive coping (Turk et al., 1983). The scripts and rationale for the use of relaxation training are found in Appendix G.

Self-monitoring attention control: Subjects were informed that the purpose of intervention was to identify the degree to which self-awareness of one's own behaviour, as acquired through self-monitoring, could decrease reported limitations or disability attributed to chest discomfort. The weekly sessions consisted of a review and discussion of self-monitoring. Subjects were encouraged to take an empirical approach to their chest discomfort by examining the data, and formulating and testing hypotheses generated by themselves. Therapists took a passive role and engaged in no active teaching of behavioural principles or strategies, or problem solving. Questions regarding MVP or NCA and their significance were directed to the family physician or specialist.

Dependent Measures

Pre and Post Intervention Questionnaires. Subjective magnitude measures: The following measures were obtained from ratings on 100 mm Likert-type visual analogue scales (VAS) (Likert, 1932). VAS are reported to be more sensitive to changes in pain perception than simple descriptive pain scales; furthermore, changes in the two types of scales are reported to be highly correlated (Scott and Huskisson, 1976).
Subjects were instructed to indicate:

1. "How limited [they considered themselves to be by their] chest discomfort; 0 = not at all, 100 = totally limited.

2. "How disabling each [of four] type of chest discomfort" (chest pain, chest pressure, palpitations, and difficulty breathing) was to [them]; 0 = not at all, 100 = totally disabling. In order to have a measure on which data were available for all subjects (because few subjects reported experiencing all four types of discomfort), a "worst symptom" variable was created for data analysis. This was defined as the type of chest discomfort given the highest pre-intervention disability rating of the four types of discomfort.

3. "How disabling fatigue" was to [them]; 0 = not at all, 100 = totally disabling.

4. "The degree to which [their] chest discomfort limited [them] in carrying out" each of the following three types of activities: work activity for income (WAI), necessary activities for daily living (NADL) (e.g., shopping, housework), and leisure exercise (LE) (e.g., sports, calisthenics, walking); 0 = not at all, 100 = totally limiting.

5. "How physically active" they considered themselves to be relative to the "norm"; 0 = very inactive, 100 = very active.

Self-report estimates of frequency and duration: The following measures were obtained from frequency or duration estimates. Total frequency per measure for each subject was used in data analysis.
Subjects were instructed to indicate:

1. The number of pills ingested for chest discomfort per fourteen days prior to data collection. For data analysis, two categories of medication intake were created: cardiac and non-cardiac. Cardiac medication included nitroglycerine, beta-blocking agents, calcium antagonists, and other miscellaneous cardiac medications. Non-cardiac medication included analgesics, tranquilizers, hypnotics, antacids, anti-asthma medication, and anti-inflammatories.

2. The number of visits to physicians in the two months prior to data collection: a) made for all reasons, and b) made on the basis of chest discomfort. For outcome data analysis, only the latter measure was used because it was most relevant to the goals of the study.

3. The number of episodes of each of four types of chest discomfort (chest pain, chest pressure, palpitations, difficulty breathing) in the month preceding data collection. For data analysis, the number of episodes of worst symptom per month was used.

4. The number of episodes of physical activity in the 14 days preceding data collection. For data analysis, three categories of activities were created: walking, muscle strength and endurance (calisthenics), and aerobic. In addition, a composite measure of frequency of physical activity was calculated for each subject by summing frequency estimates over the three activity types.

Categorical measures:

1. Employment: Subjects reported current job status and job changes (put on lighter duties, stopped working) (a) made for all
reasons, and (b) made on the basis of chest discomfort. For data analysis, only the latter measure was used as it was considered most relevant to the study goals.

2. Chest discomfort attributions: Subjects reported believed cause of chest discomfort at onset of discomfort and at time of screening. Five categories of attributions were created for discussion of pre-intervention illness level: cardiac; non-cardiac medical (e.g., cancer, influenza); stress; other non-medical (e.g., smoking, "lack of exercise"); and "don't know." For discussion of outcome data, attributions were categorized into cardiac and non-cardiac.

**Pre and Post Intervention Self-Monitoring.** The measures described below were derived from self-monitoring completed on an hourly basis for two week periods before and after intervention. For data analysis, data from each subject were totalled for the following individual measures over the two weeks of pre and post data collection: number of episodes of physical activity, numbers of cardiac and non-cardiac pills ingested, number of episodes of palpitations, number of hours in which worst symptom or any chest discomfort occurred. Individual means were computed for energy level and intensity of worst symptom.

**Subjective magnitude measures:**

1. Intensity of chest discomfort (pain, pressure and difficulty breathing) was rated on a 0-10 Likert-type scale (Likert, 1932); 0 = none at all, 10 = worst ever. Mean intensity was calculated for each subject by summing intensity ratings and dividing by the total number of non-zero
ratings. For outcome data analysis, mean intensity of worst symptom was used. In cases of worst symptom being identified as "palpitations", the next most disabling symptom per pre-intervention questionnaire was used, to enable "intensity" data on all subjects.

2. "Energy level" was rated on a 0-10 Likert-type scale (Likert, 1932); 1 = none at all, 10 = most ever. Mean energy level was calculated for each subject by summing the ratings and dividing by the total number of non-zero ratings. Zero (0) ratings were employed by the subjects for sleep only.

Measures of frequency:

1. Number of pills ingested for chest discomfort. Medications included those described above. For each subject, number of pills ingested per hour were summed over the 14 days to obtain total number of pills ingested for cardiac and non-cardiac medications.

2. Number of episodes of chest discomfort. For data analysis, two measures were derived from entries of chest discomfort intensity and duration: (a) total number of hours in which worst symptom occurred, and (b) total number of hours in which any type of chest discomfort occurred, over the 14 day of data collection.

3. Number of episodes of leisure exercise activity. This measure was based on the total number of entries of leisure exercise (physical activity) over the 14 days of data collection.
Psychometric Measure. Pre and post intervention "locus of control" measure: The Health Locus of Control Scale (HLC) (Wallston et al., 1976) yields one measure of health-related locus of control. High scores are indicative of greater externality, the belief that one's sickness or health is unrelated to one's behaviour. Low scores are indicative of greater internality, the belief that one's health is a function of one's behaviour.
Chapter 6
RESULTS 1
CHEST DISCOMFORT INTERVENTION STUDY

Overview

Of 1125 potential subjects recruited, 355 were screened. The remaining 770 declined to participate (n = 32) or did not meet the diagnostic criteria for the study (n = 738). One hundred and four (90 MVP's, 14 NCA's) met the criteria for inclusion, agreed to participate, and were assigned to one of the four conditions (see Table 17). Four additional subjects were excluded after starting intervention (2 GE, 2 SMAC): three due to changes in medical status, and one due to a confounding medical condition (rheumatoid arthritis) which the subject reported to be more disabling than chest discomfort. Sixty-nine subjects completed the study. Ten of the 12 S's who were crossed over (CO) into the IT intervention from WLC completed IT (see Table 18). Mean duration of intervention and number of sessions attended for each condition are presented in Appendix H, Table 1.

The overall attrition rate was 34%. A chi-square test of independence revealed a significant difference in dropout rate between the four conditions, $X^2(3, 104) = 7.96$, $p < .05$. The dropout rate in the SMAC condition (61%) was greater than that of the other conditions (GE: 33%, IT: 24%, WLC: 22%, CO: 17%). However, t-tests and chi-square tests
<table>
<thead>
<tr>
<th>Condition</th>
<th>MVP Female</th>
<th>MVP Male</th>
<th>NCA Female</th>
<th>NCA Male</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Education (GE)</td>
<td>33</td>
<td>2</td>
<td>4</td>
<td>3</td>
<td>42</td>
</tr>
<tr>
<td>Individual Treatment (IT)</td>
<td>17</td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>25</td>
</tr>
<tr>
<td>Self Monitoring Attention Control (SMAC)</td>
<td>14</td>
<td>4</td>
<td>0</td>
<td>0</td>
<td>18</td>
</tr>
<tr>
<td>Wait List Control (WLC)</td>
<td>15</td>
<td>3</td>
<td>0</td>
<td>1</td>
<td>19</td>
</tr>
<tr>
<td><strong>Total</strong></td>
<td><strong>79</strong></td>
<td><strong>11</strong></td>
<td><strong>6</strong></td>
<td><strong>8</strong></td>
<td><strong>104</strong></td>
</tr>
</tbody>
</table>
Table 18

Subject Status by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Completed</th>
<th>Dropout</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Education</td>
<td>28</td>
<td>14</td>
<td>42</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>19</td>
<td>6</td>
<td>25</td>
</tr>
<tr>
<td>Self-Monitoring</td>
<td>7</td>
<td>11</td>
<td>18</td>
</tr>
<tr>
<td>Attention Control</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait List Control</td>
<td>15</td>
<td>4</td>
<td>19</td>
</tr>
<tr>
<td>Crossover to Individual Treatment</td>
<td>10</td>
<td>2</td>
<td>12</td>
</tr>
</tbody>
</table>

Note. Column totals do not include Crossover subjects.

a

Three crossover subjects refused offer of crossover into Individual Treatment following completion of WLC period.
of independence revealed no differences between dropouts and those who completed intervention on age, gender, diagnosis, marital or employment status, or duration of chest discomfort (see Appendix H). The only illness measure on which differences were found was number of subjects using cardiac medication (see Appendix H). Proportionately more dropouts than subjects who completed intervention were using cardiac medication ($X^2(1) = 4.79, p < .05$). The reasons provided by subjects for dropping out are presented in Appendix H.

Pre-intervention measures of level of illness are presented on the 104 subjects who were assigned to one of the four conditions. Outcome illness and psychometric data are presented on the 69 subjects who completed intervention. Completed pre and post self-monitoring data are presented on 50 of the 69 subjects who completed intervention. Nineteen of the 69 subjects failed to provide complete self-monitoring data.

Results of the study are presented in three sections: (1) Pre-intervention descriptive data; (2) Outcome data: Effects of experimental interventions; and (3) Illness behaviour: Relationships among measures.
Results

Pre-intervention Descriptive Data

Data on the pre-intervention level of illness of the total subject sample (N = 104; 90 MVP, 14 NCA) are presented in Tables 19-24. Given the relatively low number of NCA's who were successfully recruited, the MVP and NCA data were combined for data analysis. The data indicate a high level of disability in this group of individuals with chest discomfort and MVP or NCA.

Seventy-four subjects or 71% of the total subject sample were engaged in full or part-time gainful employment prior to the onset of chest discomfort. Twenty-seven percent of these subjects reported that they made job changes attributed to chest discomfort (i.e., stopped working, went to lighter duties) following its onset.

In the two months prior to screening, 71% of subjects reported making at least one visit to a physician, and 56% reported at least one visit made on the basis of chest discomfort. Details are provided in Table 19. At the time of screening, a total of 59 (56.7%) subjects reported taking some type of medication for chest discomfort. Details of reported medication intake are provided in Table 20. The three most common types of medication were cardiac (N = 35), tranquilizer (N = 24), and analgesic (N = 16).

The four types of chest discomfort were equally common: 82 subjects reported chest pain; 85: chest pressure; 85: palpitations; and 85: difficulty breathing. Eighty-five percent of the subjects (N = 89) indicated that they experienced at least three types of chest discomfort.
Table 19

Number of Reported Visits to Physicians in Two Months Prior to Screening (N=104)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>a</th>
<th>b</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>For all reasons</td>
<td>For chest discomfort</td>
</tr>
<tr>
<td>0</td>
<td>30</td>
<td>48</td>
</tr>
<tr>
<td>1-2</td>
<td>44</td>
<td>40</td>
</tr>
<tr>
<td>3-5</td>
<td>25</td>
<td>17</td>
</tr>
<tr>
<td>6+</td>
<td>5</td>
<td>0</td>
</tr>
</tbody>
</table>

%:
- a: 29% 42% 24% 5%
- b: 47% 39% 17% 0%

Note. Subjects were asked to indicate the exact number of visits to physicians. Data were categorized into the above groups for presentation only.

N = 104, N = 102.
Table 20

Numbers of Subjects who Indicated that They Were using Medication before Intervention (n=104)

<table>
<thead>
<tr>
<th>Type of Medication</th>
<th>n</th>
</tr>
</thead>
<tbody>
<tr>
<td>Any medication</td>
<td>59</td>
</tr>
<tr>
<td>Analgesic</td>
<td>16</td>
</tr>
<tr>
<td>Tranquilizer</td>
<td>24</td>
</tr>
<tr>
<td>Anti-Depressant</td>
<td>4</td>
</tr>
<tr>
<td>Anti-inflammatory, Antacid &amp; Anti-asthmatic</td>
<td>7</td>
</tr>
<tr>
<td>Any cardiac medication</td>
<td>35</td>
</tr>
<tr>
<td>Nitroglycerine</td>
<td>13</td>
</tr>
<tr>
<td>Beta-blocker</td>
<td>21</td>
</tr>
<tr>
<td>Calcium-blocker</td>
<td>8</td>
</tr>
<tr>
<td>Other Cardiac</td>
<td>3</td>
</tr>
</tbody>
</table>

Note. Seven subjects were using more than one type of cardiac medication.
Sixty-three percent of the subjects (N = 66) reported chest discomfort that they experienced daily. Descriptive statistics on mean number of episodes of chest discomfort reported per month are presented in Table 21.

The high levels of disability suggested by the behavioural measures are also reflected in the cognitive measures of illness. At screening, 63% of the subjects attributed their chest discomfort to their heart (see Table 22).

Ratings of disability and limitations on activities also indicated significant illness that was attributed to chest discomfort. These data are presented in two formats. First, descriptive statistics for these measures are presented in Table 23. As shown, mean ratings of limitations on activities (scale ranged from 0: not at all limited, to 100: totally limited) attributed to chest discomfort ranged from 31 (work activity for income) to 47 (leisure exercise). Mean ratings of disability and limitations attributed to worst symptom and general chest discomfort were 57 and 43, respectively. Second, frequency distributions for ratings of these measures are presented in Table 24. For example, 61 (59%) subjects indicated ratings of greater than 50 on the "disability attributed to worst symptom" measure.

**Differences Between Conditions. Pre-Intervention**

In order to ensure that subjects in the four conditions did not differ pre-intervention, a series of chi-square tests of independence and between-group analyses of variance were performed on demographic data and illness measures. Summary data for all analyses are presented in
Table 21

Pre-Intervention Descriptive Statistics on Reported Number of Episodes of Four Types of Chest Discomfort and Worst Symptom in the Month Preceding Screening

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Chest pain</th>
<th>Chest pressure</th>
<th>Palpitations</th>
<th>Difficulty breathing</th>
<th>Worst symptom</th>
</tr>
</thead>
<tbody>
<tr>
<td>n</td>
<td>78</td>
<td>83</td>
<td>81</td>
<td>81</td>
<td>102</td>
</tr>
<tr>
<td>Mean</td>
<td>28</td>
<td>32</td>
<td>36</td>
<td>39</td>
<td>44</td>
</tr>
<tr>
<td>SD</td>
<td>41</td>
<td>54</td>
<td>55</td>
<td>50</td>
<td>55</td>
</tr>
<tr>
<td>Minimum</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
<td>0.5</td>
</tr>
<tr>
<td>Maximum</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Median</td>
<td>12</td>
<td>10</td>
<td>10</td>
<td>16</td>
<td>18</td>
</tr>
</tbody>
</table>

a Minimum: 0.5 = less than once per month.

b Maximum: 180 = greater than or equal to 3 times per day.
Table 22

Number of Subjects Reporting Chest Discomfort Attributions by Type, Before Intervention (n=104)

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Cardiac</th>
<th>Other other</th>
<th>Stress</th>
<th>Don't know</th>
<th>Other non-medical</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>66</td>
<td>2</td>
<td>10</td>
<td>24</td>
<td>2</td>
</tr>
<tr>
<td>% total</td>
<td>63%</td>
<td>2%</td>
<td>10%</td>
<td>23%</td>
<td>2%</td>
</tr>
</tbody>
</table>

*For example: cancer, hypertension.*

*b Smoking, lack of physical exercise.*
Table 23

Pre-intervention Descriptive Statistics on Subjective Magnitude Ratings of Disability and Limitations Attributed to Chest Discomfort and Fatigue

<table>
<thead>
<tr>
<th>Statistic</th>
<th>Worst symptom</th>
<th>Chest discomfort</th>
<th>Fatigue</th>
<th>Work for income</th>
<th>Routine daily activities</th>
<th>Leisure exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>N</td>
<td>104</td>
<td>104</td>
<td>98</td>
<td>73</td>
<td>104</td>
<td>104</td>
</tr>
<tr>
<td>Mean</td>
<td>57</td>
<td>43</td>
<td>52</td>
<td>31</td>
<td>33</td>
<td>47</td>
</tr>
<tr>
<td>SD</td>
<td>26</td>
<td>22</td>
<td>26</td>
<td>28</td>
<td>24</td>
<td>29</td>
</tr>
<tr>
<td>Minimum</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
<td>00</td>
</tr>
<tr>
<td>Maximum</td>
<td>100</td>
<td>97</td>
<td>100</td>
<td>100</td>
<td>89</td>
<td>100</td>
</tr>
<tr>
<td>Median</td>
<td>57</td>
<td>46</td>
<td>55</td>
<td>21</td>
<td>26</td>
<td>45</td>
</tr>
</tbody>
</table>

Note. Disability and limitation ratings are from 100 mm visual analogue scales, 0 = not disabling/limiting, 100 = totally disabling/limited.

a
Data were missing on six subjects.

b
Data are from subjects working for income prior to the onset of chest discomfort.
Table 24

Frequency Distributions of Subjective Magnitude Ratings of Disability and Limitations Attributed to Chest Discomfort and Fatigue, Pre-intervention (N = 104)

<table>
<thead>
<tr>
<th>Categories of ratings</th>
<th>Worst symptom</th>
<th>Chest discomfort</th>
<th>Fatigue</th>
<th>Work for income</th>
<th>Routine daily activities</th>
<th>Leisure exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
<td>n</td>
</tr>
<tr>
<td>0 - 25</td>
<td>13</td>
<td>25</td>
<td>20</td>
<td>41</td>
<td>50</td>
<td>29</td>
</tr>
<tr>
<td>26 - 50</td>
<td>30</td>
<td>46</td>
<td>26</td>
<td>13</td>
<td>28</td>
<td>29</td>
</tr>
<tr>
<td>51 - 75</td>
<td>31</td>
<td>23</td>
<td>32</td>
<td>13</td>
<td>19</td>
<td>22</td>
</tr>
<tr>
<td>76 - 100</td>
<td>30</td>
<td>8</td>
<td>20</td>
<td>6</td>
<td>7</td>
<td>24</td>
</tr>
</tbody>
</table>

Note. Disability and limitation ratings are from 100 mm visual analogue scales, 0 = not disabling/limiting, 100 = totally disabling/limited.

a
Data were missing on six subjects.

b
Data are from subjects working for income prior to the onset of chest discomfort.
Appendix I. No statistically significant differences were found between the four conditions on age, sex, diagnosis, or duration of chest discomfort.

Between-group ANOVA's revealed differences on only two pre-intervention measures of illness (see Table 25): reported number of visits to physicians made on the basis of chest discomfort in the two months prior to screening, $F (3,98) = 4.74, p < .005$; and subjective magnitude estimates of physical activity level, $F (3,97) = 3.81, p < .01$. Tukey-Kramer post hoc multiple comparisons revealed that subjects in the IT condition reported a significantly greater number of visits to physicians than subjects in the SMAC condition ($p < .001$); Subjects in the WLC condition reported significantly higher activity levels than subjects in the GE ($p < .01$) and IT ($p < .05$) conditions.
Table 25

Mean Number of Physician Visits and Subjective Ratings of Physical Activity Level by Condition, Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Number of ** physician visits</th>
<th>Physical * activity level</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>a n</td>
<td>b</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Group Education</th>
<th>42</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>1.1</td>
</tr>
<tr>
<td>SD</td>
<td>1.3</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Individual Treatment</th>
<th>25</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>2.0</td>
</tr>
<tr>
<td>SD</td>
<td>1.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Self-Monitoring Attention Control</th>
<th>18</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>0.4</td>
</tr>
<tr>
<td>SD</td>
<td>0.8</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Wait List Control</th>
<th>19</th>
</tr>
</thead>
<tbody>
<tr>
<td>M</td>
<td>1.3</td>
</tr>
<tr>
<td>SD</td>
<td>1.3</td>
</tr>
</tbody>
</table>

a
Visits made on the basis of chest discomfort in the two months prior to screening.

b
The values represent mean ratings of physical activity level from 100mm visual analogue scales: 0 = very inactive, 100 = very active.

* p < .01.  ** p < .005.
Discussion

The data indicate that there exists a population of individuals with chest discomfort and either MVP or NCA who exhibit significant levels of illness. Because the demographic and illness behaviour data reported by the present sample are consistent with previously reported data on NCA and MVP populations (Lavey and Winkle, 1979; Ockene et al., 1980; Retchin et al., 1986), the present sample appears valid and representative of the population of individuals with chest discomfort and MVP or NCA. The greater proportions of women (81.7%) in the present study likely reflect the greater prevalence of MVP in women compared to men in the general population (Savage, Garrison et al., 1983), and the greater number of women than men in chronic pain populations (Fordyce et al., 1984).

The low number of successfully recruited NCA's (N = 14) compared to MVP's (N = 90) was unanticipated. The study design called for an equal number (N = 60) of NCA's and MVP's. This decision was based primarily on physician reports that there existed adequate numbers of NCA's and MVP's with disabling chest discomfort. Data from the echocardiogram and catheterization laboratories in the Hamilton area indicated that MVP diagnoses occurred with at least twice the frequency of NCA diagnoses (approximately eight MVP diagnoses are made for every 3-4 NCA diagnoses). However, it was expected that a greater proportion of NCA's would fit the criteria of disabling chest discomfort because all of them reported discomfort (the primary rationale for catheterization), whereas only a
subset of MVP's was believed to report chest discomfort (Savage, Devereux, et al., 1983).

The finding of six MVP's recruited for every NCA suggests four possibilities. While exact numbers are not available, many individuals reporting disabling chest discomfort were interested in participating in the study, but were not accepted because they did not fit the medical criteria. Either MVP was not confirmed on echocardiogram, or NCA was not confirmed by cardiac catheterization. Estimates from the present sample with respect to the proportion of the general population who experience disabling chest discomfort, but who do not have significant cardiac disease, are likely conservative because of the stringent medical criteria. Subjects with disabling chest discomfort and identified MVP or NCA represent only a subset of the population who are disabled by chest discomfort, and in whom cardiac disease is not suspected to be a factor.

Second, it is possible that there existed a number of NCA's with disabling chest discomfort who were not successfully recruited. This may have occurred because physicians were unaware of disability in their patients. In the Ockene et al. (1980) study, physicians tended to underestimate the severity of their patient's chest pain. It is also possible that physicians expected their patients to be reassured by the normal catheterization results, and concluded that intervention would not be necessary. However, results of the Ockene et al. (1980) study suggest that this type of reassurance doesn't eliminate disease attributions or reported limitations on activities. Similarly, it also seems likely that many individuals with MVP and disabling chest discomfort existed who did
meet the subject criteria, but who were not referred to the study because their physicians were either unaware of their chest discomfort or unaware that the patients considered the discomfort disabling. In the Retrospective Chest Pain Study, only 52.5% (31/59) of subjects with chest pain were reported to experience chest pain by their physicians.

Third, physicians may have overestimated the numbers of NCA's with disabling chest discomfort. This may be accounted for by the "availability heuristic," described by Nisbett and Ross (1980). The authors suggest that information that is more salient is more likely to be retained in memory, more easily recalled, and its frequency more likely to be overestimated, than information that is less salient. It is argued here that patients with disabling chest discomfort and no defined disease are more salient for physicians than patients with non-disabling chest discomfort. Physicians likely saw them more frequently, may have been less confident about the diagnosis and its treatment (Klein et al., 1965), and subsequently spent more time on their cases, than subjects with identified cardiac disease.

The only measure from the present study for which normative data were found was health care utilization. The data suggest that subjects in the present study tended to use health care facilities more than average. Norman et al. (1982) reported that subjects chosen at random for a family practice study on health patterns made on average one visit to a physician for any reason per six month interval, compared to 5.7 visits to physicians and hospital admissions (for all reasons) in the present study. Furthermore, subjects in the Norman et al. (1982) study
were drawn from the same geographic area as subjects in the present study (Hamilton, Ontario) and used the same health care system.

Finally, the overall attrition rate (34%) was not different from that reported in previous research of this nature. The reported attrition rates in outpatient, cognitive-behavioural programmes reviewed ranged from 14% in the Turner (1982) study to 30% in the Gamsa, Braha, and Catchlove (1985) study. These attrition rates were for treated and wait list control subjects and are comparable to those of the present study for the treated (GE and IT) and WLC subjects (26% for these three conditions combined).

One possible cause of attrition in treatment groups, suggested by Turk et al. (1983), is an incompatibility between subjects' beliefs and attitudes and those presented by the therapist. Turk et al. (1983) stated that patients often resist treatment that does not fit with their expectations and understanding. This may have been particularly the case with the SMAC subjects who received no directive advice or "educational" information. Furthermore, the high attrition rate in the SMAC condition (61%) was consistent with the suggestion of Fordyce et al. (1985) that chronic pain subjects in an untreated/placebo condition would not stay in "treatment" for as long as subjects in actual treatment conditions.

Fordyce et al. (1985) argued that, in general, chronic pain patients have attempted and failed numerous other treatments, and therefore are not likely to stay in treatment without improvement. Maintaining interest in the study for an extended period of time was particularly difficult for SMAC subjects reporting less frequent chest discomfort,
because the intervention focussed solely on symptoms as reported in self-monitoring.

Between-group differences were found on only two of the pre-intervention measures of illness: ratings of physical activity level, and number of visits to physicians made on the basis of chest discomfort. These were also the only measures on which between-group differences were found when examining pre-intervention data from the 69 S's who completed intervention. The effects of these differences on outcome data will be discussed in Section 2 of the Results.

In summary, the data indicate a high level of unnecessary illness in the study sample that seems consistent with previously reported data on NCA and MVP populations. It was suggested that estimates from the present study of the proportion of individuals in the general population with disabling chest discomfort are conservative because of the stringent medical inclusion criteria. It was also argued that there existed many individuals who met the subject criteria, but who were not successfully recruited because their physicians were unaware of their chest discomfort or that the chest discomfort was disabling. The attrition rate in the GE, IT and WLC conditions was consistent with that reported in previous studies. The relatively high attrition rate in the SMAC condition suggests that it was not a credible intervention for subjects or that it did not meet their expectations for "treatment." The effects of the identified pre-intervention differences between conditions are dealt with in the following section of the Results.
Chapter 7

RESULTS 2

CHEST DISCOMFORT INTERVENTION STUDY

Outcome Data: Effects of Intervention

The data provide support for the efficacy of cognitive-behavioural (CB) interventions, in both individual and group formats, at reducing illness in individuals having chest discomfort with either MVP or NCA. More specifically, subjects in the CB interventions, compared to the WLC, reported greater decreases in level of reported disability and limitations and greater shifts toward internality on health locus of control. Furthermore, subjects in the GE condition reported greater increases in the level of physical activity than the SMAC. Data from subjects who were crossed over into the IT condition following completion of the WLC period provide further support for the efficacy of the IT intervention.

In order to facilitate an understanding of the results of the statistical tests, descriptive statistics (mean percent change per condition from pre to post intervention) are presented for each set of illness measures. The effects of the CB interventions on the illness measures were examined using between-group analyses of variance on pre- and post data (repeated measures ANOVA) and pre-post change scores (one-way ANOVA). There were four levels of the between factor: GE, IT, SMAC,
and WLC. NCA and MVP data were combined for data analysis because of the low number of NCA subjects. Similar results were obtained when analyzing pre-post and change score data. Pre-post summary data and change score summary data with results of one-way ANOVA's are presented in tabular form. Discussions in the text are restricted to outcomes of change score analyses. In order to examine the between-group differences and to control for alpha level, Tukey HSD tests were performed.

Missing data on one or two of the subjects are a common occurrence for the majority of the variables. However, there was no identifiable pattern for any of the individual variables or subjects. As suggested by Tabachnick and Fidell (1983), missing pre and post data were estimated for statistical purposes by using information obtained from the subject's file; if data were not available from the file, group means were used as estimates. Similar results were obtained on the statistical tests when data were analyzed with missing data excluded, and when estimates of missing data were used. The latter are used in text discussions and tables.

**Questionnaire Outcome Data**

**Subjective magnitude illness measures.** Summary data for pre and post ratings of the subjective magnitude measures of illness are presented in Tables 26 and 27 and Figures 2-8. These measures include ratings of disability attributed to worst symptom and fatigue, limitations attributed to chest discomfort, limitations on work activity for income, routine daily activities, and leisure exercise, and physical
Table 26
Mean Subjective Ratings of Disability/Limitations Attributed to Chest Discomfort by Condition, Before and After Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Disability Attributed to Worst Symptom</th>
<th>Limitations Attributed to Chest Discomfort</th>
<th>Work Activity for Income</th>
<th>Routine Daily Activities</th>
<th>Leisure Exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
<td>Post</td>
<td>Pre</td>
</tr>
<tr>
<td>Group Education</td>
<td>28</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>65</td>
<td>9</td>
<td>49</td>
<td>15</td>
<td>36</td>
</tr>
<tr>
<td>SD</td>
<td>(22)</td>
<td>(13)</td>
<td>(18)</td>
<td>(17)</td>
<td>(33)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>19</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>54</td>
<td>8</td>
<td>51</td>
<td>14</td>
<td>26</td>
</tr>
<tr>
<td>SD</td>
<td>(25)</td>
<td>(10)</td>
<td>(24)</td>
<td>(13)</td>
<td>(23)</td>
</tr>
<tr>
<td>Self-Monitoring Attention Control</td>
<td>7</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>55</td>
<td>20</td>
<td>41</td>
<td>19</td>
<td>13</td>
</tr>
<tr>
<td>SD</td>
<td>(38)</td>
<td>(27)</td>
<td>(26)</td>
<td>(26)</td>
<td>(15)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td>15</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>60</td>
<td>28</td>
<td>38</td>
<td>23</td>
<td>25</td>
</tr>
</tbody>
</table>

Note. The values represent mean ratings of disability/limitations on 100mm visual analogue scales (0 = not limited; 100 = totally limited). Only S's working for income or "unable" to work because of chest discomfort are included in the "work activity for income" data.

a n=19. b n=17. c n=5. d n=12.
Table 27
Mean Subjective Ratings of Disability Attributed to Fatigue and Physical Activity Level by Condition, Before and After Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Disability attributed to fatigue</th>
<th>How physically Active</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>Group Education 28</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>55</td>
<td>18</td>
</tr>
<tr>
<td>SD</td>
<td>(25)</td>
<td>(21)</td>
</tr>
<tr>
<td>Individual Treatment 19</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>50</td>
<td>20</td>
</tr>
<tr>
<td>SD</td>
<td>(28)</td>
<td>(19)</td>
</tr>
<tr>
<td>Self-Monitoring Attention Control 7</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>70</td>
<td>35</td>
</tr>
<tr>
<td>SD</td>
<td>(22)</td>
<td>(24)</td>
</tr>
<tr>
<td>Wait List Control 15</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>52</td>
<td>38</td>
</tr>
<tr>
<td>SD</td>
<td>(25)</td>
<td>(30)</td>
</tr>
</tbody>
</table>

Note. The values represent mean ratings on 100 mm visual analogue scales (Fatigue: 0 = not disabled at all, 100 = totally disabled; Activity level: 0 = very inactive, 100 = very active).
Figure 2.

Mean subjective magnitude ratings of disability attributed to worst symptom by condition, before and after intervention; ratings are from visual analogue scale: 
0 = not disabled, 100 = totally disabled.

Figure 3.

Mean subjective magnitude ratings of limitations attributed to chest discomfort by condition, before and after intervention; ratings are from visual analogue scale: 
0 = not limited, 100 = totally limited.
Figure 4.

Mean subjective magnitude ratings of limitations on work activity for income by condition, before and after intervention; ratings are from visual analogue scale: 0 = not limited, 100 = totally limited.

Figure 5.

Mean subjective magnitude ratings of limitations on routine daily activities by condition, before and after intervention; ratings are from visual analogue scale: 0 = not limited, 100 = totally limited.
Figure 6.

Mean subjective magnitude ratings of limitations on leisure exercise by condition, before and after intervention; ratings are from visual analogue scale:

0 = not limited, 100 = totally limited.

Figure 7.

Mean subjective magnitude ratings of disability attributed to fatigue by condition, before and after intervention; ratings are from visual analogue scale:

0 = not disabled, 100 = totally disabled.
Figure 6

Mean of limitations/lapse exercises

GE
IT
SMAC
WLC

Pre  Post

Figure 7

Mean of disability/fatigue

Pre  Post
Figure 8.

Mean subjective magnitude ratings of physical activity level by condition, before and after intervention; ratings are from visual analogue scale:

0 = very inactive, 100 = very active.
Figure 8

Mean of physical activity level

Time

Pre Post

SE
IT
SNAC
WLC
activity level. Group means were calculated by summing individual ratings and dividing by the number of subjects per condition. As shown in Tables 26-27 and Figures 2-7, decreases in "disability" and "limitation" ratings were found for all groups. However, the magnitude of change were greater in the CB conditions than in the control conditions. Mean percent change for these six measures ranged from 64-86\% (GE), 60-85\% (IT), 48-64\% (SMAC), and 27-53\% (WLC).

Pre-intervention ratings of physical activity level for the 69 subjects who completed intervention showed a similar pattern to the 104 subjects who started intervention: ratings from the WLC condition were significantly higher than those for the GE, IT and SMAC condition. Despite these differences, the CB conditions showed an increase from pre to post intervention in ratings of physical activity level, while the control groups showed decreases (see Table 27 and Figure 8). Mean percent increases were 50\% and 27\% for the GE and IT conditions, respectively. Mean percent decreases were 15\% and 14\% for the SMAC and WLC conditions, respectively.

In order to examine the effects of intervention, a series of between-group ANOVA's were performed on pre-post change scores of the subjective magnitude measures. Change score summary data are presented in Tables 28 and 29. Results of F-tests are presented in Appendix J. Statistically significant between-group differences were found for all measures with the exception of work activity for income. Results of Tukey post hoc multiple comparisons indicate differences between the CB conditions and the WLC. Changes in the GE condition were significantly
Table 28

Mean Prepost Change Scores of Subjective Ratings of Disability / Limitations Attributed to Chest Discomfort, by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Disability Attributed* to worst symptom</th>
<th>Limitations Attributed* to chest discomfort</th>
<th>Work activity for income</th>
<th>Routine** daily activities</th>
<th>Leisure** exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>56</td>
<td>34</td>
<td>23</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td>SD</td>
<td>(23)</td>
<td>(21)</td>
<td>(24)</td>
<td>(23)</td>
<td>(34)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>46</td>
<td>37</td>
<td>20</td>
<td>24</td>
<td>44</td>
</tr>
<tr>
<td>SD</td>
<td>(30)</td>
<td>(27)</td>
<td>(24)</td>
<td>(22)</td>
<td>(26)</td>
</tr>
<tr>
<td>Self-Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>35</td>
<td>22</td>
<td>8</td>
<td>17</td>
<td>31</td>
</tr>
<tr>
<td>SD</td>
<td>(33)</td>
<td>(18)</td>
<td>(17)</td>
<td>(26)</td>
<td>(30)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
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<td></td>
</tr>
<tr>
<td>M</td>
<td>32</td>
<td>15</td>
<td>7</td>
<td>8</td>
<td>7</td>
</tr>
<tr>
<td>SD</td>
<td>(30)</td>
<td>(25)</td>
<td>(18)</td>
<td>(23)</td>
<td>(36)</td>
</tr>
</tbody>
</table>

Note. The values represent mean prepost change scores derived from ratings of disability/limitations on 100mm visual analogue scales (0 = not limited; 100 = totally limited). Positive change scores reflect mean decreases and negative scores reflect mean increases in ratings from pre to post. Only those working for income or "unable" to work because of chest discomfort are included in the "work activity for income" data.

a b c d n=19  n=17  n=5  n=12.

* p < .05  ** p < .01.
Table 29

Mean Prepost Change Scores of Subjective Ratings of Disability Attributed to Fatigue, and Physical Activity Level by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>Disability* attributed to fatigue</th>
<th>How ** physically Active</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td></td>
</tr>
<tr>
<td>Group Education</td>
<td>28</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>37</td>
<td>-16</td>
</tr>
<tr>
<td>SD</td>
<td>(24)</td>
<td>(17)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>30</td>
<td>-9</td>
</tr>
<tr>
<td>SD</td>
<td>(29)</td>
<td>(23)</td>
</tr>
<tr>
<td>Self-Monitoring Attention Control</td>
<td>7</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>35</td>
<td>3</td>
</tr>
<tr>
<td>SD</td>
<td>(19)</td>
<td>(14)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td>15</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>14</td>
<td>8</td>
</tr>
<tr>
<td>SD</td>
<td>(21)</td>
<td>(20)</td>
</tr>
</tbody>
</table>

Note. The "fatigue" and "activity level" values represent mean prepost change scores derived from ratings on 100 mm visual analogue scales (fatigue: 0 = not disabled at all, 100 = totally disabled; Activity level: 0 = very inactive, 100 = very active). Positive change scores reflect mean decreases and negative scores reflect mean increases in ratings from pre to post.

* p < .05  
** p < .001
greater than changes in WLC for disability attributed to worst symptom (p < .05), disability attributed to fatigue (p < .025), limitations on routine daily activities (p < .01), limitations on leisure exercise (p < .05), and physical activity level (p < .005). Changes in the IT condition were greater than changes in the WLC condition for limitations on leisure exercise (p < .05), and physical activity level (p < .05). The SMAC did not differ statistically from the CB or the WLC conditions on any of the subjective magnitude measures.

Self-report chest discomfort and behavioural measures. Summary data for pre and post intervention scores for the symptom and behavioural measures of illness are presented in Table 30. These measures include the composite measure of number of episodes of leisure exercise; number of episodes of worst symptom and the composite measure of number of episodes of any chest discomfort symptom; number of physician visits made on the basis of chest discomfort; and number of cardiac and non-cardiac pills ingested for chest discomfort. Only those subjects reporting cardiac/non-cardiac medication ingestion are included in summary data and analysis of medication intake. For all measures, group means were calculated by summing individual scores and dividing by the number of subjects per condition.

As shown in Table 30 and Figure 9, the CB conditions reported an increase in the frequency of leisure exercise, while the control conditions reported no change. Mean percent change for the CB conditions was 49% (GE) and 68% (IT).
### Table 30

Mean Reported Number of Episodes of Physical Activity, Chest Discomfort, Visits to Physicians, and Number of Pills Ingested by Condition, Before and After Intervention (Questionnaire Data)

<table>
<thead>
<tr>
<th>Condition</th>
<th># Episodes per week</th>
<th># Episodes per month</th>
<th># Physician visits per 2 months</th>
<th># Pills ingested per 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Physical activity</td>
<td>Worst symptom</td>
<td>Composite of four symptoms</td>
<td>For chest discomfort</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Pre Post</td>
<td>Pre Post</td>
<td>Pre Post</td>
<td>Pre Post</td>
<td>Pre Post</td>
</tr>
<tr>
<td><strong>Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>7.6</td>
<td>45</td>
<td>87</td>
<td>1.1</td>
</tr>
<tr>
<td></td>
<td>(3.6)</td>
<td>(55)</td>
<td>(67)</td>
<td>(1.3)</td>
</tr>
<tr>
<td>SD</td>
<td>5.1</td>
<td>22</td>
<td>67</td>
<td>0.3</td>
</tr>
<tr>
<td><strong>Individual</strong></td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Treatment</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>9.7</td>
<td>46</td>
<td>93</td>
<td>2.4</td>
</tr>
<tr>
<td></td>
<td>(4.0)</td>
<td>(51)</td>
<td>(74)</td>
<td>(1.8)</td>
</tr>
<tr>
<td>SD</td>
<td>3.4</td>
<td>22</td>
<td>42</td>
<td>0.7</td>
</tr>
<tr>
<td><strong>Self-Monitoring</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Attention Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>2.4</td>
<td>60</td>
<td>123</td>
<td>0.3</td>
</tr>
<tr>
<td>SD</td>
<td>(3.6)</td>
<td>(82)</td>
<td>(125)</td>
<td>(0.0)</td>
</tr>
<tr>
<td><strong>Wait List</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Control</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>4.8</td>
<td>31</td>
<td>100</td>
<td>1.3</td>
</tr>
<tr>
<td>SD</td>
<td>(3.4)</td>
<td>(50)</td>
<td>(104)</td>
<td>(0.9)</td>
</tr>
</tbody>
</table>
Table 30 (cont’d)

Note. "Episodes of physical activity" is a composite measure derived from reported frequencies of three types of physical activity (walking, muscle strength and endurance, and aerobic).

a
in the two months prior to pre and post data collection; means are shown to the 0.1 to be more informative.

b
Only subjects reporting cardiac medication intake pre-intervention are included in the summary data [GE (n = 8); IT (n = 4); SMAC (n = 2; WLC (n = 4)].

c
Only subjects reporting non-cardiac medication intake pre-intervention are included in the summary data [GE (n = 15); IT (n = 10); SMAC (n = 1); WLC (n = 6)].

d
n=26.
Figure 9.

Mean reported number of episodes of physical activity per week by condition, before and after intervention (Questionnaire data).
Figure 9

Mean of physical activity episodes/wk

Time

Pre Post

GE
IT
SHAC
WLC
As shown in Table 30 and Figures 10 and 11, the CB and SMAC conditions reported decreases in the frequency of worst symptom and "all symptoms," while the WLC condition reported an increase in symptom frequency. Magnitude of change for worst symptom frequency appeared larger in the CB conditions than in the SMAC condition [mean percent decrease: 51% (GE) and 52% (IT); 35% (SMAC)]. Mean percent increase for worst symptom frequency was 19% for the WLC condition.

Reported number of visits to physicians made on the basis of chest discomfort decreased in all conditions, as shown in Table 30 and Figure 12. Despite a statistically significant difference between-groups pre-intervention (F (3, 65) = 4.69, p < .005 (IT reported a greater number of physician visits than SMAC, p < .001), there were no significant between-group differences post-intervention.

An examination of group means revealed decreases in the frequency of cardiac medication use in all conditions (see Table 30 and Figure 13). However, the numbers of subjects per condition taking cardiac medications were very small and this must be taken into account. Mean percent decrease was 37% (GE, n = 8), 10% (IT, n = 4), 61% (SMAC, n = 2), and 36% (WLC, n = 4). Greater numbers of subjects reported using non-cardiac than cardiac medication, with the exception of the SMAC [GE (n = 15); IT (n = 10); WLC (n = 6); SMAC (n = 1)]. As shown in Table 30 and Figure 14, the CB conditions revealed decreases in the number of non-cardiac pills taken for chest discomfort, and the control conditions revealed no change. Mean percent decreases for the CB conditions were 54% (GE) and 77% (IT).
Figure 10.

Mean reported number of episodes of worst symptom per month by condition, before and after intervention (Questionnaire data).

Figure 11.

Mean reported number of episodes of chest discomfort per month by condition, before and after intervention (Questionnaire data).
Figure 12.

Mean reported number of visits to physicians for chest discomfort per two months by condition, before and after intervention (Questionnaire data).
Figure 12

Mean # physician visits for cd/2 mo

Time

Pre Post

GE
IT
SMAC
WLC
Figure 13.

Mean reported number of cardiac pills ingested per 14 days by condition, before and after intervention (Questionnaire data).

Figure 14.

Mean reported number of non-cardiac pills ingested per 14 days by condition, before and after intervention (Questionnaire data).
Effects of intervention on the symptom and behavioural measures were examined using a series of one-way ANOVA's computed on prepost change scores. Cardiac medication intake data were not analyzed because of the small number of subjects per group using cardiac medications. Summary data are presented in Table 31. Results of F tests are presented in Appendix J. Tests revealed no statistically significant differences between groups.

Categorical data. Two categorical measures were examined: job change, and attributions for chest discomfort. Summary data are presented in Table 32. As shown, two subjects in the experimental conditions reported returning to work after intervention, reportedly because of decreased chest discomfort. None of the control subjects reported job changes. Cardiac attributions for chest discomfort decreased in three of the four conditions (CE, IT, and WLC).

Self-Monitoring Outcome Data

Subjective magnitude illness measures. Pre and post summary data are presented in Table 33 for the subjective magnitude measures of illness obtained from self-monitoring. These measures include ratings of intensity of worst symptom, and energy level. Individual subject means were calculated by summing individual ratings made over the 14 days and dividing by the total number of non-zero ratings (see Methods section). Group means were then calculated by summing individual means and dividing by the total number of subjects per condition. As shown in Table 33 and Figure 15, ratings of intensity of worst symptom decreased in the CE and
Table 31

Mean Prepost Change Scores of Reported Number of Episodes of Physical Activity, Chest Discomfort, Visits to Physicians, and Number of Pills Ingested by Condition (Questionnaire Data)

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Physical Activity</th>
<th>Worst Symptom</th>
<th>Composite of Four Symptoms</th>
<th>For Chest Discomfort</th>
<th>Non-cardiac Medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>28</td>
<td>-2.5</td>
<td>23</td>
<td>20</td>
<td>0.9</td>
<td>16</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>(4.6)</td>
<td>(71)</td>
<td>(134)</td>
<td>(1.4)</td>
<td>(34)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>19</td>
<td>-2.2</td>
<td>24</td>
<td>51</td>
<td>1.6</td>
<td>20</td>
</tr>
<tr>
<td>SD</td>
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<td>(5.7)</td>
<td>(53)</td>
<td>(73)</td>
<td>(2.1)</td>
<td>(27)</td>
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<td></td>
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<td>7</td>
<td>0.0</td>
<td>21</td>
<td>14</td>
<td>0.3</td>
<td>-</td>
</tr>
<tr>
<td>SD</td>
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<td>(4.2)</td>
<td>(66)</td>
<td>(78)</td>
<td>(0.9)</td>
<td>-</td>
</tr>
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<td>Wait List Control</td>
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<td></td>
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<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>15</td>
<td>-0.1</td>
<td>-6</td>
<td>-12</td>
<td>0.9</td>
<td>-1</td>
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<tr>
<td>SD</td>
<td></td>
<td>(3.6)</td>
<td>(53)</td>
<td>(82)</td>
<td>(1.2)</td>
<td>(16)</td>
</tr>
</tbody>
</table>

Note. Positive change scores reflect mean decreases and negative scores reflect mean increases in frequency from pre to post. Cardiac medication intake was not analyzed because n's were too small.

a in the two months prior to pre and post data collection.

b Only subjects reporting non-cardiac medication intake pre-intervention are included in analysis (GE (n = 15); IT (n = 10); VLC (n = 6)). The one SHAC subject reporting non-cardiac medication intake is excluded from the analysis to allow for comparison of GE, IT and VLC data.

c n=26.
Table 32
A Comparison of Numbers of Subjects Reporting (a) Job Changes Attributed to Chest Discomfort, and (b) Cardiac Attributions for Chest Discomfort after Onset of Discomfort and Following Intervention, by Condition (Questionnaire data)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Job change</th>
<th>No job change</th>
<th>Cardiac attribution</th>
<th>Other attribution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>At onset</td>
<td>After IV</td>
<td>At onset</td>
<td>After IV</td>
</tr>
<tr>
<td>Group Education</td>
<td>n</td>
<td>5</td>
<td>1</td>
<td>13</td>
</tr>
<tr>
<td>(n=28) (18 employed)</td>
<td>(%)</td>
<td>(28)</td>
<td>(6)</td>
<td>(72)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>n</td>
<td>3</td>
<td>1</td>
<td>10</td>
</tr>
<tr>
<td>(n=19) (13 employed)</td>
<td>(%)</td>
<td>(23)</td>
<td>(8)</td>
<td>(77)</td>
</tr>
<tr>
<td>Self-Monitoring Attention Control</td>
<td>n</td>
<td>1</td>
<td>0</td>
<td>4</td>
</tr>
<tr>
<td>(n=7) (5 employed)</td>
<td>(%)</td>
<td>(20)</td>
<td>(00)</td>
<td>(80)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td>n</td>
<td>3</td>
<td>0</td>
<td>9</td>
</tr>
<tr>
<td>(n=15) (12 employed)</td>
<td>(%)</td>
<td>(25)</td>
<td>(00)</td>
<td>(72)</td>
</tr>
</tbody>
</table>

Note. Job change made following the onset of chest discomfort = lighter duties or stopped working; changes made following intervention = return to heavier duties or start working.
Table 33

Mean Subjective Ratings of Intensity of Worst Symptom and Energy Level by Condition, Before and After Intervention (Self-Monitoring)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Intensity of worst symptom over 14 days</th>
<th>Energy level over 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Pre</td>
<td>Post</td>
</tr>
<tr>
<td>----------------------------</td>
<td>------</td>
<td>------</td>
</tr>
<tr>
<td>Group Education:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>3.2</td>
<td>1.9</td>
</tr>
<tr>
<td>SD</td>
<td>(1.6)</td>
<td>(1.4)</td>
</tr>
<tr>
<td>Individual Treatment:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>2.5</td>
<td>2.0</td>
</tr>
<tr>
<td>SD</td>
<td>(1.2)</td>
<td>(1.8)</td>
</tr>
<tr>
<td>Self-Monitoring Attention Control</td>
<td>4.0</td>
<td>4.1</td>
</tr>
<tr>
<td>SD</td>
<td>(1.0)</td>
<td>(0.9)</td>
</tr>
<tr>
<td>Wait List Control:</td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>2.8</td>
<td>2.5</td>
</tr>
<tr>
<td>SD</td>
<td>(1.9)</td>
<td>(2.1)</td>
</tr>
</tbody>
</table>

Note. The values represent mean pre and post ratings of intensity of worst symptom and energy level made on an hourly basis over the 14 day pre and post periods. Intensity of worst symptom and energy level were rated on a 0 - 10 scale, (0 = none at all, 10 = worst/most ever).
Figure 15.

Mean subjective magnitude ratings of intensity of worst symptom by condition, before and after intervention, 0 = none at all, 10 = worst ever (Self-monitoring data).

Figure 16.

Mean subjective magnitude ratings of energy level by condition, before and after intervention, 0 = none at all, 10 = most ever (Self-monitoring data).
WLC conditions, and did not change in the SMAC condition. Mean percent
decrease in the CB conditions was 41% (GE) and 20% (IT), and 12% in the
WLC condition. As shown in Table 33 and Figure 16, ratings of energy
level increased in the CB conditions (by 11%), and decreased slightly (by
2%) in the control conditions.

In order to examine the effects of the CB conditions, one-way
ANOVA's were performed on pre-post change scores of ratings of intensity
of worst symptom and energy level. Summary data are presented in Table
34. Results of F-tests are presented in Appendix J. No statistically
significant between-group differences were found for either measure.

Chest discomfort and behavioural measures. Pre and post
intervention summary data are presented in Table 35 for the chest
discomfort and behavioural measures. These measures include reported
number of episodes of leisure exercise, reported number of hours in which
worst symptom and any chest discomfort symptom occurred; and reported
number of cardiac and non-cardiac pills ingested for chest discomfort.
Only those subjects reporting cardiac/non-cardiac medication ingestion
are included in the summary data and analyses of medication intake. For
all measures, individual subject totals were calculated by summing the
number of episodes/hours/pills ingested over the 14 day period. Group
means were then calculated by summing individual totals and dividing by
the total number of subjects per condition.

As shown in Table 35 and Figure 17, increases in the number of
episodes of leisure exercise were reported by the CB and WLC conditions,
and a decrease was reported by the SMAC. Mean percent increases were
<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Intensity of worst symptom over 14 days</th>
<th>Energy level over 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group Education</td>
<td>23</td>
<td>1.3</td>
<td>-0.4</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>(2.1)</td>
<td>(0.9)</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>12</td>
<td>0.5</td>
<td>-0.5</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>(1.2)</td>
<td>(1.0)</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Monitoring Attention Control</td>
<td>5</td>
<td>-0.1</td>
<td>0.1</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>(0.8)</td>
<td>(1.0)</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait List Control</td>
<td>10</td>
<td>0.3</td>
<td>0.0</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>(1.0)</td>
<td>(1.9)</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. The values represent mean prepost change scores derived from mean subjective magnitude ratings of intensity of chest discomfort and energy level made on an hourly basis over the 14 day pre and post periods. Intensity of worst symptom and energy level were rated on a 0-10 scale, (0 = none at all, 10 = worst/most ever). Positive change scores reflect decreases and negative scores reflect increases in measures from pre to post.
Table 35

Mean Reported Number of Episodes of Leisure Exercise, Number of Hours in which Worst and Any Symptom Occurred, and Number of Pills Ingested Before and After Intervention, by Condition (Self-Monitoring)

<table>
<thead>
<tr>
<th>Condition</th>
<th>Pre Hours</th>
<th>Post Hours</th>
<th>Pre Pills</th>
<th>Post Pills</th>
<th>Pre</th>
<th>Post</th>
<th>Cardiac</th>
<th>Non-cardiac</th>
</tr>
</thead>
<tbody>
<tr>
<td>Leisure exercise over 14 days</td>
<td># Episodes</td>
<td># Episodes</td>
<td># Pills ingested over 14 days</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>n</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>23</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>7</td>
<td>14</td>
<td>43</td>
<td>19</td>
<td>74</td>
<td>37</td>
<td>32</td>
<td>42</td>
</tr>
<tr>
<td>SD</td>
<td>(7)</td>
<td>(9)</td>
<td>(30)</td>
<td>(30)</td>
<td>(56)</td>
<td>(36)</td>
<td>(23)</td>
<td>(41)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>12</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>12</td>
<td>36</td>
<td>14</td>
<td>94</td>
<td>33</td>
<td>35</td>
<td>26</td>
</tr>
<tr>
<td>SD</td>
<td>(8)</td>
<td>(7)</td>
<td>(30)</td>
<td>(16)</td>
<td>(56)</td>
<td>(37)</td>
<td>(11)</td>
<td>(30)</td>
</tr>
<tr>
<td>Self-Monitoring</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>3</td>
<td>29</td>
<td>15</td>
<td>90</td>
<td>61</td>
<td>35</td>
<td>21</td>
</tr>
<tr>
<td>SD</td>
<td>(11)</td>
<td>(11)</td>
<td>(25)</td>
<td>(12)</td>
<td>(57)</td>
<td>(46)</td>
<td>(8)</td>
<td>(30)</td>
</tr>
<tr>
<td>Wait List</td>
<td>10</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>10</td>
<td>14</td>
<td>23</td>
<td>12</td>
<td>90</td>
<td>62</td>
<td>18</td>
<td>5</td>
</tr>
<tr>
<td>SD</td>
<td>(8)</td>
<td>(11)</td>
<td>(28)</td>
<td>(14)</td>
<td>(82)</td>
<td>(71)</td>
<td>(13)</td>
<td>(6)</td>
</tr>
</tbody>
</table>

Note. The values represent mean number of episodes of leisure exercise, mean number of episodes of worst or any symptom, and mean number of pills ingested, derived from self-monitoring records made on an hourly basis over the fourteen day pre and post periods.

a Only subjects reporting cardiac medication intake pre-intervention are included in the summary data [GE (n = 6); IT (n = 2); SMAC (n = 2); WLC (n = 4)].

b Only subjects reporting non-cardiac medication intake pre-intervention are included in the summary data [GE (n = 15); IT (n = 7); SMAC (n = 1); WLC (n = 6)].
Figure 17.

Mean reported number of episodes of leisure
exercise per 14 days by condition,
before and after intervention
(Self-monitoring data).
Figure 17

Mean # episodes exercise/14 days (SH)

Time

GE
IT
SMAC
WLC
100% and 20% for the GE and IT, respectively, and 40% for the WLC; mean percent decrease for the SMAC condition was 70%.

All conditions showed decreases in the number of hours in which the worst symptom or any chest discomfort symptom occurred, as shown in Table 35 and Figures 18 and 19. Mean percent change for hours of any symptom appeared greater for the CB conditions [50% (GE), and 65% (IT)] than for the control conditions [32% (SMAC), and 31% (WLC)].

Finally, as shown in Table 35 and Figure 20, the GE condition reported an increase in cardiac medication intake, and the IT and control conditions reported decreases in intake. Again, the small number of subjects per group using cardiac medications must be taken into account when considering these data. As shown in Table 35 and Figure 21, decreases in non-cardiac medication intake were reported by the CB and WLC conditions, with no change for the SMAC condition. N's were larger for non-cardiac than cardiac medication intake with the exception of the SMAC (n = 1). Mean percent decreases for the CB conditions were 60% (GE, n = 15) and 70% (IT, n = 7), and 32% for the WLC condition (n = 6).

One-way ANOVA'S were performed on pre-post change scores of each of the symptom and behavioural measures, with the exception of cardiac medication intake (because of small n's). Change score summary data are presented in Table 36. F statistics are presented in Appendix J. Statistically significant between-group differences were found for reported number of episodes of leisure exercise, F (3,46) = 3.82, p < .025. Tukey post hoc multiple comparisons indicated that increases in reported number of episodes of exercise were greater in the GE condition
Figure 18.

Mean reported number of hours in which worst symptom occurred per 14 days by condition, before and after intervention
(Self-monitoring data).

Figure 19.

Mean reported number of hours in which chest discomfort occurred per 14 days by condition, before and after intervention
(Self-monitoring data).
Figure 20.

Mean reported number of cardiac pills ingested per 14 days by condition, before and after intervention (Self-monitoring data).

Figure 21.

Mean reported number of non-cardiac pills ingested per 14 days by condition, before and after intervention (Self-monitoring data)
Table 36

Mean Pre-post Change Scores of Mean Report Number of Episodes of Leisure Exercise, Number of Hours in which Worst or Any Symptom Occurred, and Number of Pills Ingested by Condition (Self-Monitoring)

<table>
<thead>
<tr>
<th>Condition</th>
<th># Episodes *</th>
<th># Hours in which worst symptom occurred over 14 days</th>
<th># Hours in which any symptom occurred over 14 days</th>
<th># Pills ingested over 14 days</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Group</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Education</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>-7.6</td>
<td>24</td>
<td>37</td>
<td>9</td>
</tr>
<tr>
<td>SD</td>
<td>(8.6)</td>
<td>(46)</td>
<td>(49)</td>
<td>(22)</td>
</tr>
<tr>
<td><strong>Individual</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>-1.8</td>
<td>22</td>
<td>61</td>
<td>7</td>
</tr>
<tr>
<td>SD</td>
<td>(5.0)</td>
<td>(30)</td>
<td>(55)</td>
<td>(6)</td>
</tr>
<tr>
<td><strong>Self-Monitoring</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention Control</td>
<td>5</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>6.6</td>
<td>14</td>
<td>29</td>
<td></td>
</tr>
<tr>
<td>SD</td>
<td>(10.0)</td>
<td>(28)</td>
<td>(22)</td>
<td></td>
</tr>
<tr>
<td><strong>Wait List</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>-4.1</td>
<td>11</td>
<td>28</td>
<td>6</td>
</tr>
<tr>
<td>SD</td>
<td>(12.1)</td>
<td>(23)</td>
<td>(54)</td>
<td>(7)</td>
</tr>
</tbody>
</table>

Note. The values represent mean pre-post change scores derived from mean number of episodes of leisure exercise, hours of worst and any symptom, and medication intake, made on an hourly basis over the 14 day pre and post periods. Positive change scores reflect mean decreases and negative scores reflect mean increases in ratings from pre to post.

* Only subjects reporting non-cardiac medication intake pre-intervention are included in the analysis (GE (n = 15); IT (n = 7); WLC (n = 6)). The one SMAC subject reporting non-cardiac medication intake is excluded from analysis to allow for comparison of GE, IT, and WLC data.

* p < .025
than in the SMAC, p < .001. No between-group differences were found for number of hours in which chest discomfort symptoms occurred, or number of non-cardiac pills ingested for chest discomfort. Cardiac medication intake data were not analyzed because of small number of subjects per group using cardiac medication.

Psychometric "Locus of Control" Measure

Pre and post summary data for the Health Locus of Control Scale (Wallston et al., 1976) are presented in Table 37. High scores are indicative of greater externality, and low scores indicative of greater internality. As shown in Table 37 and Figure 22, shifts toward greater internality occurred in the CB conditions, while either no change or a slight shift toward greater externality occurred in the control conditions.

In order to examine the effects of the CB interventions, a one-way ANOVA was performed on pre-post change scores from the Health Locus of Control Scale. Summary data are presented in Table 37. Results of the F-test are presented in Appendix J. Statistically significant between-group differences were found, F (3,65) = 4.72, p < .005. Tukey post hoc multiple comparisons revealed that shifts toward greater internality were greater in the GE condition than in the WLC (p < .025) and SMAC conditions (p < .05).
Table 37

Mean Prepost Scores and Mean Prepost Change Scores of Health Locus of Control Scale by Condition

<table>
<thead>
<tr>
<th>Condition</th>
<th>n</th>
<th>Pre</th>
<th>Post</th>
<th>Change* score</th>
</tr>
</thead>
<tbody>
<tr>
<td>Health Locus of Control Scale Scores</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Condition</td>
<td>n</td>
<td>Pre</td>
<td>Post</td>
<td>Change* score</td>
</tr>
<tr>
<td>Group Education</td>
<td>28</td>
<td>37.7</td>
<td>32.8</td>
<td>4.9</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>37.7</td>
<td>32.8</td>
<td>4.9</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>(9.0)</td>
<td>(6.6)</td>
<td>(6.9)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>19</td>
<td>38.1</td>
<td>33.2</td>
<td>4.9</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>38.1</td>
<td>33.2</td>
<td>4.9</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>(5.9)</td>
<td>(5.6)</td>
<td>(5.0)</td>
</tr>
<tr>
<td>Self-Monitoring Attention Control</td>
<td>7</td>
<td>34.3</td>
<td>34.4</td>
<td>-0.1</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>34.3</td>
<td>34.4</td>
<td>-0.1</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>(6.8)</td>
<td>(5.7)</td>
<td>(5.9)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td>15</td>
<td>36.1</td>
<td>37.1</td>
<td>-1.0</td>
</tr>
<tr>
<td>M</td>
<td></td>
<td>36.1</td>
<td>37.1</td>
<td>-1.0</td>
</tr>
<tr>
<td>SD</td>
<td></td>
<td>(7.8)</td>
<td>(8.1)</td>
<td>(4.4)</td>
</tr>
</tbody>
</table>

Note. Low prepost scores reflect greater "internality." Positive change scores reflect a shift toward greater "externality."

* p < .005.
Figure 22.

Mean health locus of control score by condition, before and after intervention; high scores reflect greater "internality," low scores reflect greater "externality."
Figure 22

Mean Health Locus of Control Score

Time

Pre Post

SE
IT
SMAC
WLC
In summary, statistically significant between-group differences were found between the cognitive-behavioural (GE and IT) and WLC conditions on six of the seven subjective magnitude measures of illness, indicating greater decreases in self-reported disability/limitations in the GE and/or IT subjects than in wait list controls. The data also indicate that increases in ratings of physical activity level were greater in the GE and IT conditions than in the WLC. No statistically significant between-group differences were found on symptom or behavioural measures of illness obtained from questionnaires. However, the data are in the expected direction for reported number of episodes of leisure exercise and chest discomfort, and reported number of non-cardiac pills taken for chest discomfort.

With regard to self-monitoring data, statistically significant between-group differences in the anticipated direction were found on reported number of episodes of leisure exercise. While not significant, the data on energy level, worst symptom intensity, number of hours in which chest discomfort occurred, and non-cardiac medication intake are in the expected direction. Analyses of psychometric data revealed that the GE intervention resulted in greater "internal" shifts than the WLC or SMAC conditions.
Discussion

The results of the present study provide the first known report on the efficacy of cognitive-behavioural interventions at lowering the degree of illness in individuals with chronic, unexplained chest discomfort. Statistically significant between-group differences were found that supported the efficacy of the cognitive-behavioural interventions over the SMAC and the WLC conditions. These differences were found primarily on measures of cognition or beliefs (e.g., ratings of disability and limitations, health locus of control), rather than on measures of overt behaviour (e.g., medication intake, physician visits). Statistically significant differences were found between groups on one behavioural measure from self-monitoring, number of episodes of leisure exercise. From hereafter, this will be referred to as "level of physical activity." Data from the symptom and remaining behavioural measures were in the anticipated direction with greater, but not significant improvements in reported illness in the experimental conditions than in the controls.

Outcome data from the two experimental conditions did not differ suggesting that both individual and group formats were effective at lowering reported illness. No related studies were found that compared individual to group CB interventions for chronic pain. From an inspection of group means, it appears that the GE condition was more effective than the IT condition at increasing the level of physical activity. Mean percent increase in the number of episodes of leisure
exercise in the GE and IT conditions was 100% and 20%, respectively. However, these differences may reflect the lower, pre-intervention level of physical activity reported by the GE condition relative to that reported by the IT condition, rather than actual differences in the efficacy of the group and individual interventions at increasing activity level.

As discussed in Chapter 3, an individual's beliefs and attributions are considered important in a cognitive-behavioural analysis of illness behaviour. It follows that changes in beliefs regarding the significance of symptoms are important goals of intervention. In the present study these changes occurred, as measured by decreases in level of reported disability and limitations on activities attributed to chest discomfort.

The improvements in subjective measures of illness found in the present study are consistent with results of CB outpatient interventions for chronic pain (Herman and Baptiste, 1981; Large, 1985; Moore and Chaney, 1985; Turner, 1982). As discussed previously, results of those studies indicated improvements in pain level ratings and mood, and on global measures of illness. However, results of individual items or scales from these measures were not presented, so conclusions regarding specific areas of improvement are not possible. Furthermore, symptom frequency was not reported in any of the studies. Rather, pain ratings were made on visual analogue scales (VAS), and in some cases, the nature of the ratings were not specifically described (e.g., "pain perception"). Finally, none of the studies reported the use of self-monitoring as part
of treatment, or as a means of providing outcome data.

Improvements in activity level and medication intake for chest discomfort (per self-monitoring and questionnaire) found in the CB conditions are consistent with the findings of operant interventions for chronic pain (Linton, 1986), discussed previously. In the present study, subjects in the CB conditions reported mean increases in physical activity level (per self-monitoring) of 100% (CE) and 20% (IT) compared to a 33% increase in "uptime" (time spent in a non-reclining position) reported by Fordyce et al. (1973).

While no statistically significant between-group differences were found in the present study on medication intake, mean percent decreases for non-cardiac medication intake (per self-monitoring) for the CE and IT conditions were 60% and 70%. These results seem comparable to the 50% decrease in drug intake (analgesic, sedative, and hypnotic) reported in the Fordyce et al. (1973) study. The absence of effects on cardiac medication intake may be at least partially explained by the fact the nearly all of the cardiac medications are taken on a prescribed regimen, rather than on an "as needed" basis, as are the majority of the non-cardiac medications.

These comparisons of changes in activity level and non-cardiac medication intake reflect positively on the efficacy of the CB interventions used in the present study, particularly when taking into account the fact that the results of Fordyce et al. (1973) were obtained in an inpatient setting where there is a greater degree of control by the experimenter than in outpatient settings.
Self-monitoring procedure. In the present study, complete pre and post intervention self-monitoring data were available on 73% of subjects. This degree of compliance is consistent with that reported in previous studies. For example, in the Norman et al. (1982) study (described below), a 52-93% compliance rate was reported, depending upon which incentive strategies were employed (telephone reminder, mailed reminder, lottery ticket). The 73% completion rate in the present study compares well when the frequency (hourly) and duration (up to eight months) of monitoring is taken into account.

Decreases in frequency of chest discomfort symptoms occurred in all conditions. One factor that may account for this is the "fall off effect," described as a lack of willingness to complete self-monitoring in the same detail as time passes (Mooney, 1962 in Verbrugge, 1980). For example, Norman et al. (1982) found a consistent drop in reported illness over time (5-25% over a 3 month period). Subjects in that study monitored once every two weeks for a period of two years; data were actually completed retrospectively at the end of a three-day period, which in itself presents problems related to recall (Nisbett and Wilson, 1977). Illness measures included number of days with symptoms and number of symptom days on which (a) an action was taken (e.g., medication), (b) there was a change in activity, or (c) there was contact with a health professional (Norman et al., 1982).

If there is indeed a fall off effect, decreases in reported symptoms in the SMAC would be expected to be similar to the CB conditions, because subjects in those conditions were expected to monitor
on an hourly basis as part of intervention for as long as 6-8 months. Furthermore, decreases in reported symptoms in the CB and SMAC conditions would be expected to be greater than that reported by the WLC because subjects in that condition only monitored for pre and post data collection (two 14 day periods separated by 4-8 months). However, if there is some treatment effect, the CB conditions would be expected to show greater decreases than the SMAC and the WLC conditions. This did occur. Mean percent decreases in reported symptoms per self-monitoring ranged from 50-65% in the CB conditions and 31-32% in the control conditions. The mean percent decrease in reported symptoms in the SMAC and WLC conditions is also in keeping with the 5-25% decrease in reported illness in the Norman et al. (1982) study, which was attributed to the "fall off effect."

The effect of long-term monitoring on subjective magnitude ratings of illness (e.g., symptom intensity and energy level) and specific behaviours (e.g., medication intake, activity level) is not known. However, data from the CB conditions in the present study, for example, energy level ratings and frequency of leisure exercise, suggest that the "fall off effect" may not apply to these types of measures.

Self-monitoring attention control condition. The small percentage of subjects who completed intervention (39% or 7/18) makes valid comparisons of outcome data with other conditions difficult. Nevertheless, it is argued that while the SMAC procedure caused those subjects who completed intervention to report "feeling" better, it did not result in changes in behaviour. From a cognitive-behavioural
perspective, however, these changes in "feelings" are not likely to be maintained without related changes in behaviours (Turk et al., 1983).

Data from the seven SMAC subjects who completed intervention suggest that the SMAC condition was effective in lowering certain aspects of illness. Mean percent decreases in the disability and limitation ratings ranged from 48-64%. An overall decrease in the frequency of reported chest discomfort was also found in the SMAC condition. However, no improvements were found for physical activity level or the locus of control measure. In fact, an overall decrease in the number of hours in which physical activity occurred was recorded in the self-monitoring.

There are several possible explanations for the improvements in subjective magnitude illness ratings and symptom frequency seen in the SMAC condition. Changes in these measures may reflect the demand characteristics of participating in a study which was designed to lower illness in a chest discomfort population. Furthermore, it is possible that the decreases in reported symptom frequency per self-monitoring in the SMAC condition were a result of the "fall off effect," as discussed above. However, it seems unlikely that the overall reductions in reported chest discomfort frequency were a result of the use of symptom reduction strategies (e.g., relaxation training) because they were not taught to the SMAC subjects. It is possible, but seems unlikely, that subjects began using them on their own.

Improvements in disability and limitation ratings in the SMAC condition are consistent with the subjective improvement reported by subjects who undergo non-directive or client-centered therapy (Rogers,
1951). It is argued here that in many respects, the SMAC procedure was similar to non-directive therapy because in the SMAC, subjects were encouraged to talk about their discomfort and related problems, while no education or directives regarding behaviour change were given by the therapist. Finally, subjects may have become more objective about their discomfort as a direct effect of the self-monitoring, and as a result perceived it as less threatening (resulting in lower disability/limitation ratings), paid less attention to it, and subsequently noticed and reported it less frequently.

One final explanation for the improvement seen in the SMAC condition is that the results reflect attrition factors rather than the efficacy of the SMAC "intervention." It is possible that those subjects who were improving completed intervention, while those who were not improving dropped out. If this were the case, post-treatment SMAC data would be inflated, and would reflect "who stayed in" rather than the efficacy of the SMAC procedure itself. The same may be said of the experimental conditions. However, there were proportionately fewer subjects who dropped out of those conditions, so the effect would not be as great.

While "post" data are not available on SMAC dropouts because attempts to collect these data from SMAC subjects were unsuccessful, pre-intervention data from dropouts (n = 11) and completed SMAC subjects (n = 7) are consistent with this hypothesis. Inspection of the data reveals that, overall, subjects who completed the SMAC condition reported higher levels of illness than dropouts (data are presented in Appendix H). This
suggests that the subjects who completed intervention were more disabled at the start of intervention, had more room to improve, and were possibly more motivated to stay in intervention than subjects who dropped out.

Finally, no conclusions can be drawn regarding the effect of the SMAC intervention on medication intake because of the very small number of subjects reporting cardiac (n = 2) and non-cardiac (n = 1) medication intake for chest discomfort. An examination of individual data revealed that only one subject using cardiac medications reported reductions in intake, while the other reported no change from pre to post intervention. The one subject reporting non-cardiac medication intake reported no change from pre to post intervention.

Wait list control condition. Data from the WLC subjects indicate that subjects do improve on their own, although not to the extent of "treated" subjects. Improvements were found for disability/limitation ratings and symptom frequency per self-monitoring, however these were of lesser magnitude than improvements in the GE and IT conditions. According to self-monitoring data, subjects in the WLC condition also increased their physical activity level from before to after intervention. An examination of individual subject self-monitoring data revealed that 60% (6/10) of WLC subjects reported increases in the number of episodes of physical exercise. Conclusions regarding medication intake are difficult because of small n's (cardiac medication: n = 4; non-cardiac medication intake: n = 6).

In the WLC condition, the summary data from questionnaires are not consistent with the improvements indicated by the SM data. In
questionnaires, subjects reported an increase in symptom frequency and no change in the frequency of physical activity or non-cardiac medication intake. These results are consistent with self-report data from previous CB studies indicating no change or a worsening of illness in wait list control subjects (Moore and Chaney, 1985; Turner, 1982). Previous CB chronic pain research appears to have used questionnaires to collect outcome data, and as a result, no comparisons can be made with self-monitoring data from the present study.

Assuming greater accuracy of self-monitoring data, it is possible that subjects did not report (in questionnaires), either intentionally or unknowingly, the changes in behaviour and symptom frequency when asked at post data collection, for fear that they would not be eligible for participation in intervention. However, this seems unlikely given the improvements in ratings of disability and limitations.

A more parsimonious explanation is that the discrepancies between self-monitoring and questionnaire data occurred because WLC subjects did not have the benefits of continuous self-monitoring and related discussions, which are believed to make individuals more objective about their own behaviour (Nelson, 1977). Further support for this explanation is found in data from the CE, IT and SMAC conditions in which subjects self-monitored for the duration of the study: Direction of change and in some cases magnitude of change were similar for nearly all of the comparable measures obtained from SM and Q.
In summary, the present study is the first known controlled experiment demonstrating the efficacy of cognitive-behavioural interventions in lowering self-reported illness in a chest discomfort population. Results of the present study compare favorably to those of CB and operant-based intervention studies with chronic pain patients. The data indicate that both individual and group CB interventions are effective at lowering perceived level of disability and limitations on activities, shifting locus of control toward "internal," decreasing the frequency of reported chest discomfort and non-cardiac medication intake, and increasing reported activity level.

Results of between-group analyses of variance indicate that the CB interventions were more effective than the WLC in altering level of reported illness, as measured by disability and limitation ratings, and locus of control scores. In addition, the CB conditions were more effective than the SMAC in increasing level of physical activity. Data from the CB conditions also indicate that there were substantial improvements in reported symptom frequency and non-cardiac medication intake, that were of lesser magnitude in the control conditions. It is argued here that statistically significant between-group differences were not found for these measures in part because of the large within-group variances, in the case of symptom frequency, and small number of subjects per group who reported using medication for chest discomfort.

The small proportion of subjects who completed the SMAC condition makes comparisons with outcome data from other conditions difficult. In the seven subjects who completed intervention,
improvements were seen in subjective magnitude ratings of disability and limitations and reported symptom frequency, but not in activity level. There are several possible explanations for these improvements, including the demand characteristics of the study, direct effects of self-monitoring, and the therapeutic effects of attention in a "non-directive" therapy setting. It was also argued that some of the improvement seen in the SMAC post data may have been the result of attrition factors. Those who completed the SMAC intervention may have been those who were improving, while those who dropped out were not improving, resulting in "inflated" post SMAC data.

In the WLC condition, the improvement in subjective magnitude ratings and symptom and behavioural measures from self-monitoring is consistent with the finding that one third of subjects tend to improve on their own. However, these data were not reflected in the self-report behavioural data from questionnaires. It was suggested that this discrepancy occurred because the WLC subjects did not have the benefit of ongoing self-monitoring and related discussions, as did the CB and SMAC conditions. From a cognitive-behavioural perspective, self-monitoring is believed to result in greater awareness of one's behaviour and the related effects of the environment.
Chapter 8
RESULTS 3
CHEST DISCOMFORT INTERVENTION STUDY

Comparisons Among Measures

The analyses reported in this section focus on four issues: 1) the relationship between questionnaire measures and self-monitoring data;
2) the relationships between symptom characteristics (i.e., reported frequency and intensity of chest discomfort) and cognitive and behavioural measures of illness; 3) the relationships between medication intake and other aspects of illness; and 4) the relationship between physical exercise and other measures of illness.

The pre-intervention data presented in this section are from the 50 subjects on whom pre and post SM data were collected. Correlational analyses and t-tests were computed on illness data from the 38 subjects on whom complete SM and Q data were available (i.e., no missing data), except in the case of limitations on work activity for income (N = 25 subjects who were employed).

In order to examine the relationship between comparable questionnaire and self-monitoring measures, Pearson product moment correlations and t-tests were computed for the five self-report measures on which comparable SM and Q data were collected: number of episodes of leisure exercise, number of cardiac and non-cardiac pills taken for chest
discomfort, and frequency of chest discomfort (worst symptom and the composite measure). Results of Pearson product moment correlations revealed significant positive correlations between SM and Q data for all five measures (see Table 38).

SM and Q measures were also compared by computing t-tests on SM and Q means. In order to make the data comparable with respect to "time," individual SM data for symptom frequencies were multiplied by two (because symptom frequency was calculated per month for Q and per 14 days in SM), and individual Q data for leisure exercise were multiplied by two (because frequency of LE was calculated per week in Q and per 14 days in SM). (Note: The operational definitions of SM and Q symptom frequency were somewhat different. SM symptom frequency data were based on number of hours in which worst/any chest discomfort symptom were reported, and Q data were based on the reported number of episodes of worst/any symptom. However, the data were considered comparable and as they were both measures of chest discomfort frequency.)

An examination of SM and Q means (see Table 39) suggests that subjects underestimated symptom frequency in Q compared to SM. The overall frequency of worst symptom per SM is 61% higher than that from Q, and overall frequency of any symptom per SM is 85% higher than that from Q. The reverse was found for medication intake, suggesting that subjects overestimated medication intake in Q compared to SM. The overall frequency of medication intake from Q was 99% higher than that from SM for non-cardiac medication intake, and was 32% higher than that from SM
Table 38

Pearson Product-Moment Correlations between Comparable Questionnaire and Self-Monitoring Measures,

Pre-intervention (N = 38)

<table>
<thead>
<tr>
<th>Variable</th>
<th>r</th>
</tr>
</thead>
<tbody>
<tr>
<td>Frequency of leisure exercise per 14 days</td>
<td>.50 **</td>
</tr>
<tr>
<td>Frequency of worst symptom per month</td>
<td>.36 *</td>
</tr>
<tr>
<td>Frequency of total symptoms per month</td>
<td>.32 *</td>
</tr>
<tr>
<td>Frequency of cardiac medication per 14 days</td>
<td>.90 **</td>
</tr>
<tr>
<td>Frequency of non-cardiac medication per 14 days</td>
<td>.48 **</td>
</tr>
</tbody>
</table>

* p < .025. ** p < .001.
Table 39

A Comparison of Mean Number of Episodes/Hours of Leisure Exercise and Chest Discomfort, and Mean Number of Pills Ingested from Self-Monitoring and Questionnaire Measures on Comparable Variables, Pre-intervention (N= 38)

<table>
<thead>
<tr>
<th>Source of data</th>
<th>Leisure exercise</th>
<th>Worst symptom</th>
<th>Total symptom</th>
<th>Non-cardiac medication</th>
<th>Cardiac medication</th>
</tr>
</thead>
<tbody>
<tr>
<td>Self-monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>7.7</td>
<td>74</td>
<td>179</td>
<td>6.8</td>
<td>8.4</td>
</tr>
<tr>
<td>SD</td>
<td>7.4</td>
<td>81</td>
<td>127</td>
<td>10.5</td>
<td>16.2</td>
</tr>
<tr>
<td>Questionnaire</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>8.5</td>
<td>46</td>
<td>97</td>
<td>13.5</td>
<td>11.1</td>
</tr>
<tr>
<td>SD</td>
<td>7.6</td>
<td>61</td>
<td>86</td>
<td>21.3</td>
<td>22.7</td>
</tr>
</tbody>
</table>

Note. In order to make the SM and Q data comparable with respect to time, the following manipulations were made on individual data: For “number of episodes of leisure exercise,” individual questionnaire data (calculated for seven days) were multiplied by two; for symptom frequency (worst and any symptom), individual SM data (collected over a 14 day period) were multiplied by two.

\[ a \quad \text{per 14 days.} \quad b \quad \text{per month.} \]

\* p < .05. \quad ** p < .001.
for cardiac medication intake. SM and Q means for frequency of leisure exercise do not appear to differ.

Results of t-tests comparing SM and Q means indicate that SM data are significantly higher than Q data for chest discomfort frequency (worst symptom: t (37) = 4.84, p < .05; any symptom: t (37) = 16.65, p < .001), and that Q data are significantly higher than SM data for frequency of non-cardiac medication intake (t (37) = 5.22, p < .05). Q and SM data did not differ significantly for frequency of leisure exercise or cardiac medication intake.

The second group of correlational analyses addressed two questions: 1) Are symptom reports related to other aspects of illness? and 2) Are changes in symptom reports necessary for changes in reported level of illness? In the Retrospective Chest Pain Study, frequency of chest discomfort was identified as a predictor of illness. As discussed previously, the relationship between symptoms and other aspects of illness is believed to be mediated by cognitions, such as beliefs relating to hurt and harm issues, rather than being a direct effect of the subjective characteristics of symptoms themselves. In the present study, it was anticipated that symptom measures, such as reported frequency and intensity of chest discomfort, were positively related to pre-intervention level of illness, and that improvements in symptoms may be positively related to improvements in other aspects of illness. However, it was further anticipated that decreases in symptoms were not a necessary condition for improvements in illness. This latter prediction was based on the nature of the relationship between symptoms and illness.
(i.e., that it is mediated by cognitions), and the belief that response
to symptoms may change as a result of alterations in cognitions, while
subjective aspects of symptoms may remain stable.

In order to test these hypotheses, Pearson product moment
correlations were computed on pre-intervention and prepost change score
data for the following measures of illness: Symptom-related measures
were frequency (Q and SM) and intensity (SM) of worst symptom, and the
composite frequency of chest discomfort measure (Q and SM). Measures of
covert behaviours were subjective ratings of level of disability and
limitations on routine daily and leisure exercise activities attributed
to chest discomfort (Q). The Health Locus of Control Scale provided a
measure of belief. "Limitations on work activity for income" was not
included in the analyses because of the reduced number of subjects on
this measure (i.e., data were collected only from subjects working for
income). Measures of specific illness behaviours were number of pills
taken for chest discomfort (cardiac and non-cardiac; Q and SM), number of
physician visits made on the basis of chest discomfort (Q), and number of
episodes of leisure exercise (Q and SM).

The results of the correlational analyses computed on pre-
intervention data support the hypotheses (see Tables 40 and 41).
Relationships were found between symptom variables and four illness
measures. The data indicate a positive relationship between reported
worst symptom frequency (Q) and subjective magnitude ratings of
limitations on leisure exercise, and also between intensity of worst
symptom (SM) and ratings of limitations on leisure exercise (see Table
Table 40

Pearson Product-Moment Correlations between Frequency and Intensity of Chest Discomfort, and Cognitive Measures of Illness, Pre-intervention (N = 38)

<table>
<thead>
<tr>
<th>Symptom Variable</th>
<th>Disability/ Limitations/</th>
<th>Limitations on</th>
<th>Health</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>worst Chest</td>
<td>Work activity for income</td>
<td>Routine daily activities</td>
</tr>
<tr>
<td>Symptom symptom</td>
<td>symptom discomfort</td>
<td>income</td>
<td>activities</td>
</tr>
<tr>
<td>Frequency/worst</td>
<td>.11</td>
<td>.03</td>
<td>.11</td>
</tr>
<tr>
<td>symptom (Q)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency/worst</td>
<td>-.07</td>
<td>-.21</td>
<td>-.06</td>
</tr>
<tr>
<td>symptom (SM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency/total</td>
<td>-</td>
<td>-.12</td>
<td>.30</td>
</tr>
<tr>
<td>symptom (Q)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Frequency/total</td>
<td>-</td>
<td>-.20</td>
<td>-.14</td>
</tr>
<tr>
<td>symptom (SM)</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Intensity/worst</td>
<td>.19</td>
<td>.12</td>
<td>-.28</td>
</tr>
<tr>
<td>symptom (SM)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Note. Similar results were obtained when using Spearman Rank Correlations. Q = questionnaire data; SM = self-monitoring data.

a n = 25 (only those working for income included in analysis).
b Worst symptom intensity/frequency (Q) correlation = .25, n.s.
c Worst symptom intensity/frequency (SM) correlation = -.10, n.s.
* p < .05.
### Table 41

**Pearson Product-Moment Correlations between Frequency and Intensity of Chest Discomfort, and Behavioural Measures of Illness (N = 38), Pre-intervention**

<table>
<thead>
<tr>
<th>Symptom variable</th>
<th>Non-cardiac</th>
<th>Cardiac</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(O) (SM)</td>
<td>(O) (SM)</td>
</tr>
<tr>
<td><strong>Freq/worst symptom (O)</strong></td>
<td>.07 .09</td>
<td>-.18 -.26</td>
</tr>
<tr>
<td><strong>Freq/worst symptom (SM)</strong></td>
<td>-.17</td>
<td>-.17 -.21</td>
</tr>
<tr>
<td><strong>Freq/total symptom (O)</strong></td>
<td>.34** .22</td>
<td>-.06 -.16</td>
</tr>
<tr>
<td><strong>Freq/total symptom (SM)</strong></td>
<td>.05</td>
<td>.07 .07</td>
</tr>
<tr>
<td><strong>Intensity/worst symptom (SM)</strong></td>
<td>.14</td>
<td>-.07 -.13</td>
</tr>
</tbody>
</table>

**Note.** Similar results were obtained when using Spearman Rank Correlations. O = questionnaire data; SM = self-monitoring data.

* p < .05. ** p < .025. *** p < .005.
Subjects reporting more frequent and intense symptoms tended to report greater limitations on leisure exercise activities. The data also indicate that reported frequency of chest discomfort (SM and Q) was positively correlated with self-reported number of physician visits (Q) and number of non-cardiac pills ingested (Q) (see Table 41). Subjects reporting more frequent chest discomfort tended to report a greater number of physician visits made on the basis of chest discomfort, and also reported more frequent intake of non-cardiac medications for chest discomfort. Furthermore, the data indicate a negative relationship between intensity of chest discomfort (per SM) and frequency of leisure exercise (per SM) (see Table 41). Subjects reporting more intense chest discomfort tended to report exercising less frequently.

Results of correlational analyses computed on change score data provide further support for the hypotheses. Greater decreases in reported frequency of chest discomfort were related to decreases in ratings of limitations attributed to chest discomfort, shifts in "locus of control" toward "internal," decreases in reported cardiac medication intake, and increases in the reported frequency of leisure exercise. Reports of decreases in symptom frequency (worst symptom and any symptom) (SM) were positively related to: (a) decreases in subjective magnitude ratings of limitations attributed to chest discomfort \( r = .41 \) \( p < .025 \) and \( .40 \) \( p < .025 \), for worst and any symptom, respectively; (b) decreases (i.e., shifts toward "internal") in Health Locus of Control scores \( r = .39 \) \( p < .025 \) and \( .46 \) \( p < .005 \), for worst and any symptom, respectively; and (c) reported cardiac medication intake (Q) \( r = .33 \) \( p < .05 \) for worst
symptom]. There was also a relationship between decreases in reported symptom frequency (Q) and decreases in reports of cardiac medication intake (Q) \[ r = .35 \ (p < .05) \] and \[ r = .32 \ (p < .05) \] for worst and any symptom, respectively. Finally, there was a relationship between decreases in reported symptom frequency (SM) and increases in the reported frequency of leisure exercise (SM) \[ r = .31 \ (p < .05) \], for any symptom.

Finally, support was also found for the hypothesis that symptom reductions are not a necessary condition for improvements in illness. The correlation between pre-post changes in disability attributed to worst symptom and changes in the reported frequency of that symptom (Q) was low \( r = .20 \) and not statistically significant. More importantly, large pre-post reductions in disability attributed to worst symptom were reported by the 13 subjects receiving individual or group cognitive-behavioural intervention who reported no change or an actual increase in the frequency of their worst symptom \((t(12) = 5.01, p < .001, \text{see Figure 23})\).

The third set of Pearson \( r \) correlations examined the relationship between medication intake and other illness measures. The rationale for these analyses was that medication intake is believed to be incompatible with cognitions of "health," and that it reinforces illness cognitions and related behaviours. The results of the Retrospective Chest Pain Study, in which cardiac medication use was identified as a predictor of illness, are consistent with this hypothesis. In the present study, it was expected that frequency of non-cardiac medication
Figure 23.

Comparison of pre-treatment to post-treatment changes in the frequency of "worst symptom" (open squares) versus disability attributed to that symptom (closed squares). Means represent data from the 13/43 treated subjects who reported no reduction in the frequency of chest discomfort.
intake would be more related to other illness measures than cardiac medication intake. This prediction was based on the assumption that non-cardiac medications are generally taken on an "as needed" basis and may be more subject to the effects of the environment than cardiac medications, which are generally taken on a "quota" basis (e.g., three times a day), rather than being contingent on the occurrence of symptoms.

Results of several of the correlations support the hypothesis. There was a positive correlation between reported number of non-cardiac pills ingested for chest discomfort (Q or SM) and ratings of disability and limitations on activities attributed to chest discomfort (see Table 42). In addition, number of non-cardiac pills ingested (Q) was negatively related to frequency of leisure exercise (SM) \( r = - .28, p < .05 \), and positively related to reported number of visits to physicians \( r = .36, p < .025 \). Number of non-cardiac pills ingested (SM) was also positively related to reported number of physician visits \( r = .31, p < .05 \). As expected, frequency of cardiac medication intake was not related to other pre-intervention measures of illness.

The relationship between medication intake and other aspects of illness received further support in analyses of change score data. Reports of decreases in non-cardiac medication intake (Q) were positively related to decreases in subjective magnitude ratings of disability attributed to worst symptom \( r = .34, p < .05 \), limitations on routine daily activities \( r = .41, p < .025 \), and limitations on leisure exercise \( r = .32, p < .05 \).
Table 42

Pearson Product-Moment Correlations between Medication Intake, Frequency of Leisure Exercise and Cognitive and Other Behavioural Measures of Illness, Pre-intervention (n = 38)

<table>
<thead>
<tr>
<th>Disability/ Limitations/ Limitations on Health</th>
<th># Episodes</th>
<th># Visits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Behavioural Variable</td>
<td>Worst symptom</td>
<td>Chest discomfort</td>
</tr>
<tr>
<td>Non-cardiac med intake</td>
<td>(.45****)</td>
<td>(.22)</td>
</tr>
<tr>
<td>(Q)</td>
<td>(.15)</td>
<td>(.03)</td>
</tr>
<tr>
<td>Cardiac med intake</td>
<td>(.02)</td>
<td>(.02)</td>
</tr>
<tr>
<td>(Q)</td>
<td>(.02)</td>
<td>(.01)</td>
</tr>
<tr>
<td># Episodes leisure exercise</td>
<td>(.35**)</td>
<td>(.05)</td>
</tr>
<tr>
<td>(Q)</td>
<td>(.38***)</td>
<td>(.01)</td>
</tr>
</tbody>
</table>

Note. Similar results were obtained when using Spearman Rank Correlations. Q = questionnaire data; SM = self-monitoring data.

\( n = 25 \) (only subjects working for income included in analysis).

* \( p < .05 \). ** \( p < .025 \). *** \( p < .01 \). **** \( p < .005 \).
The fourth set of Pearson r correlations was computed to examine the relationship between physical exercise and level of illness. Because of the assumption that physical exercise is incompatible with cognitions of illness, it was anticipated that frequency of physical activity would be negatively related to level of illness. Results indicate some support for the hypothesis. A negative relationship was found between frequency of leisure exercise (Q and SM) and ratings of disability attributed to worst symptom (see Table 42). Frequency of leisure exercise was also negatively related to locus of control scores (low scores are indicative of greater "internality"). However, frequency of leisure exercise was not related to ratings of limitations on activities, as might be expected.

In summary, correlational analyses of similar SM and Q variables indicated that subjects who reported higher levels of illness in Q also tended to report higher levels of illness in SM. However, analyses of mean SM and Q data using t-tests revealed that subjects underestimated symptom frequency in Q compared to SM, and that subjects overestimated medication intake in Q compared to SM. Frequency of leisure exercise as reported in Q tends to be similar to that reported in SM.

The data provide support for the hypothesis that symptom reports are related to other aspects of illness, but that improvements in symptoms are not necessary for reductions in disability. Pre-intervention correlations indicated that subjects reporting more frequent/intense chest discomfort also reported higher ratings of limitations on leisure exercise, less frequent leisure exercise, and more
frequent non-cardiac medication ingestion and visits to physicians. Change score correlations indicated that subjects reporting greater decreases in the frequency of chest discomfort tended to report greater decreases in limitations attributed to chest discomfort, greater decreases in cardiac medication intake, greater increases in the frequency of leisure exercise, and greater shifts toward "internal." One interpretation is that the shift toward greater internality resulted in a greater tendency to implement the symptom reduction strategies, which in turn may have reduced the frequency of chest discomfort symptoms. However, additional data from treated subjects who reported no change or an increase in symptoms, but who did report significant reductions in disability attributed to worst symptom, suggest that improvements in disability are not dependent upon symptom reductions.

Results also indicated that medication intake is related to other aspects of illness, as predicted. Pre-intervention, subjects who reported taking non-cardiac medications more frequently reported higher levels of disability and limitations, less frequent exercise, and more frequent visits to physicians for chest discomfort. Furthermore, change score analyses revealed that decreases in reported non-cardiac medication intake were related to decreases in ratings of disability and limitations on activities.

The results also provide support for the use of physical exercise as an incompatible response strategy. Relationships were found between frequency of physical activity and disability attributed to worst symptom, health locus of control, and symptom frequency.
Discussion

Three conclusions can be drawn from the data presented in Section 3. The significant correlations between similar SM and Q pre-intervention measures provide some evidence of the reliability of the SM and Q measures. However, the data suggest that subjects tend to underestimate symptom frequency and overestimate medication intake when making retrospective estimates in questionnaires. While it is possible that some of the significant correlations are spurious, the pattern of significant correlations among symptom and illness measures are consistent with a cognitive-behavioural formulation of illness. Finally, the data provide further support for the conclusions drawn in the Retrospective Chest Pain Study.

There are two possible interpretations of the differences in comparable SM and Q data. One assumes that the Q data represent over- or underestimations of what "actually" occurred, and that the SM data are more accurate because they rely less on long term memory (Nelson, 1977; Verbrugge, 1980). The other assumes that both sets of data are accurate.

Assuming that Q data represent over- or underestimations of what "actually" occurred, the underestimation of symptom frequency in Q compared to SM may be primarily the result of lower recall ability in Q reporting. That subjects are better able to recall the frequency or presence of symptoms in the previous hour than in the previous week or month does not seem surprising. This discrepancy is consistent with previous findings for symptom reporting. Verbrugge (1980) found that, in
general, self-monitoring data provide higher counts of symptoms than interviews, particularly in cases of acute conditions, chronic conditions that are disabling, and when symptoms are diffuse and the medical cause is unclear. Individuals in the present study with MVP or NCA and chronic, disabling, and often unexplained chest discomfort fit this description.

One additional factor that may have contributed to the discrepancy between SM and Q symptom frequency is the difference in operational definitions of symptom frequency per Q and SM. In Q, symptom frequency was "reported number of episodes of worst/all symptoms per month." In SM, symptom frequency was operationalized as "the total number of hours in which worst/any symptom was reported over 14 days" (individual totals per SM were doubled in order to make the SM and Q data comparable with respect to time). Given these definitions, two situations may have occurred. An episode of chest discomfort may have lasted for more than one hour, in which case that episode would be reported more than once in SM. Alternatively, there may have been more than one episode of chest discomfort per hour, in which case the number of reported episodes per Q would be higher than that reflected in SM. These situations appear to have occurred with similar frequency, based on an inspection of individual self-monitoring records, and are not believed to have inflated SM data more than Q.

In the case of medication intake, two factors may have contributed to an overestimation in Q compared to SM. One is that all subjects in the present study perceived themselves as disabled and
limited by their symptoms, and 2/3 of subjects reported cardiac attributions for chest discomfort. From a cognitive-behavioural perspective, these cognitions may have affected (inflated) estimates of medication intake, in particular non-cardiac medications, as estimates of intake of these types of medications are believed to be more influenced by conditioning factors than are estimates of cardiac medication intake. The data indicate that this may, in fact, have occurred. The disparity between SM and Q means was greater for non-cardiac medication intake than for cardiac medication intake.

One other factor that could account for the difference between mean SM and Q medication intake is "telescoping." Telescoping is a cognitive distortion process in which individuals group together events which actually occurred over a longer period of time, some of which were outside of the data collection period (Verbrugge, 1980). Data from previous research comparing interview to SM data on medication intake are equivocal, as there is evidence for both under and over-reporting in interviews compared to SM (Verbrugge, 1980).

Alternatively, it may be assumed that both SM and Q data sets are accurate. If this is the case, it may be that self-monitoring had a differential influence on symptom reporting and medication intake. In the case of symptom reporting, self-monitoring may have increased awareness and subsequent reporting of symptoms. In the case of medication intake, self-monitoring may have had an opposite effect (caused a decrease in medication intake). The rationale for this latter effect is not clear. However, it remains a possibility.
In contrast to symptom frequency and medication intake, reports of frequency of leisure exercise from SM and Q were similar. As discussed previously, results of studies examining the relationship between self-report data on activity level (e.g., time spent standing or walking) and that obtained from more objective means, such as trained observers or automated devices, indicate that data from the two sources are correlated, but that self-report data are consistently lower than that obtained by more objective means (Kremer et al., 1981; Sanders, 1983b). No reports of the relationship between SM and observer data on leisure exercise, the activity measure used in the present study, were found. However, if conclusions from previous research were applied to the present data, it would suggest that both estimates of frequency from Q and SM may be low in contrast to "actual" frequency of physical exercise.

In the present study, the relationship identified between symptom frequency/intensity and ratings of limitations on leisure exercise is consistent with results of previous research in which pain intensity ratings were found to be related to reported degree of limitations on, or interference with, activities (Fordyce et al., 1984; Linton, 1985; Naliboff et al., 1985). However, data from the present study are inconsistent with previous findings indicating a lack of relationship between pain ratings and behavioural measures of illness such as activity level and medication intake (Fordyce et al., 1984, Linton, 1985). In the present study, ratings of symptom intensity were negatively related to reports of physical activity frequency. There was
also a relationship between reported frequency of symptoms and measures of specific illness behaviours: frequency of reported non-cardiac medication intake and visits to physicians.

It has been argued that the relationships identified between symptoms and other measures of illness are mediated through cognitions regarding the significance of symptoms (e.g., hurt/harm interpretations), rather than being the direct result of subjective characteristics of symptoms (i.e., their frequency or intensity). Data to support this conclusion come from the 13 treated subjects who reported significant reductions in disability, despite an overall increase in chest discomfort frequency. This strongly suggests that the mechanism of functional improvements is a change in health beliefs, as indicated by the finding that subjects who received cognitive-behavioural intervention evidenced significant changes toward an "internal" locus of control, whereas subjects in the control conditions exhibited no such changes.

"Harm" interpretations of symptoms are viewed as more likely than "hurt" interpretations to result in the belief that symptoms are disabling and limiting, and in related illness behaviours (e.g., medication intakes, avoidance of activity). Furthermore, these mediating cognitions may also have an effect on the subjective experience of symptoms, and subsequent reports of symptom frequency or intensity. Symptoms that have significance for the individual (i.e., those associated with "harm") may be perceived as more intense, and may be noticed and remembered more often, and as a result, reported more frequently. This interpretation is consistent with the availability
heuristic described by Nisbett and Ross (1980): Events that are less salient to the subject (e.g., symptoms that are perceived as non-threatening) are less likely to be recalled than events that are more salient.

One factor that may account for the differences in results, between the present and previous research, is study population. Previous research examining relationships between illness measures has focussed primarily on back pain populations. It is argued that "harm" attributions may have greater significance for, and a subsequently greater effect on individuals with chest discomfort because it is more likely to be viewed as potentially life threatening than other types of chronic pain. It follows that individuals who experience chest discomfort may be more likely than individuals with other types of chronic pain, to act in response to it, for example, go to physicians, take medication, and avoid exercise.

Consistent with the results of the Retrospective Chest Pain Study, the present data suggest that the prescription of medications by physicians may contribute to the development and maintenance of illness cognitions and behaviours. As discussed previously, from a cognitive-behavioural perspective, medication ingestion is incompatible with cognitions of "health," and likely reinforces disease attributions and related illness cognitions and behaviours. Both pre-intervention and change score correlations support this hypothesis. Pre-intervention, subjects reporting more frequent non-cardiac medication intake rated themselves as more disabled and limited by chest discomfort, and also
reported less frequent leisure exercise, more frequent chest discomfort and visits to physicians.

Most chronic pain patients attribute their limitations on physical activity to pain and the belief that activity will increase pain (Fordyce et al., 1981). However, results of previous research do not support a relationship between subjective reports of pain and physical activity. Comparisons of pain ratings and activity level have shown either no relationship or a negative relationship between the two variables (Fordyce et al., 1984; Kremer et al., 1981; Linton, 1985). Furthermore, Fordyce et al. (1981) found a negative relationship between amount of exercise performed and frequency of pain behaviours (e.g., verbal statements about pain, "pain" gestures, gasps, moans, and statements regarding difficulty or inability to perform exercise). Similarly, in the present study, frequency of leisure exercise was negatively related to pre-intervention chest discomfort intensity, increases in exercise frequency were associated with decreases in symptom frequency following intervention.

Fordyce et al. (1982) suggest that individuals with chronic pain may exercise less because of "harm" attributions, anticipatory fear, and the expectation of symptoms, rather than a direct relationship between symptoms and activity. Furthermore, Wood and Bandura (1989) state that subjective states and symptoms such as pain may be interpreted as signs of physical incapability. Moreover, continued avoidance of activity allows for the maintenance of these cognitions because they are
not challenged by conflicting data (i.e., that exercise does not lead to harm or increased symptoms).

Wood and Bandura (1989) state that self-efficacy may be enhanced by increasing physical capability and altering dysfunctional interpretations of somatic information. The successful completion of physical exercise may accomplish both because it increases exercise tolerance and, when not accompanied by an exacerbation of symptoms or disease, may alter dysfunctional interpretations of symptoms. Physical exercise is effective as an incompatible response strategy because it challenges harm attributions, perceptions of frailty and weakness, and lowers anticipatory fear. This is the purpose of the "reattributeion" component of the cognitive-behavioural interventions.

Data from the present study support the use of physical exercise as an incompatible response strategy. Frequency of physical activity was related to disability ratings, locus of control, and symptom frequency. In addition to cognitive mediators, one possible mechanism for the reported decreases in symptoms is that physical exercise may contribute to the disruption of the pain-tension cycle, as regular exercise may reduce muscle tension, thereby reducing associated pain.

In summary, the data provide support for the Disease Illness Distinction Model in two ways. First, the data provide support for the mechanisms involved in the development and maintenance of illness behaviour. Second, the data provide support for the utility of the model with respect to the procedures and clinical strategies that arise from
it. Because of the large number of correlations, it is possible that some of the significant correlations among cognitive and behavioural measures of illness are spurious. Nevertheless, the pattern of significant correlations are consistent with a cognitive-behavioural formulation of illness.

The significant correlations between similar SM and Q measures provide some support for the reliability of these measures. The differences in SM and Q data may be explained by underestimation of symptom frequency and overestimation of medication intake in Q compared to SM. Lower recall ability and telescoping were suggested as possible mechanisms for these results. Alternatively, the two sets of data may be accurate and reflect the differential influence of SM on symptom reports and medication intake.

The data indicate that symptom frequency may be an important determinant of illness, as suggested in the Retrospective Chest Pain Study. However, data from the present study also indicate that reductions in reported symptoms are not a necessary condition for improvements in disability. In the case of chest discomfort symptoms, it is argued that mediating cognitions regarding the significance of symptoms are more likely the "true" determinants of illness, rather than the subjective characteristics of the symptoms themselves.

Medication prescriptions and intake are also considered to be an important determinant of illness, because they are believed to encourage and confirm disease attributions and related behaviours. The data also support the role of medication intake in response to treatment.
Reductions in reported medication intake were related to improvements in ratings of disability and limitations on activities. These relationships are also believed to be mediated by changes in cognitions regarding the significance of symptoms, for example changes in beliefs of "hurt" and "harm". Individuals who consider their symptoms to be benign from a disease standpoint are less likely to take medication in response to them, and more likely to engage in symptom reduction strategies, than individuals who believe that their symptoms indicate "harm."

Finally, the data support the use of physical exercise as an effective incompatible response strategy. From a cognitive-behavioural perspective, physical activity is considered to be incompatible with cognitions of "wellness" and as a result, has an effect on individuals' health-related beliefs. It was also suggested that physical exercise may have a beneficial effect on symptoms through the disruption of the pain-tension cycle, because exercise may reduce muscle tension.
Chapter 9

GENERAL DISCUSSION

In this thesis, a cognitive-behavioural formulation of illness behaviour was presented. From this perspective, illness behaviour was examined in a group of individuals with chest discomfort that could not entirely be accounted for on the basis of cardiac or any other identifiable disease process. Results of the Retrospective Chest Pain Study (RCPS) confirmed earlier reports of high levels of illness behaviour in individuals with "unexplained" chest pain. Consistent with the Disease Illness Distinction Model, cardiac attributions for chest pain and cardiac medication ingestion were identified as predictors of illness in this population. These data suggest that medication prescriptions are one determinant in the development and maintenance of IB.

The utility of cognitive-behavioural formulations of illness was further examined in the Chest Discomfort Intervention Study (CDIS). Group and individual cognitive-behavioural interventions were presented to subjects with disabling chest discomfort and either MVP or NCA. Results indicated that both group and individual CB interventions were effective at decreasing reported illness. Substantial decreases were obtained in reported ratings of disability and limitations attributed to chest discomfort, frequency of chest discomfort symptoms, and frequency
of medication intake, while substantial increases were achieved in physical activity level. Moreover, the CB interventions were more effective than the WLC condition at lowering ratings of disability and limitations, and at shifting locus of control toward increased internality. Finally, the GE condition was more effective than the SMAC at increasing physical activity level. These data are consistent with results from outpatient cognitive-behavioural interventions and inpatient operant-based interventions for chronic pain (Fordyce et al., 1973; Moore and Chaney, 1985; Turner, 1982).

Assuming that attrition is largely the result of an absence of response to treatment, comparisons drawn between the SMAC and cognitive-behavioural conditions are conservative because of the 61% drop out rate in the SMAC condition. Furthermore, the absence of statistically significant differences post-intervention between the SMAC and the CB conditions (with one exception) may be more a reflection of the differential drop out rates, than an indication of the lack of efficacy of the CB interventions compared to the SMAC condition.

Analyses of relationships between measures used in the Chest Discomfort Intervention Study indicated that two variables, frequency of reported chest discomfort and non-cardiac medication ingestion, are positively related to level of reported illness. Changes in these variables from pre to post-intervention were also related to changes in other aspects of illness. However, data from treated subjects who reported increases in symptom frequency concurrent with decreases in disability suggest that these relationships are complex and interactive,
rather than simple and one-dimensional as assumed by the medical model. Furthermore, these data suggest that while the experience of symptoms may contribute to the development of illness behaviour, symptoms need not be lessened or absent in order for improvement in illness behaviour to occur. The relationships between reported chest discomfort frequency and other illness measures are likely mediated by cognitions regarding the significance of symptoms, rather than being a direct effect of the intensity or severity of symptoms.

Data also provide support for the role of physical activity as an effective incompatible response strategy, and possibly an effective symptom reduction strategy. Subjects reporting more frequent physical activity rated themselves as less disabled and limited by chest discomfort, had more "internal" locus of control scores, and also reported fewer symptoms and pills taken for chest discomfort.

Methodological Issues

The absence of a definitive diagnosis in subjects in the Retrospective Chest Pain Study is not problematic for two reasons. It is highly unlikely that any of the subjects had undiagnosed cardiac disease, given the low false-negative diagnostic rates in cardiology (Proudfit et al., 1980). Furthermore, from a cognitive-behavioural perspective, the presence or absence of disease is not of primary importance because it need not be altered in order for improvements in illness behaviour to occur. Rather, it is the belief in the presence of disease and the belief in the association among disease, symptoms, and illness that are
of primary importance and which must be altered in order that illness improve.

Several methodological problems arose in the Chest Discomfort Intervention Study. These do not appear, however, to have influenced the final conclusions drawn from the data. A likely contributing factor for the low number of successfully recruited NCA's is physician beliefs. It is probable that some physicians believe that normal catheterization results would be sufficient to eliminate illness behaviour in their patients. However, data from the studies reviewed indicated that results of objective diagnostic tests and reassurance from physicians are not necessarily effective in reducing illness reported NCA's (Ockene et al., 1980). It is also likely that in some cases, physicians had less contact with NCA's following catheterization, because of reluctance on the part of the patient to continue to go to their physician for chest discomfort following normal test results. As a result, some physicians were not aware of their patients' continued disability.

Because of the lower than expected recruitment rate, a decision was made to delay running the Wait List Control condition until it was determined that sufficient numbers would be obtained in the CB and SMAC conditions. Although subject assignment was not entirely random, it is unlikely that this was a factor in response to treatment (i.e., that subjects who entered the study at a later time responded less well to intervention). Data from the WLC subjects who were crossed over into individual treatment following the WLC period indicate that these subjects responded as well as the original individual treatment (IT).
subjects to the CB intervention. If time of entry into the study was a factor in response to treatment, these results would likely not have occurred.

Validity and reliability of data are always an issue when using self-report data only. Attempts to deal with this issue were made through the use of self-monitoring records, because they are believed to provide more accurate data than questionnaires or interviews (Nelson, 1977). The collection of more "objective" data from third parties such as family members, physician or hospital records, and employers was not attempted because the collection of such data in a consistent manner for a meaningful number of subjects was not possible in this study. Although these sources of data would have verified behavioural measures, there were no other means available than self-report to collect information on beliefs and symptoms from this population.

The non-compliance in completing self-monitoring data did become problematic and can be attributed to at least one factor. The self-monitoring procedure was an onerous task. Subjects were asked to record several pieces of information on an hourly basis. For the CB and SMAC conditions, subjects monitored on this basis for up to 6 months (as part of intervention). Given the immensity of the task, compliance with the procedure was remarkable. The strategy used to increase compliance was not sufficiently effective to maintain compliance. One lottery ticket was given for each 14 days of pre/post self-monitoring handed in to the experimenter. Other forms of reinforcement, such as payment in cash, may have been more effective.
Because of the high attrition rate (61%) in the SMAC condition, the low sample size did not allow for meaningful pre-post comparisons to be made with the CB conditions. Alternatives to the SMAC condition are discussed below.

**Significance of the Thesis**

Results of the CDIS indicate that illness (disability) is not a simple function of symptoms. Rather, the relationship between the two is complex and interactive. The data also suggest that illness is affected by learning and beliefs, and that it is amenable to both individual and group treatment using cognitive and behavioural learning strategies. Finally, the results of the present study are comparable with results of inpatient operant-based programmes for chronic pain, in terms of improvements in activity level and medication intake (Fordyce et al., 1973). These data have financial implications regarding treatment programmes, as outpatient programmes are likely to be more cost effective than programmes that are inpatient, and group programmes are more cost effective than individual programmes.

It is likely that interventions using cognitive and behavioural strategies would also be effective at decreasing illness behaviour in individuals with diagnosed cardiac disease, the one difference being the nature of the identified disease determinant in these individuals. Cognitive-behavioural interventions applied to individuals with cardiac disease would be considered adjuncts to, not a replacement for, medical therapy.
The high attrition rate in the SMAC conditions indicates that it was not a plausible alternative to the CB interventions, and that other types of control groups need to be considered. Results of the WLC condition indicate that some subjects do improve on their own, although not to the extent of subjects treated in CB interventions. Motivation and demand characteristics of the study may be important factors in the improvement seen in the WLC subjects.

Finally, the data provide support for the hypothesis that beliefs and attributions are important in the development and maintenance of IB. Furthermore, the data suggest that physician behaviour may be contributing to IB through the prescription of medications for chest discomfort.

Future Direction

Based on the number of individuals who expressed interest in participating in the study, but who did not meet the stringent diagnostic criteria, it appears that there are many individuals with disabling chest discomfort who could benefit from the CB interventions. In the future, subject criteria for studies examining the efficacy of treatment should focus more on symptomatology and functional status (e.g., ability to carry out routine daily or work activities), with less emphasis on medical status. The latter has been found to be a poor predictor of IB in previous research (Retchin et al., 1986; Wielgosz and Earp, 1986) as well as in the present studies.
It is also apparent that medical status is not necessarily relevant to treatment outcome. One way to confirm this hypothesis would be to compare the efficacy of CB interventions using three patient populations: NCA's, MVP's, and individuals with defined significant cardiac disease, such as coronary artery disease. In addition, since the goal is to treat cardiac IB regardless of diagnosis, it would also be useful to redefine the NCA group to include individuals who report disabling chest discomfort and who have not been given a cardiac diagnosis, but are not considered candidates for cardiac catheterization.

The use of global measures of IB, such as the Illness Behaviour Questionnaire (Pilowsky and Spence, 1976), in addition to the individual measures of illness that were used in the present studies, would allow more valid comparisons between studies of illness behaviour and chronic pain. Because the results of the CDIS show a positive influence of cognitive-behavioural interventions, further investigations that would be more costly and difficult in terms of data collection seem justified, such as data obtained from employment and medical records.

In order to increase compliance with self-monitoring, some suggested changes include monitoring every two hours instead of every hour, monitoring on alternate days, and collecting fewer pieces of information per time period. However, all of these changes would result in the loss of data and may limit conclusions related to outcome.

Moore and Chaney (1985) stated that "To date, no one has developed a plausible attention/placebo control condition for psychological interventions for chronic pain" (p. 332). Evidence from
the present study supports this contention. Furthermore, there are ethical, legal, financial and patient/personal constraints with regard to using a classically defined control group in such studies (Fordyce et al., 1985). Several alternatives to the SMAC as a treatment control are proposed. These are suggested because they are accepted forms of treatment and may as a result be more credible to the subject: "traditional" exercise-oriented cardiac rehabilitation, relaxation training only, or standard psychotherapy or non-directive Rogerian type therapy (Rogers, 1951). One additional group may be a "behavioural education/demedicalization only" group, in which subjects receive education with regard to behavioural principles and the hurt/harm distinction, but are given no specific prescriptions of strategies or skills training to implement (e.g., exercise, relaxation training, problem solving).

In order to further investigate the role of attributions in illness behaviour and the mechanisms of change, it would be necessary to collect pre and post intervention data on beliefs related to hurt/harm issues and their relationship to illness behaviour, and also to examine the changes that occur within and among these variables. This would address the question of whether "harm" attributions are more related to other aspects of illness than hurt" attributions, as hypothesized in the Disease Illness Distinction Model.

Finally, further study is required in order to determine the exact nature and extent of physician behaviour as a determinant of IB.
Given the results of the Retrospective Chest Pain and Chest Discomfort Intervention Studies, further study into this topic seems justified.

In summary, the research presented in this thesis demonstrates that illness is not a direct function of symptoms, and that it is affected by learning and cognitions. The results indicate that illness associated with unexplained chest discomfort is amenable to treatment using cognitive and behavioural learning strategies applied in both individual and group formats. The data also indicate that these types of interventions are superior to a wait list control condition. Data from both the RCFS and the CDIS indicate the importance of patient cognitions and physician behaviours as determinants of illness reported by individuals with chest discomfort and no significant, identified cardiac disease.
REFERENCES


Appendix A

Retrospective Chest Pain Study Materials
Retrospective Chest Pain Study
Letter to Prospective Subjects

Dear (patient name):

Our medical records indicate that you were among a group of patients admitted to the Cardiac Care Unit at St. Joseph's Hospital between July, 1979 and September, 1981. Researchers at St. Joseph's Hospital are following up a large number of patients similar to yourself to find out what happens to them after having been in the Cardiac Care Unit. We will be asking a small number of questions about how you are now feeling and whether you have seen any more doctors about your chest pain. Your answers may be helpful in treating future patients like yourself.

We will be telephoning you soon. At that time you may state whether you want to take part in the study. If you agree to do so, the interviewer will go on with the questions. Do not feel that you must answer all of the questions. Any information that you provide will be confidential and only reported in group form. If you decide not to take part in the study, this will not affect any treatment you may need in the future at St. Joseph's Hospital.

If you have any questions or do not want to be called about the study, please phone Ms. Jane McCully, (529-5283).

Thank you for your help.

Sincerely,

D.S. Scott, B.A., M.H.A.
Assistant Executive Director and
Director of Medical Services
St. Joseph's Hospital
Retrospective Chest Pain Study

Telephone Script of Introduction to Study

My name is (nurse's name). I am calling from St. Joseph's Hospital regarding a research project that you received a letter about within the past week or two. We are investigating people who were admitted to Cardiac Care at St. Joseph's. If you agree, I would like to ask you some questions over the telephone that should take just a few minutes of your time. Are you in agreement with answering the questions?

Most but not all of the questions I'll be asking you pertain to chest pain. I would very much appreciate your answering the questions even if you do not currently experience chest pain.
Retrospective Chest Pain Study

Subject Questionnaire

1. How often are you having chest pain?
   More than daily
   More than once per week
   More than once per month
   More than once per six months
   Never

2. Are you taking any medication now for your chest pain?
   Yes
   No

3. If yes, what medications are you taking and how often do you take them?
   N/A
   Analgesic
   Tranquilizer
   Nitroglycerin
   Beta-blocker
   Isordil
   Digoxin

4. How much has your chest pain affected your life?
   Not at all
   A little
   Very much

5. What do you think is causing your chest pain?
   Don’t know
   Heart problems
   Other
6. About how many visits have you made to doctors in the past six (6) months?

None
1-2
3-5
6 or more

7. How many of these visits were related to your chest pain?

N/A
None
1-2
3-5
6 or more

How much does your chest pain keep you from doing:

8. House or yard work?

Not at all
A little
Very much

9. Exercise or sports?

Not at all
A little
Very much

10. Social activities?

Not at all
A little
Very much

11. Has something about your job changed since your chest pain started?

N/A
Put on lighter duties
Stopped working
No
12. Has this change occurred because of your chest pain?
   N/A
   Yes
   No

13. How many days of work did you miss in the last month?
   N/A
   None
   1-2
   3-5
   6-10
   11 or more

14. How many of these days missed were because of your chest pain?
   N/A
   None
   1-2
   3-5
   6-10
   11 or more

15. Are you happy with the medical care you received for your chest pain?
   Yes
   No

16. Is there anything further you would like to have done about your chest pain?
   Yes
   No
   If so, what?
Retrospective Chest Pain Study

Letter of Introduction to Physicians

Dear (physician name):

We are following up a group of patients admitted to the Cardiac Care Unit at St. Joseph's Hospital who were discharged with a diagnosis of "chest pain of uncertain etiology" to determine what happens to these individuals following their initial admission. Could you please complete the following questionnaire and return to the Behavioural Medicine Unit at St. Joseph's Hospital?

Thank you for your cooperation.
1. Have you seen him/her since that date
   Yes
   No

2. If yes, in your opinion, what is her/her current state of health?
   Excellent
   Very good
   Good
   Fair
   Poor

3. Since the above hospitalization date, does this person continue to report chest pain?
   Yes
   No

4. How often has (patient's name) been admitted to hospital again for chest pain?
   Don't know
   None
   1-2 times
   3-5 times
   6 or more times?
Appendix B

Chest Discomfort Intervention Study

Instruments
A) **DEMOGRAPHIC INFORMATION**
(Where indicated, please circle the appropriate number)

1. **SEX:**
   - Male ...... 1
   - Female ...... 2

2. **MARITAL STATUS:**
   - Married ...... 1
   - Divorced ...... 2
   - Single ...... 3
   - Separated ...... 4
   - Living with someone ...... 5

3. **DATE OF BIRTH:**

4. **TELEPHONE HOME #:**
   - **BUSINESS #:**

5. **ADDRESS:**

6. **EDUCATION:** (mark highest level attained)
   - Graduate or professional training ...... 1
   - College or university graduate ...... 2
   - Partial college training ...... 3
   - High school graduate ...... 4
   - Partial high school ...... 5
   - Junior high school ...... 6
   - Less than 7 years school ...... 7
   - Information not available ...... 8
7. You Are:  
- Employed, working full time .........1 
- Employed, working part time .........2 
- Employed, on temporary disability .........3 
- Employed, on permanent disability .........4 
- Currently unemployed .........5

8. YOUR PRESENT OCCUPATION IS: ____________________________

9. OCCUPATION: (mark highest level attained)
   - Higher exec., proprietor of large concern, major professional .........1
   - Business mgr. of large concern, proprietor of med. sized concern, lesser professional .........2
   - Admin. personnel, owner of small business .........3
   - Clerical or sales worker, technician, .........4
   - Skilled manual employee .........5
   - Machine operator, semi-skilled employee .........6
   - Unskilled employee .........7
   - Never worked in paid employment .........8
   - Housewife .........9
   - Student, full-time .........10
   - Student, part-time .........11

10. YOUR FIRST LANGUAGE IS: 
    (circle one) 
    - English .........1
    - French .........2
    - Italian .........3
    - Other .........4
    (please specify)
11. ON THE SCALE BELOW, PLEASE RATE YOUR ABILITY TO SPEAK ENGLISH.

/-----------------------------------------------/
Very poor                                         Very good

12. ON THE SCALE BELOW, PLEASE RATE YOUR ABILITY TO WRITE ENGLISH.

/-----------------------------------------------/
Very poor                                         Very good

B) MEDICAL INFORMATION

13. FAMILY DOCTOR'S NAME: __________________________

14. YOUR FIRST EPISODE OF CHEST DISCOMFORT OCCURRED ON: __________________________

15. YOU WERE FIRST SEEN BY A PHYSICIAN ABOUT YOUR CHEST DISCOMFORT ON: __________________________

16. AT THAT TIME, WHAT DID YOU THINK WAS THE CAUSE OF YOUR CHEST DISCOMFORT? __________________________

17. NOW, WHAT DO YOU THINK IS THE CAUSE OF YOUR CHEST DISCOMFORT? __________________________

18. LIST ALL MEDICATIONS WHICH YOU ARE CURRENTLY TAKING.
- CIRCLE LETTER IF THAT MEDICATION IS FOR YOUR CHEST PAIN.
- PLEASE CHECK YOUR PRESCRIPTION BOTTLE(S) TO OBTAIN PRECISE INFORMATION.

(EXamples)

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>DOSAGE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tylenol</td>
<td>500 mg.</td>
<td>4 per day (as required)</td>
</tr>
<tr>
<td>Valium</td>
<td>5 mg.</td>
<td>3 per day (after meals)</td>
</tr>
<tr>
<td>Serax</td>
<td>15 mg.</td>
<td>before bed</td>
</tr>
</tbody>
</table>

(a)  
(b)  
(c)  
(d)  
(e)  
(f)  
19. PLEASE CHECK THE SYMPTOMS THAT APPLY TO YOU AND THE FREQUENCY WITH WHICH THEY OCCUR.

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) chest pain</td>
<td></td>
</tr>
<tr>
<td>(b) pressure/tightness</td>
<td></td>
</tr>
<tr>
<td>(c) palpitations</td>
<td></td>
</tr>
<tr>
<td>(d) pounding</td>
<td></td>
</tr>
<tr>
<td>(e) difficulty breathing</td>
<td></td>
</tr>
<tr>
<td>(f) other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

20. PLEASE INDICATE ON THE SCALES BELOW HOW DISABLING EACH TYPE OF CHEST DISCOMFORT IS TO YOU:

<table>
<thead>
<tr>
<th>Type</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) pain</td>
<td>Not at all</td>
</tr>
<tr>
<td>(b) pressure/tightness</td>
<td></td>
</tr>
<tr>
<td>(c) palpitations</td>
<td></td>
</tr>
<tr>
<td>(d) pounding</td>
<td></td>
</tr>
<tr>
<td>(e) difficulty breathing</td>
<td></td>
</tr>
<tr>
<td>(f) other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

21. PLEASE INDICATE ON THE SCALE BELOW HOW DISABLING FATIGUE IS TO YOU.

<table>
<thead>
<tr>
<th>Fatigue</th>
<th>Scale</th>
</tr>
</thead>
<tbody>
<tr>
<td>Not at all</td>
<td></td>
</tr>
<tr>
<td>Totally</td>
<td></td>
</tr>
</tbody>
</table>
22. PLEASE INDICATE WHAT YOU USUALLY DO (RESPONSE) WHEN YOUR CHEST DISCOMFORT COMES ON (E.G.: LIE DOWN, TAKE PILL).

<table>
<thead>
<tr>
<th>Type of Discomfort</th>
<th>Response</th>
<th>Effective (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>a)</td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>b)</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>c)</td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>d)</td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

23. PLEASE INDICATE ON THE SCALES BELOW THE DEGREE TO WHICH YOUR CHEST DISCOMFORT LIMITS YOU IN CARRYING OUT THE FOLLOWING ACTIVITIES:

Not at All | Totally
---|---

a) Work Activity for Income | /-------------------/  
b) Necessary Activities for Daily Living (e.g., cleaning) | /-------------------/  
c) Leisure-Exercise (e.g., sports) | /-------------------/  
d) Leisure-Rest (e.g., reading) | /-------------------/  
e) Sleep | /-------------------/  

24. HOW PHYSICALLY ACTIVE DO YOU CONSIDER YOURSELF TO BE?

Very Inactive | Very Active | /-------------------/  

25. WHAT PHYSICAL ACTIVITIES ARE YOU NOW ENGAGING IN REGULARLY?

<table>
<thead>
<tr>
<th>Activity (Tennis, Walking, Bowling, Swimming, etc.)</th>
<th>How Often?</th>
<th>Duration/Bout of Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
26. PLACE A CHECK BESIDE THOSE ACTIVITIES THAT YOU WOULD ENJOY CONTINUING OR BEGINNING?

ACTIVITY

--- walking
--- jogging
--- bicycling
--- swimming
--- other (please specify)

27. HAVE YOU BEEN UNDER A DOCTOR'S CARE FOR ANY REASON DURING THE PAST YEAR?

YES______    NO______  If YES Describe: ________________________

28. IF YOU HAVE EVER BEEN TOLD BY A DOCTOR NOT TO EXERCISE, PLEASE INDICATE:

- Reason

- Type of exercise

- When told

- Not Applicable

29. DO YOU HAVE HIGH BLOOD PRESSURE?

YES ________  1
NO ________  2
DON'T KNOW ________  3

30. ARE YOU BEING TREATED FOR HIGH BLOOD PRESSURE NOW?

YES ________  1
NO ________  2

31. HAS YOUR DOCTOR EVER TREATED YOU FOR HIGH BLOOD PRESSURE IN THE PAST?

YES ________  1
NO ________  2
IF YES, WHEN ________  3
32. DO YOU HAVE A BONE OR JOINT PROBLEM THAT YOU HAVE BEEN TOLD WOULD PREVENT YOU FROM DOING CERTAIN TYPES OF EXERCISE?  

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IF YES, PLEASE SPECIFY:  

PROBLEM___ EXERCISE NOT ALLOWED___ WHEN TOLD___

33. DO YOU HAVE OTHER PHYSICAL PROBLEMS WHICH WOULD PREVENT YOU FROM ENGAGING IN ACTIVITY?  

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
</tr>
</tbody>
</table>

IF YES, PLEASE DESCRIBE:  

________________________________________________________________________
________________________________________________________________________

34. HAS THE NATURE OF YOUR JOB CHANGED SINCE THE ONSET OF YOUR CHEST DISCOMFORT?  

YES:

- put on lighter duties ......1
- put on heavier duties ......2
- stopped working ......3
- started working (or returned to work) ......4

NO ......5

NOT APPLICABLE ......6

35. HAS THIS CHANGE OCCURRED BECAUSE OF YOUR CHEST DISCOMFORT?  

<table>
<thead>
<tr>
<th>YES</th>
<th>NO</th>
<th>NOT APPLICABLE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>


36. HOW MANY DAYS OF WORK HAVE YOU MISSED IN THE PAST MONTH?

NOT APPLICABLE

37. HOW MANY OF THESE DAYS WERE MISSED BECAUSE OF CHEST DISCOMFORT?

NOT APPLICABLE

38. HOW MANY TIMES HAVE YOU VISITED A PHYSICIAN OR BEEN ADMITTED TO HOSPITAL IN THE PAST 2 MONTHS?

39. HOW MANY OF THE ABOVE VISITS WERE BECAUSE OF CHEST DISCOMFORT?

NOT APPLICABLE

40. PLEASE INDICATE HOW LIMITED YOU CONSIDER YOURSELF TO BE BY YOUR CHEST DISCOMFORT ON THE FOLLOWING SCALE:

Not At All [ ] Totally

/--------------------------------------------------/
POST-TREATMENT AND FOLLOW-UP QUESTIONNAIRE

1. MARITAL STATUS
   Married ..... 1
   Divorced ..... 2
   Single ..... 3
   Separated ..... 4
   Living with Someone ..... 5

2. EDUCATION: (mark highest level attained)
   Graduate or Professional Training ..... 1
   College or University Graduate ..... 2
   Partial College Training ..... 3
   High School Graduate ..... 4
   Partial High School ..... 5
   Junior High School ..... 6
   Less than 7 years School ..... 7
   Information Not Available ..... 8

3. YOU ARE:
   Employed, working full time ..... 1
   Employed, working part time ..... 2
   Employed, on temporary disability ..... 3
   Employed, on permanent disability ..... 4
   Currently unemployed ..... 5

4. YOUR PRESENT OCCUPATION IS:
5. What do you think is the cause of your chest discomfort?

6. Please check the symptoms that apply to you and the frequency with which they occur:

<table>
<thead>
<tr>
<th>TYPE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. chest pain</td>
<td></td>
</tr>
<tr>
<td>b. pressure/tightness</td>
<td></td>
</tr>
<tr>
<td>c. palpitations</td>
<td></td>
</tr>
<tr>
<td>d. pounding</td>
<td></td>
</tr>
<tr>
<td>e. difficulty breathing</td>
<td></td>
</tr>
<tr>
<td>f. other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

7. Please indicate on the scales below how disabling each type of chest discomfort is to you:

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Totally</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. pain</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>b. pressure/</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>tightness</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>c. palpitations</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>d. pounding</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>e. difficulty</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>breathing</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>f. other</td>
<td>------------</td>
<td></td>
</tr>
<tr>
<td>(please specify)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

8. Please indicate on the scale below how disabling fatigue is to you.

<table>
<thead>
<tr>
<th></th>
<th>Not At All</th>
<th>Totally</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>------------</td>
<td>---------</td>
</tr>
</tbody>
</table>
9. Please indicate what you usually do (response) when your chest discomfort comes on (e.g., lie down, take pills):

<table>
<thead>
<tr>
<th>TYPE OF DISCOMFORT</th>
<th>RESPONSE</th>
<th>EFFECTIVE</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(circle one)</td>
</tr>
<tr>
<td>a.</td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>b.</td>
<td></td>
<td>NO</td>
</tr>
<tr>
<td>c.</td>
<td></td>
<td>YES</td>
</tr>
<tr>
<td>d.</td>
<td></td>
<td>NO</td>
</tr>
</tbody>
</table>

10. Please indicate on the scales below the degree to which your chest discomfort limits you in carrying out the following activities:

<table>
<thead>
<tr>
<th></th>
<th>Not at all</th>
<th>Totally</th>
</tr>
</thead>
<tbody>
<tr>
<td>a. Work Activity for Income</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>b. Necessary Activities for Daily Living</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>c. Leisure-Exercise</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>d. Leisure-Rest</td>
<td>---------------</td>
<td></td>
</tr>
<tr>
<td>e. Sleep</td>
<td>---------------</td>
<td></td>
</tr>
</tbody>
</table>

11. How physically active do you consider yourself to be?

<table>
<thead>
<tr>
<th></th>
<th>Very Inactive</th>
<th>Very Active</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>---------------</td>
<td>---------------</td>
</tr>
</tbody>
</table>

12. List all medications which you are currently taking. Circle letter if that medication is for your chest pain. Please check your prescription bottle(s) to obtain precise information.

(EXAMPLES)

<table>
<thead>
<tr>
<th>MEDICATION</th>
<th>DOSAGE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>Tylenol</td>
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<td>5 mg.</td>
<td>3 per day (after meals)</td>
</tr>
<tr>
<td>Serax</td>
<td>15 mg.</td>
<td>before bed</td>
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</table>

<p>| | |</p>
<table>
<thead>
<tr>
<th></th>
<th></th>
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</thead>
<tbody>
<tr>
<td>a.</td>
<td></td>
</tr>
<tr>
<td>b.</td>
<td></td>
</tr>
<tr>
<td>c.</td>
<td></td>
</tr>
<tr>
<td>d.</td>
<td></td>
</tr>
<tr>
<td>e.</td>
<td></td>
</tr>
<tr>
<td>f.</td>
<td></td>
</tr>
</tbody>
</table>
13. What physical activities are you now engaging in regularly?

<table>
<thead>
<tr>
<th>Activity (Tennis, Walking Bowling, Swimming, etc.)</th>
<th>How Often? Days/Week</th>
<th>Duration/Bout of Activity</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>2.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>3.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

14. Has the nature of your job changed since you were last interviewed for the study?

**YES**
- put on lighter duties
- put on heavier duties
- stopped working
- returned to work/began working

**NO**
- 

**N/A**
- 

15. Has this change occurred because of your chest discomfort?

**YES**
- 1.

**NO**
- 2.

**N/A**
- 3.

16. How many days of work have you missed in the past month?

**N/A**
- 

17. How many of these days were missed because of chest discomfort?

**N/A**
- 
18. How many times have you visited a physician or been admitted to hospital in the past 2 months?

N/A

19. How many of the above visits were because of chest discomfort?

N/A

20. Please indicate how limited you consider yourself to be by your chest discomfort on the following scale:

Not at all  

/-----------------------------------------------/

Totally

21. Has your participation in this research project been useful to you and if so, how?

---------------------------------------------------------------

---------------------------------------------------------------

---------------------------------------------------------------
SESSIONAL QUESTIONNAIRE

The following questions are designed to measure a number of different aspects of your behaviour (related to your discomfort). Please indicate your response in the space provided.

1. PLEASE INDICATE BELOW THE TYPE AND FREQUENCY, IF APPLICABLE, OF YOUR DISCOMFORT IN THE PAST WEEK.

   (e.g., 2 x per day; 3 x per week, etc.)

<table>
<thead>
<tr>
<th>TYPE OF DISCOMFORT</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a) chest pain</td>
<td></td>
</tr>
<tr>
<td>(b) pressure/tightness</td>
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<td>(c) palpitations</td>
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</tr>
<tr>
<td>(d) pounding</td>
<td></td>
</tr>
<tr>
<td>(e) difficulty breathing</td>
<td></td>
</tr>
<tr>
<td>(f) other (please specify)</td>
<td></td>
</tr>
</tbody>
</table>

2. PLEASE INDICATE BELOW HOW DISABLING EACH TYPE OF DISCOMFORT WAS TO YOU IN THE PREVIOUS WEEK. USE A STROKE ON THE SCALES BELOW TO INDICATE YOUR ANSWER.

   FOR EXAMPLE: Not at all                             Totally
                    /-----------------------------------------------/

   (a) pain                                          /-----------------------------------------------/
   (b) pressure/tightness                             /-----------------------------------------------/
   (c) palpitations                                  /-----------------------------------------------/
   (d) pounding                                      /-----------------------------------------------/
   (e) difficulty breathing                           /-----------------------------------------------/
   (f) other (please specify)                         /-----------------------------------------------/
3. PLEASE INDICATE BELOW HOW DISABLING FATIGUE WAS TO YOU IN THE PAST WEEK.

Not at all                                             Totally
/----------------------------------------------------------/

4. PLEASE INDICATE WHAT YOU USUALLY DID IN THE PAST WEEK (RESPONSE) WHEN YOUR DISCOMFORT OCCURRED.

<table>
<thead>
<tr>
<th>TYPE OF DISCOMFORT</th>
<th>RESPONSE</th>
<th>EFFECTIVE (circle one)</th>
</tr>
</thead>
<tbody>
<tr>
<td>(a)</td>
<td></td>
<td>YES  NO</td>
</tr>
<tr>
<td>(b)</td>
<td></td>
<td>YES  NO</td>
</tr>
<tr>
<td>(c)</td>
<td></td>
<td>YES  NO</td>
</tr>
<tr>
<td>(d)</td>
<td></td>
<td>YES  NO</td>
</tr>
</tbody>
</table>

5. HAS THE NATURE OF YOUR JOB CHANGED IN THE PREVIOUS WEEK?

Yes:
put on lighter duties     1
put on heavier duties     2
stopped working         3
began/returned to work   4

No                        5
Not Applicable            6

6. WAS THIS CHANGE A RESULT OF YOUR DISCOMFORT?

Yes                      1
No                        2
Not Applicable           3

7. HOW MANY DAYS WERE YOU SCHEDULED TO WORK IN THE PAST WEEK?

Not Applicable

8. HOW MANY OF THESE DAYS DID YOU MISS?

Not Applicable

9. HOW MANY OF THESE DAYS WERE MISSED BECAUSE OF:

a. CHEST DISCOMFORT?  

b. OTHER (please specify)?

__________________

c. Not Applicable  __________________
10. IN THE PAST WEEK, HOW MANY TIMES HAVE YOU:
   a. CONTUCTED A PHYSICIAN? ______
   b. BEEN ADMITTED TO HOSPITAL? ______

11. HOW MANY OF THE ABOVE VISITS WERE BECAUSE OF:
   a. CHEST DISCOMFORT? ______
   b. OTHER (please specify)? ______
   c. Not Applicable ______

12. LIST ALL MEDICATIONS TAKEN IN THE PAST WEEK. PLACE AN "X" NEXT TO THOSE THAT ARE FOR YOUR CHEST DISCOMFORT

<table>
<thead>
<tr>
<th></th>
<th>MEDICATION</th>
<th>DOSAGE</th>
<th>FREQUENCY</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>(a)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(b)</td>
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<td></td>
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<tr>
<td></td>
<td>(c)</td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>(d)</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

13. PLEASE INDICATE BELOW THE DEGREE TO WHICH YOUR DISCOMFORT HAS LIMITED YOU IN CARRYING OUT THE FOLLOWING ACTIVITIES IN THE PAST WEEK. USE A STROKE ON THE SCALES BELOW TO INDICATE YOUR ANSWER.

(a) Work Activity for Income
    Not at All
    ____________________________
    Totally
    ____________________________

(b) Necessary Activities for Daily Living (eg., housework, shopping)
    ____________________________

(c) Leisure-Exercise (eg., sports, walking)
    ____________________________

(d) Leisure-Rest (eg., reading, sewing)
    ____________________________

(e) Sleep ____________________________
Health Locus of Control Scale*
-----------------------------

The items in this questionnaire refer to ideas and beliefs about health and illness. Please circle the number that most adequately describes how you feel about each statement. There are no right or wrong answers, so please respond as honestly as you can.

(Strongly agree) | (Strongly disagree)
-----------------|-----------------|
| | |

1. If I take care of myself, I can avoid illness. 1 2 3 4 5 6

2. Whenever I get sick it is because of something I've done or not done. 1 2 3 4 5 6

3. Good health is largely a matter of good fortune. 1 2 3 4 5 6

4. No matter what I do, if I am going to get sick I will get sick. 1 2 3 4 5 6

5. Most people do not realize the extent to which their illnesses are controlled by accidental happenings. 1 2 3 4 5 6

6. I can only do what my doctor tells me to do. 1 2 3 4 5 6

7. There are so many strange diseases around that you can never know how or when you might pick one up. 1 2 3 4 5 6

8. When I feel ill, I know it is because I have not been getting the proper exercise or eating right. 1 2 3 4 5 6

9. People who never get sick are just plain lucky. 1 2 3 4 5 6

10. People's ill health results from their own carelessness. 1 2 3 4 5 6

11. I am directly responsible for my own health. 1 2 3 4 5 6

PHYSICIAN QUESTIONNAIRE

(1) Patient Name: ________________________________

(2) Physician Name ____________________________ (3) Sex M F

(4) Date of onset of patient's chest discomfort ______________

(5) Diagnosis made ______________________________

(6) Basis of diagnosis - Clinical
   - Tests: ECG ______ Angiogram ______/ Ergonovine ______
     Stress Test ______
     Echocardiogram ______
     Thallium Scan ______

(7) Contraindications: ____________________________

(8) Number of times patient has seen you for his/her chest discomfort __________

(9) Number of times patient has been admitted to hospital for chest discomfort __________

(10) Please list all medications that the patient is currently taking. Include dose and frequency of ingestion.
   a. For Chest Discomfort: ________________________________
   b. Other: ________________________________

(11) Does the patient have other significant medical conditions of which we should be aware?
    Yes ________________
    No ________________

If so what are they? ________________________________

(12) Please estimate on the scale below how disabled you consider this individual to be by his/her chest discomfort with respect to his/her employment and routine daily activities.

NOT AT ALL ________ TOTALLY ________
_________________________________________

Please Return To: Jane McCully,
Behavioural Medicine Unit,
St. Joseph's Hospital - McMaster University,
Fontbonne Hall - 5th Floor,
HAMILTON, Ontario. L8N 1Y4
## PRE POST
**SELF MONITORING FORM**

**Intensity:** 0 - 10

**Duration:** # of Minutes

**R = Response to Discomfort (Categories:)**
- P - Pill
- I - Ignored
- L - Lay Down
- R - Relaxation
- S - Sat Down
- O - Other

<table>
<thead>
<tr>
<th>Date: Jan 4/83</th>
<th>Time</th>
<th>Activity</th>
<th>Energy Level (0-10)</th>
<th>Chest Pain (Intens/Duration)</th>
<th>Chest Pressure (Intens/Duration)</th>
<th>Awareness of Heart (# Episode)</th>
<th>Difficulty Breathing (Intens/Duration)</th>
<th>Medication for Chest Discomfort (Type/Dose)</th>
</tr>
</thead>
<tbody>
<tr>
<td>A.M. 12 - 2</td>
<td></td>
<td>Sleeping</td>
<td></td>
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<td>2 - 4</td>
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<td>4 - 6</td>
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<td>6 - 8</td>
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<td>Sleeping</td>
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<tr>
<td>8 -10</td>
<td></td>
<td>Up, Shower &amp; Breakfast</td>
<td>6</td>
<td>4</td>
<td>10</td>
<td>0</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>10 -12</td>
<td></td>
<td>Vacuum &amp; Dust</td>
<td></td>
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<tr>
<td>P.M. 12 - 2</td>
<td></td>
<td>Lunch &amp; Dishes</td>
<td></td>
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<tr>
<td>2 - 4</td>
<td></td>
<td>Shopping</td>
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<tr>
<td>4 - 6</td>
<td></td>
<td>Rest, Prepare dinner</td>
<td>2</td>
<td>0</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>6 - 8</td>
<td></td>
<td>Eat dinner &amp; Dishes</td>
<td>1</td>
<td>0</td>
<td>0</td>
<td>1</td>
<td>1</td>
<td>2</td>
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<tr>
<td>8 -10</td>
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<td>TV &amp; Knit</td>
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<tr>
<td>10 -12</td>
<td></td>
<td>Bath, Bed</td>
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</table>
Appendix C

Chest Discomfort Intervention Study

Recruitment Materials
Description of Study for Physicians

Dear---:

I am a Ph.D. student in the Psychology Department at McMaster University. My thesis supervisor is Dr. A. Cott, Associate Professor, Department of Medicine, McMaster University and Director, Behavioural Medicine Unit, St. Joseph's Hospital, Hamilton. The purpose of this letter is to identify those physicians who are willing to refer patients to the thesis study outlined below. The study is under the medical supervision of Dr. Paul Tanser, Associate Professor, Department of Medicine, McMaster University, and Chief of Medicine and Head, Service of Cardiology at St. Joseph's Hospital.

For my thesis project, I will be working with two groups of patients, both of whom are by self-report disabled by chest discomfort: (1) one group has mitral valve prolapse on echocardiogram with no other known cardiac abnormalities; and (2) the second group has normal coronary arteries on angiogram. There are no contraindications in either group with regard to activity. Therefore, disability would not necessarily be expected from a medical point of view.

The purpose of the study is to determine whether comprehensive, therapeutic, non-medical intervention that includes behavioural, cognitive and educational components can lessen the degree of disability displayed by these individuals. This type of intervention has been successful when applied to patients having other health problems in which the degree of disability displayed by the individual cannot be totally accounted for by the disease process alone. Should the intervention prove effective in decreasing disability levels of the patients in the present study, further work is planned involving patients with more severe cardiac dysfunction.

The study is described in more detail on the attached page. Your assistance as a referring physician would be greatly appreciated. I will be calling in the next few days to discuss this matter with you and to answer any questions you may have regarding the study.

Sincerely,

Jane McCully
Design

The study employs a 2 x 4 factorial design. The first factor is "type of population" of which there are two levels: mitral valve prolapse (MVP) and normal coronary arteries (NCA). The second factor is "type of treatment" of which there are four levels: (1) individual treatment (IT); (2) group education (GE); (3) self-monitoring attention control (SMAC); and (4) wait list control (WLC).

Methods

Patients will be randomly allocated to the four treatment conditions. Intervention will consist of weekly meetings with patients in either individual or group form for a period of 16 weeks. Follow-up interviews will occur every six months for a period of 18 months.

Should either/both individual/group treatment be significantly more effective at decreasing disability levels than SMAC or WLC, subjects in the two latter groups will be offered individual/group treatment after the first follow-up period.

Subject Criteria

---------------------

Age: 18 years and over
Sex: Male/female
Behavioural: By self-report, lives disrupted by chest discomfort
Medical: (1) Diagnosis of MVP by echocardiogram with no other known cardiac abnormalities; or
(2) No evidence of MVP on echocardiogram, coronary artery disease or spasm on coronary angiography, or any other cardiac abnormalities.

Should subjects desire medical attention for their chest discomfort over the course of the study, they will be requested to inform the experimenters of the outcome of such consultations.

Role of Referring Physicians

----------------------

Referring physicians will be requested to:
(1) briefly explain the study to suitable patients,
(2) complete a "physician questionnaire" for each interested patient; and
(3) send echocardiogram and/or angiogram results along with the relevant consult notes to the study's cardiology consultant, Dr. Paul Tanser, for screening purposes. Release forms will be supplied to the physicians for this purpose.

Permission will be requested from the referring physicians to carry out exercise treadmill tests on all subjects pre-treatment and at follow-ups.
Prescription of medication during study:

Whenever possible, physicians are encouraged to hold subjects' medications constant for the duration of the study. For valid evaluation results, it is extremely important, where possible, to minimize alterations in medication (e.g., type, dose, regimen) because:

1. rate of ingestion of on demand (p.r.n.) medication is an important dependent measure in the study, and
2. possible effects on symptomatology and behaviour, caused by alterations in prescribed medication during the course of the experiment, will not allow the effects due to intervention to be evaluated.

It will be difficult to draw conclusions regarding the outcome of the study if dependent measures have been directly or indirectly manipulated. For example, if a subject is either taken off a medication or prescribed a new one and changes do occur in other dependent measures, it will be difficult to determine whether the intervention or medication alteration effected those changes. It has been our experience that often when a subject shows improvement, physicians may reduce medication, with a resultant increase in symptomatology.

Therefore, when possible, physicians are encouraged to hold medications constant for the duration of the study.
Physician script

A study is being conducted at the Behavioural Medicine Unit at St. Joseph’s Hospital that is investigating people who have some type of chest discomfort and report that their lives have been affected in some way by it. They’re comparing a number of different behavioural interventions to determine which is more effective (successful) at lessening the effect of the chest discomfort on people’s every day lives.

If you’re interested in hearing more about the study, I will give your name and phone number to the experimenters who will contact you and arrange to discuss the study further.
Script of Study Description for Physician Referrals

This is ------ calling from the Behavioural Medicine Unit of St. Joseph's Hospital. I'm calling regarding a research project that we are conducting here at the hospital. We're investigating a group of people whose lives have been affected in some way by their chest discomfort, and Dr. ---- thought you might be interested in taking part in the study. You would be required to come in to the Behavioural Medicine Unit here at St. Joseph's Hospital, once per week during a 16 week period for anywhere from 1 - 2 1/2 hours each time, depending upon which part of the study you've been assigned to.

What I'd like to do if you're interested in finding out more about the study, is to make an appointment with you to discuss it further. I would also like to determine whether you fit the criteria for the study. This initial appointment will take about 1 - 1 1/2 hours.

If questions: Explain that this is an experiment and that we're comparing a number of different behavioural programmes to see which is more useful and that if one does prove to be more useful than the one they have been assigned to, it will be offered to them following their participation in the study. Furthermore, the programmes do not involve medication or psychiatric intervention and that nothing they will be asked to do will be harmful to their health.
Invitation to Participate in Study for Laboratory Referrals

This is ------ calling from the Behavioural Medicine Unit of St. Joseph's Hospital. I'm calling regarding a research project that we are conducting here at the hospital. We're investigating a group of people whose lives have been affected in some way by their chest discomfort. We obtained your name from the echocardiogram (or cardiac catheterization) laboratory at (x) hospital. Your physician, Dr. ----, agreed to have us contact you to determine if you would be interested in taking part in the study. You would be required to come in to the Behavioural Medicine Unit here at St. Joseph's Hospital, once per week during a 16 week period for anywhere from 1 - 2 1/2 hours each time, depending upon which part of the study you've been assigned to.

What I'd like to do if you're interested in finding out more about the study, is to make an appointment with you to discuss it further. I would also like to determine whether you fit the criteria for the study. This initial appointment will take about 1 - 1 1/2 hours.
Script of Study Description for Self-referrals

We are conducting a research project here at St. Joseph's Hospital in which we're investigating a group of people whose lives have been affected in some way by their chest discomfort. We're investigating two groups of people with chest discomfort, those with mitral valve prolapse, and those in whom cardiac problems have been ruled out. You would be required to come in to the Behavioural Medicine Unit here at St. Joseph's Hospital, once per week during a 16 week period for anywhere from 1 - 2 1/2 hours each time, depending upon which part of the study you've been assigned to.

What I'd like to do if you're interested in finding out more about the study, is to make an appointment with you to discuss it further. I would also like to determine whether you fit the criteria for the study. This initial appointment will take about 1 - 1 1/2 hours.
1. Announcement of Research Project:

Sent to 1300 Family Practitioners through Continuing Medical Education mailing

Dr. Arthur Cott, Associate Professor of Medicine, McMaster University, and Director, Behavioural Medicine Unit at St. Joseph’s Hospital has received a $120,000.00 Research Grant from Health and Welfare Canada. Dr. Cott is investigating individuals with chest discomfort who have received a diagnosis of either (a) Mitral Valve Prolapse or (b) Normal Coronary Arteries. The focus of investigation is twofold: (i) to develop quantitative measures for determining whether and how the lives of these individuals may have been affected, and (ii) to determine whether comprehensive education in established medical, behavioural, and problem solving principles can affect these measures for those individuals whose lives have been affected.

The project is under the medical supervision of Dr. Paul Tanser, Associate Professor, Department of Medicine, McMaster University, and Chief of Medicine and Head, Service of Cardiology at St. Joseph’s Hospital, and Dr. William Goldberg, Clinical Professor, Department of Medicine, McMaster University and Head, Service of General Medicine and Head, Service of Behavioural Medicine at St. Joseph’s Hospital.

Two groups of individuals with chest discomfort are being investigated: (i) 60 with Mitral Valve Prolapse and no other known cardiac abnormalities, and (ii) 60 with Normal Coronary Arteries and no known cardiac dysfunction.
2. Public Service Announcement

Has Chest Discomfort Affected Your Life?

Do you experience chest discomfort - for example, chest pain or pressure, palpitations or shortness of breath?

If so, you may qualify to participate in a research programme that is currently underway at the Behavioural Medicine Unit at St. Joseph's Hospital. Two groups of individuals with chest discomfort are needed: (i) those with Mitral Valve Prolapse, and (ii) those in whom heart problems have been ruled out.

The programme is aimed at increasing the individual's quality of life through the application of proven techniques from Behavioural Medicine. The programme will be conducted under the direction of Dr. Arthur Cott, Associate Professor of Medicine at McMaster's Faculty of Health Sciences.

Participation involves no medication, needles or surgery and is at no cost to the individual. Your family doctor will be informed.

For further information, please contact Ms. Teresa Fitzpatrick, Behavioural Medicine Unit, St. Joseph's Hospital, Hamilton, Ontario, (416) 522-4941, ext. 3567.
3. Announced on CBC Radio's "Classy Classified"

Researchers from McMaster University are looking for subjects to participate in a study which has been funded by Health and Welfare Canada.

We are looking for individuals who experience chest pain or palpitations who fall into the following categories: people with a diagnosis of mitral valve prolapse or with no identifiable heart problems.

The study is being carried out at a clinical investigation unit of the Department of Medicine. The purpose of the study is to assess a number of procedures designed to minimize the difficulties frequently encountered by individuals with chest discomfort.

If you are interested in finding out more about the study, you can call Teresa Fitzpatrick in Hamilton at St. Joseph's Hospital. The number is area code 416-522-4941, ext. 3567.
Appendix D

Chest Discomfort Intervention Study

Screening Materials
EXPLANATION OF CARDIAC STUDY

As we discussed briefly over the phone, this is a research study which will investigate how people's chest discomfort affects their level of functioning across all aspects of their lives and whether their level of functioning can be increased through behavioural or cardiac education programmes.

These programmes do not involve drug or psychiatric intervention, and nothing you will be asked to do will be harmful to your health. A number of different behavioural interventions are being tested and you may be assigned to any one of the interventions as subjects are being randomly assigned to groups. If any one proves to be more effective than any of the others, you will be given the opportunity to receive that intervention.

The initial commitment is for an 18 week period; that involves our appointment today, another appointment next week for 2 to 2½ hours of psychometric testing which I will explain in a few minutes, and the following 16 weeks, once per week for anywhere from 1 to 2½ hours, depending on which group you are assigned to. Following the initial 18 week period, you will be asked to come into the Behavioural Medicine Unit once every 6 months for a 1½ year period, for a follow-up interview that will take 1 hour. You will also be asked to self-monitor for an initial period of 20 weeks and then for 2 week periods at each follow-up. I will describe the self-monitoring later as well.

The psychometrics will involve 3 psychological tests: the first is a personality questionnaire and the remaining two ask questions about your beliefs regarding health and illness. The purpose of these tests is to determine if we can identify any factors that will be useful predictors of the outcome of intervention. There are no right or wrong answers on any of the tests, your personal opinion is all that is required.

If you meet the subject criteria and would like to participate in this study, it is necessary that we obtain relevant medical information from your physician and a personal history from yourself. All personal information will be strictly confidential. You will also be required to complete an exercise test before. They are done over at the hospital at Electro-Diagnostic Services. You are required to walk on a tread mill while hooked up to an ECG machine. Participation in this study cannot begin until all relevant medical information is in and you have completed the exercise test.

During the period of the study, we encourage you to contact us if you desire non emergency medical attention for your chest discomfort and we will arrange an appointment for you with your family doctor or the doctor who referred you to the study. If you require emergency medical attention for your chest discomfort, we encourage you to inform us of the nature and outcome of the intervention immediately after it has taken place.
EXPLANATION OF CARDIAC STUDY

To the Screener:

Following the explanation of the study, interested subjects will be asked to read and sign the consent form and medical release forms. It must be made clear to them that we are only obtaining information that is relevant to their participation in this study. We are not obtaining complete medical files. Subjects will then be screened behaviourally by an interviewer. If they meet the screening criteria, they will then be asked to complete the history questionnaire. Self monitoring will then be explained. Subjects will be given the self monitoring handout and book and are to begin self monitoring for 2 weeks. It must be explained to subjects that there are 3 conditions under which they will be asked to monitor for 2 additional weeks. These are: (i) if the self monitoring is not done properly, (ii) if unusual conditions existed during the 2 week period of monitoring (e.g., illness, holiday), and (iii) if subjects are put into one component of the study, they will be asked to monitor again for 2 weeks prior to the start of the group course.

MENTION WINTARIC TICKETS HERE.

The interviewer is then to set up an appointment for the psychometric testing and self monitoring check in 1 week time. Verbal approval should also be obtained from the subject to set up an exercise test.

/mp
May 27/83
CONSENT FORM

I understand that this is a study which is comparing a number of behavioural interventions aimed at increasing the level of functioning in patients whose lives have been affected by chest discomfort. Further I understand that the conditions of the experiment are that I attend weekly treatment sessions at the Behavioural Medicine Unit for a period of 16 weeks and comply with the assigned programme. I have been informed that there is nothing known in the intervention which could prove harmful to me, and that I have the right to discontinue participation at any time.

I understand that any information I provide will remain confidential and will only be reported in group form. I have been told that I will be given access to the results of this study when it is completed, if I so request. I also understand that if one type of intervention proves to be more effective than the others, I will be given the opportunity to receive that intervention.

I understand that, if I require medical attention for any aspect of my chest discomfort during the period of the study, I inform the experimenter of the nature of the intervention and the outcome immediately.

WITNESS: ___________________________  SIGNATURE: ___________________________

DATE: ___________________________

Research Project #81-410
TEST BATTERY CONSENT FORM

A study is being conducted with the purpose of determining whether the level of functioning of individuals having chest discomfort can be increased through behavioural or cardiac education intervention programmes. In order to do this, it is necessary to obtain information from a large number of patients similar to yourself on how they view their environment.

In this study, you will be asked to answer three questionnaires designed to provide potentially useful information for this purpose. The purpose of this is not to provide immediate benefit to the participants but rather it is hoped that the information obtained will be beneficial to the future treatment of patients having chest discomfort.

I, ______________________ have read and understand the above description. I understand that all personal information will be strictly confidential and any public reports drawing upon such information will be anonymous or in group form.

I understand that I am free to terminate my participation at any time if I wish to do so.

WITNESS: ___________________________ SIGNATURE ___________________________

DATE ___________________________

Research Project #81-410
AUTHORIZATION FOR RELEASE OF MEDICAL INFORMATION

I agree to be screened for possible participation in the "Disability and Chest Discomfort Study" which has been described briefly to me by my physician. I hereby authorize the Behavioural Medicine Unit, St. Joseph's Hospital, Hamilton, to obtain information from __________________________ including electrocardiogram, echocardiogram and angiogram reports as well as any other medical information that may be pertinent to the screening procedure. All information will remain confidential.

________________________
Name of Patient

________________________
Witness

________________________
Address of Above

X
Signature

________________________
Address of Above

A. Colt, B.Sc., Ph.D., Director, Behavioural Medicine Unit
W. M. Goldberg, M.D., F.R.C.P.(C), F.A.C.P., Head, Service of Behavioural Medicine
SCREENING INTERVIEW

1. What problems are you having with regard to your health? (If response is a diagnosis or medical condition, ask for symptoms or feelings; if still inappropriate, ask for description of symptoms, feelings).

   After subject has mentioned symptoms, ask when each first occurred.

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<th>P</th>
<th>N</th>
<th>General</th>
<th>DATE OF ONSET</th>
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<td></td>
<td></td>
<td></td>
<td>- Fatigue</td>
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<td></td>
<td>- Headache</td>
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<td></td>
<td>- Dizziness</td>
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<td>- Muscle tension</td>
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<td>- Pain (location: ________________________)</td>
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<td>- ____________________________</td>
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<td>- ____________________________</td>
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</table>

   Chest-Related

   - Chest pain
   - Awareness of heart (e.g., palpitations, skipped beats),
   - Difficulty breathing (e.g., shortness of breath)
   - Pressure/tightness/squeezing
   - ____________________________
   - ____________________________
   - ____________________________

2. What do you understand is causing your symptoms? (Ask for believed cause of each symptom mentioned previously.)

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<thead>
<tr>
<th>S</th>
<th>P</th>
<th>N</th>
<th>Symptom</th>
<th>Believed Cause</th>
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</table>
3. Do you feel you have been adequately investigated with regard to your chest discomfort?
   Yes ______ 1.
   No ______ 2.

4. Do you think that there is something causing your chest discomfort that hasn't been found?
   Yes ______ 1.
   No ______ 2.

5. Is there anything else you would like to have done? (e.g. further tests).
   Yes ______ 1.
   No ______ 2.

6. How many physicians have you seen about your chest discomfort? _____

7. How many of these visits occurred in the past six months? (Identify type and number of visits.)
   TOTAL: ____________________________
   Office Visits: ______________________
   Hospital Emergency ________________
   Hospital Admits: __________________ 

8. Have you had a stress (exercise) test?
   Yes ______ 1.
   No ______ 2.

9. If so, when? Date
   N/A ________________

10. Do you consider yourself to be limited or disabled in any way by any of your chest-related symptoms? (Check one)
    Yes ______ 1.
    No ______ 2.

*For items 13, 14-17, ask which symptoms are disabling with regard to each limitation mentioned.

11. Have your symptoms affected your ability to carry out routine daily activities?
    S P N Activities
    - Housework (e.g., vacuuming, washing)
    - Yardwork (e.g., gardening, mowing lawn)
    - Shovelling snow
    - Shopping
    - Driving
    - ____________________________

    Disabling Symptoms
    ____________________________
    ____________________________
    ____________________________
    ____________________________
    ____________________________
    ____________________________
    ____________________________
12. If you are working, has your ability to carry out your job been affected by any of your symptoms? (Also determine insurance disability status (e.g., S.T.D., L.T.D. if applicable)

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<thead>
<tr>
<th>S</th>
<th>P</th>
<th>N</th>
<th>Work Status</th>
<th>Disabling Symptoms</th>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Not working</td>
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<td></td>
<td>Leave work early</td>
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<td>Gone to lighter duties</td>
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<td>Leave of absence</td>
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<td>Quit working</td>
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<td>Absenteeism</td>
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13. If you're working outside the home, how active are you physically while on the job? (Check one)

- Very active (e.g., labourer)
- Moderately active (e.g., salesman)
- Very inactive (e.g., desk job)

14. What about leisure - exercise?

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<th>S</th>
<th>P</th>
<th>N</th>
<th>Activity</th>
<th>Disabling Symptoms</th>
</tr>
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<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td>Stair climbing</td>
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<td>Walking</td>
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<td>Running</td>
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<td>Sports (i.e., )</td>
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<td>Dancing</td>
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15. And leisure - rest types of activities?

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<th>P</th>
<th>N</th>
<th>Activity</th>
<th>Disabling Symptoms</th>
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<tr>
<td></td>
<td></td>
<td></td>
<td>Socializing</td>
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<td>Theatre/movie</td>
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<td>Television</td>
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<td>Crafts(i.e., )</td>
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20. Do you take medication for your chest discomfort?

| Yes | No |

21. (If yes:) what type of medication do you take, how often and how much? Is each effective?

<table>
<thead>
<tr>
<th>Prescription</th>
<th>Dose</th>
<th>Frequency</th>
<th>Effective (Circle one)</th>
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<td>Yes</td>
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<tr>
<th>Non-Prescription</th>
<th>Dose</th>
<th>Frequency</th>
<th>Effective (Circle one)</th>
</tr>
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<td>Yes</td>
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</table>

22. If your chest discomfort went away, how would your behaviour change? What would you do differently? or what would you do that you’re not doing now?
CARDIAC EDUCATION

SELF MONITORING INSTRUCTIONS

DATE: Record in upper left corner.

TIME: Monitor every hour and record the time in the left hand column. Begin each day on a new page at midnight.

ACTIVITY: Refers to your major activity in the previous hour. (e.g., shopping, gardening, reading).

PLACE: Refers to where you have spent the major portion of the previous hour. (e.g., home, office, movie).

WITH WHOM: Refers to your social surroundings. Be specific (e.g., self, family, Jane, brother).

ENERGY LEVEL: Refers to how energetic you have felt during the previous hour on a 0-10 point scale. (e.g., 0 = no energy, 10 = most you’ve ever experienced).

BLANK COLUMNS: Choose the discomforts that concern you most and write one at the head of each column.

Your group leader will show you how to monitor your discomfort (e.g., Inten./Dur, #Episodes, when applicable).

R: Refers to your response to your discomfort. Indicate your response in the following way.

P - pill  I - Ignored
L - lay down  R - Relaxation
S - sat down  O - other (specify)

MEDS: Refers to any medication you have taken for your discomfort in the previous hour and the amount taken. (e.g., 2 aspirin).

COMMENTS: Refers to anything you think could explain the occurrence of your discomfort or any other information that you think is important.

ADDITIONAL INFORMATION: If you forget to self monitor, leave that line blank and do not go back and fill it in from memory.

Monitor "O" for discomfort when you are sleeping.

If you are wakened with or by discomfort, make an entry in your book.
INSTRUCTIONS FOR THE PRE-POST SELF-MONITORING FORM

Proper completion of the Self-Monitoring Form is extremely important. With your co-operation, this form will permit us to monitor your chest discomfort and activities in much greater detail than is possible in weekly sessions. Maintenance of an accurate record is very simple and takes little time out of your day if you follow these instructions.

The monitoring forms consist of a series of 14-day booklets in which certain information is to be recorded. The information describes different aspects of your chest discomfort and activities in the previous 1-hour period, and any medications which you have taken. Information for each 24-hour period is required. You may fill in the previous night's record when you wake up in the morning. If you wake up during the night for any extended period of time (e.g., more than 15 minutes), please record the appropriate information.

A sample of how the form is to be filled out is provided. "Activity" refers to what you were doing in the previous hour. (e.g. watching t.v., reading, etc.). Energy level refers to how energetic you have felt in the previous hour. Record this by choosing a number between 0-10 (0 = no energy, 10 = most you've ever experienced).

The columns labelled "Chest Pain", "Chest Pressure", "Awareness of Heart", and "Difficulty Breathing" refer to different aspects of your chest discomfort.

(a) Chest Pressure, Chest Pain and Difficulty Breathing:
Indicate the intensity by choosing a number between 0-10 (0 = no pain, pressure, difficulty breathing; 10 = worst you've ever experienced). Indicate duration by recording the number of minutes you've had chest pain (pressure, difficulty breathing) in the previous hour.

(b) Awareness of Heart:
Indicate the number of episodes of noticed heart beats (e.g., irregular beats, rapid beats) you've experienced in the previous hour.

(c) Response refers to what you did following the onset of your chest discomfort. Indicate your response in the following manner:

P - pill    I - ignored
L - lay down  R - relaxation
S - sit down  O - other

If your response does not fit in the above categories, please indicate specific response (e.g., took walk) and code on the front of the booklet.

Please indicate in the MEDICATION column any drugs you have taken in the previous hour, and the amount taken (dose).
I will be giving you 3 questionnaires today. You remember last week, I told you that our purpose in using them is to see if we can identify certain personality variables or ways of thinking that are predictive of how people respond to the intervention. The first consists of a large number of statements to which you respond either true or false depending upon how you feel about what the statement says. There are no right or wrong answers to the questionnaire, everyone answers it differently. Here is the questionnaire and answer sheet. Could you read the instructions to the questionnaire out loud so that I know you understand them.

GO AHEAD. (Subject reads)

I want to stress again that there are no right or wrong answers to the questionnaire. Don't spend too long on any one item. There may be a few that you don't understand or feel very ambiguous about. Just try to answer as many as you can. If there are more than 30 responses left blank, the questionnaire is not useful to us. So please try and answer as many as you can. Here is the answer sheet. Could you please fill in this information? (Name, etc.)

I'd like you to answer the first few items while I am here to see if you have any questions.

GO AHEAD. (Give assistance if necessary).

I will be back in a half an hour or so to see how you are doing.

After subject is finished the MMPI give them a break if they would like, and then start the Health Belief Scale.
The Health Belief Questionnaire will give us an idea of how you feel about your health and what factors influence it. Please read the instructions and go ahead. After you finish this, you can go ahead with the last questionnaire which is very similar. Then I will come back and we can go over your self monitoring.
Dear Dr.

You will recall that I contacted you recently regarding participation in the Chest Discomfort Intervention Study being conducted at the Behavioural Medicine Unit, St. Joseph's Hospital. He/she fits our criteria for the study and has agreed to participate.

Attached is a questionnaire regarding your patient's medical status. Please complete it and return it to me at the address given. I will be sending you a similar questionnaire following the intervention period.

Thank you for your cooperation.

Behavioural Medicine Unit,
St. Joseph's Hospital,
Fontbonne Hall,
301 James St. S.,
HAMILTON, Ontario.
L8N 1Y4

Sincerely,

-----------------------------
Jane McCully, B.A.,
Doctoral Candidate,
Department of Psychology,
McMaster University

JMc/illp
Appendix E

Chest Discomfort Intervention Study

Group Education Format
<table>
<thead>
<tr>
<th>SESSION</th>
<th>FORMAT</th>
<th>PLACE AND TIME</th>
</tr>
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<tbody>
<tr>
<td>Lecture I</td>
<td>Introduction to Behavioural - Empirical Approach</td>
<td>Amphitheatre 7 - 10 p.m.</td>
</tr>
<tr>
<td>Lecture II</td>
<td>Medicine, Your Heart &amp; Chest Discomfort: Fact &amp; Fiction</td>
<td>Amphitheatre 7 - 10 p.m.</td>
</tr>
<tr>
<td>Lecture III</td>
<td>Habits</td>
<td>Amphitheatre 7 - 10 p.m.</td>
</tr>
<tr>
<td>Lecture IV</td>
<td>Tutorial Session</td>
<td>Conference Rm. 2/Rooftop 7 - 9 p.m.</td>
</tr>
<tr>
<td>Lecture V</td>
<td>Build A Plan: Behavioural Techniques</td>
<td>Conference Rm. 3 7 - 10 p.m.</td>
</tr>
<tr>
<td>Lecture VI</td>
<td>Problem Solving</td>
<td>Conference Rm. 2/Rooftop 7 - 9 p.m.</td>
</tr>
<tr>
<td>Review I</td>
<td>Activities &amp; Exercise</td>
<td>Amphitheatre 7 - 10 p.m.</td>
</tr>
<tr>
<td>Review II</td>
<td>Behavioural Principles</td>
<td>Conference Rm. 2/Rooftop 7 - 9 p.m.</td>
</tr>
<tr>
<td>Review II</td>
<td>Tutorial Session</td>
<td>Amphitheatre 7 - 10 p.m.</td>
</tr>
<tr>
<td>Review II</td>
<td>Outstanding Issues</td>
<td>Conference Rm. 2/Rooftop 7 - 9 p.m.</td>
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<tr>
<td>Review II</td>
<td>Tutorial Session</td>
<td>Conference Rm. 2/Rooftop 7 - 9 p.m.</td>
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<tr>
<td>Review II</td>
<td>Final Session</td>
<td>Conference Rm. 2/Rooftop 7 - 9 p.m.</td>
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CHEST DISCOMFORT STUDY

Lecture I

I. Who we are: The Behavioural Medicine Unit
   History of unit
   Faculty
   Activities
   - Clinical outpatient
   - Health education
   - Research
     - Chest Discomfort Study
       - Background
       - Format
       - Content
       - Objectives
       - Schedule and agenda

II. Why you're here: Types of problems we've helped

Case histories

Conclusions

III. Introduction to behavioural empirical approach

A. Medicine alone can provide no additional improvement for your condition

B. You should not be limited by your condition

C. People learn to be active, they're not born that way

D. If you don't feel well, it's not because you're crazy

E. There is a method that can help: The behavioural empirical approach

- Based on 100 years research in experimental psychology
- Accounts for symptoms on basis of conditioning
- Not in conflict with medical approach - works with it
- Examples of conditioned behaviour/symptoms
- Basic assumptions about behaviour
- Everything you do is a habit
- Habits can be changed
- Introduction to rules of learning
CHEST DISCOMFORT STUDY: LECTURE II

MEDICINE, YOUR HEART AND CHEST DISCOMFORT:

FACT AND FICTION

I

FICTION: "Exercise is dangerous, I'm limited in what I can do"

FACT: "YOU CAN DO ANYTHING: THERE'S NO ACTIVITY THAT PUTS YOU AT GREATER RISK THAN ANYONE ELSE, NO MATTER WHAT YOUR CARDIAC STATUS IS" (E.G., M.V.P.)

II

FICTION: "Exercise is hard on my heart. If I tax my heart, I'll wear it down (out)"

FACT: NOT ONLY IS EXERCISE NOT HARMFUL, IT IS VERY HELPFUL: THE FIT HEART DOESN'T NEED TO WORK AS HARD

III

FICTION: "I have a weak heart. I am frail"

FACT: "HEARTS ARE NOT FRAGILE. YOUR HEART IS STRONG"

IV

FICTION: "There must be a medical explanation for what I've got. Maybe they've missed it."

FACT: "MEDICINE IS NOT A MAGIC SOLUTION"

V

FICTION: "Everytime I have chest discomfort (e.g., pain, palpitations), my heart is being damaged."

FACT: "DISCOMFORT DOES NOT NECESSARILY SIGNAL DANGER OR DAMAGE"

VI

FICTION: "Worrying is justified - After all, there are risks associated with my condition."

FACT: "THE RISKS ARE MINIMAL - NOT WORTH THE WORRY. THE WORRY WILL PROBABLY CAUSE YOU MORE PROBLEMS THAN YOUR HEART WILL EVER DO."

VII

FICTION: "I can't do it, my heart can't take it"

FACT: "IF YOU CAN'T DO SOMETHING, DON'T BLAME YOUR HEART"

VIII

FICTION: "Taking it easy is the best thing for me"

FACT: "INACTIVITY AND AVOIDANCE CAN LEAD TO WEAKNESS, FATIGUE AND SHORTNESS OF BREATH. GIVE YOUR HEART A BREAK, GET INTO SHAPE"
CHEST DISCOMFORT STUDY

Lecture III - Habits

I. Review
   A. Habits
   B. Behaviour

II. How habits are acquired/learned
   A. Classical conditioning
   B. Operant conditioning

III. Strategies for change
   A. Avoid the pitfalls of the "Why" approach (attributions)
      1. Leads to whence story
      2. "So what" if you know why
      3. Examples
      4. Extinction (can't talk self out of it)

   B. Labels dupe
      1. Examples
      2. Circular attributions
      3. Social learning theory

   C. What and how
      1. What are responses (excesses, deficits)
      2. How to change them
      3. Locus of control construct
CHEST DISCOMFORT STUDY

Lecture IV - Build a Plan

1. Review of Habits 1

2. What controls your behaviour
   - Antecedents (bells)
   - Consequents (reinforcers)

3. Build a plan
   A. Identify relationships (look for bells)
   B. Control environment
   C. Arrange contingencies (schedules of reinforcement)
   D. Shaping
   E. Realistic goals
   F. Incompatible and competing response strategies
CHEST DISCOMFORT STUDY

Lecture V: Problem Solving

1. What is science?
   - method, not subject
   - objective observation and description
   - objective, unbiased measurement
   - reproducible measurement, can be used by anyone
   - relationships and causality

   * understand and describe
   * predict and control
   * observation tells you correlation, not causality
   * causality: how do you know?

2. What is a problem?
   - desired state of affairs that doesn't exist
   - you need to: decide where you want to be, and identify where you are now
   - science allows you to deal with it better

3. How do you use science to help solve problems?
   - be empirical
   - be unbiased, objective
   - find out things

   Why use it?
   - useful
   - alternatives: ignore it, let it control you, solve it

   How to solve a problem?  - define the problem in measurable terms
   - generate alternatives
   - decision making (cost benefit analysis)
   - verification (collect data)

4. Examples...
CHEST DISCOMFORT STUDY

Lecture VI - Activity and Exercise

1. Exercise is easy
   A. You’re already doing it
   B. You have potential to improve
   C. Your heart is a muscle
   D. Guidelines for training:
      - Frequency
      - Intensity
      - Time
      - Type of activity
   E. Behavioural learning principles/strategies
      - Pick exercise for you
      - Realistic goals
      - Shape your activity
      - Plan and schedule your activity
      - Arrange contingencies

2. You are not limited

3. Exercise is a means to an end
   A. The more you do, the more you can do
   B. You will feel better
   C. Change cognitions
CHEST DISCOMFORT STUDY

Lecture VII - General Review 1

1. Review of behavioural terms and approach

2. Review of strategies for change

3. Discussion of relaxation:
   
   Generalization
   
   Differentiation

4. Etiology of chest discomfort:
   
   Hiatus hernia
   
   Esophageal spasm
   
   Hyperventilation/fainting

5. Discussion of dropouts and their effect on the group
CHEST DISCOMFORT STUDY

Lecture VIII - General Review 2

1. Chest discomfort study in larger context of Behavioural Medicine Unit

2. Disease illness distinction
   Can't predict one from the other
   Distinction is useful with regard to treatment

4. Review of conceptual model

5. Behavioural approach in relation to traditional psychiatric approach

6. Illness behaviour
   NB to examine cost to individual
   Students generate a list of IB's they have observed
   Students generate a list of incompatible behaviours
   Students generate a list of reinforcers to promote "well" behaviour
   Discussion of sleep strategies

6. Review of goals of study as outlined in Lecture I
CHEST DISCOMFORT STUDY
Session #4
AGENDA

7:00 Prior to Tutorial: (L.C., M.G.)

1. Check attendance
2. Give out handouts.
3. Wintario tickets - outstanding.

7:10 • Collect self-monitoring books.

• Ensure names and dates covered written on books.

• General information - general information sheet (compliance message
  - wear name tags.
  - pick up handouts.
  - smoking
  - purpose of tutorial.
  - education, not treatment.
  - name on all questionnaires except evaluations
    - group colour only.

7:15 • Review Lectures, I, II and III.

• Use probe questions.

7:30 • Self-Monitoring - any questions re self-monitoring
  - have you found any bells?
  - have you noticed any consequences?
  - how to use.
  - self-monitoring task.

8:15 BREAK
CHEST DISCOMFORT STUDY
Session #4
AGENDA

8:25  • Introduce Relaxation (use handout).
     • Practice Relaxation.
     • Suggest practice relaxation, 15-20 minutes, twice per day.

8:50  • Fill out Sessional Questionnaires.
     • Collect Sessional Questionnaires.
     • Collect Tutorial Evaluations.

9:00  ANNOUNCEMENT: NEXT SESSION

Date:  Tuesday April 9th, 1985
Time:  7:00 - 10:00 p.m.
Format: Lecture
Topic:  BUILD A PLAN: BEHAVIOURAL TECHNIQUES

/mp
March 29th/85
CHEST DISCOMFORT STUDY

Session #6

A G E N D A

Course Leader - Margaret Goldrick
Team Leader - Lorraine Oliver

MAIN BOARD INFORMATION - Chest Discomfort Study
DATE - Tuesday April 16th, 1985
TIME - 7:00 - 9:00 p.m.

TUTORIAL SESSION - Classroom #5 - Green
- Classroom #1 - Pink

TONIGHT'S HANDOUTS:  
Sessional Questionnaire
Tutorial Evaluations
Flexibility Exercises

7:00 Prior to Tutorial (L.O., M.G.)

1. Check attendance.
2. Give out handouts.
3. Collect self-monitoring

7:05-8:00 Lecture Review

1. Behavioural Approach
   Useful way to deal with your symptoms whether there is a medical solution or not. Usually conditioned factors you can change.

2. How has your behaviour changed as a result of your discomfort - write e.g.'s on board.

3. We have already discussed "bells" or antecedents that control behaviour.
7:05-8:00 (cont'd)

- What else controls your behaviour?

  Reinforcer - something that follows a behaviour (applied or removed) and leads to an increase in the rate of the behaviour.

- What are some examples of reinforcers? at home? at work?

  Positive Reinforcers: PAYOFFS - e.g., money, feeling good about a job well done (Hi NOA - competence)

  Negative Reinforcers: AVOIDANCE not necessarily punishment.

  e.g., Stairclimbing causes pain so avoid climbing stairs altogether. The removal of some consequent (e.g., pain) following the behaviour (stairclimbing) increases the probability that the behaviour (no stair climbing) will occur again.

  Avoid stairclimbing in anticipation of pain. The avoidance in itself becomes reinforcing.

  ESCAPE

  e.g., Quit part way through climbing the stairs to escape or stop the pain.

  e.g., Taking medication - nitro
7:05-8:00 (cont'd)

- Avoidance behaviour - more difficult to change than escape behaviour simply because the person no longer engages in the behaviour.

  Avoidance behaviours can go unnoticed since they are not occurring and do not appear in self-monitoring.

- Consider the cost of avoiding. What price do you pay? - When you are not able to go to your bedroom upstairs; not able to go downstairs to do the laundry; not able to climb the stairs of the CN tower.

  Perhaps it is costing an individual a lot to avoid by they do not realize it unless they analyze their behaviour.

- Why is it important to identify reinforcers?

  To change your behaviour, you must find your price, your payoff.

  If you can not change your behaviour, may not have found your real price. Not willpower.

- Build a Plan (Write on blackboard).

2. **Control the Environment**

3. **Arrange Contingencies**
   - Find your "real Price"
   - How you pay yourself off is important.
   - i. Pay yourself off immediately.
   - ii. Begin with frequent reinforcement.
   - iii. Later, switch to intermittent

(The following strategies to be dealt with in more detail in subsequent sessions.)

4. **Shaping** - Proceed in small steps.

5. **Realistic Goals** - Rule of thumb divided by 2, no fail goals.

6. **Incompatible/Competing Responses**

8:00-8:10 **BREAK**

8:10-8:30 **Exercise Rationale**

- see Activity Component Script

**Flexibility Exercises**

- Demonstration, group participation
  - (#5 and #6 floor exercises not included)

**To Do:**

- Suggest flexibility exercises once per day and/or as a warm up for other exercises people are currently doing.
8:30-9:00  Relaxation Discussion

- Practising? Schedule it?
- Usefulness? How doing it?

To Do's:

1. Continue to self-monitor - bells, payoffs, avoidance.
2. Practise flexibility exercises.
3. Practise relaxation daily.
4. Wear loose clothing next week for exercise break.

Collect:

Sessional Questionnaires
Tutorial Evaluations

/mp
April 15th/85
CHEST DISCOMFORT STUDY

Session #8

AGENDA

Course Leader - N. Goldrick
Team Leader - L. Oliver

MAIN BOARD INFORMATION:

Date: Tuesday April 30th, 1985
Time: 7:00 - 9:00 p.m.

Tutorial: Both groups Room #3

TODAY'S HANDOUTS:

Sessional Questionnaire
Tutorial evaluation
Self-monitoring books
Starting the 10BX
10BX Book
Modification to the 10BX
Activity Guidelines
Activity Questionnaire

7:00

Prior to Lecture (L.O., M.G.)

1. Check attendance
2. Give out handouts
3. Collect Self-monitoring

7:05-7:15

Activity Questionnaire

7:15-8:40

10BX Assessment

ACTIVITY

Why 10BX?

• Combination of flexibility and muscle strength and endurance exercises.
CHEST DISCOMFORT STUDY
Session #8
AGENDA

7:15-8:40  10BX Assessment (cont'd)

- satisfies the 3 basic activity
  principles that govern muscular
  fitness.

i  OVERLOAD - Muscles must be
    overloaded or worked a little
    harder than they are used to
    for muscular improvement.

ii  REGULARITY - Muscles must be
    overloaded regularly. The
    10BX done daily will cover
    the major muscle groups.

iii PROGRESSION - For muscular
    fitness to be improved,
    overload should be increased
    in small increments. Moder-
    ately progressive overloading
    produces faster and better
    results than large jumps.
    Progressing within the 10BX
    charts and levels ensures
    muscular improvement safely.

HANDOUT "Starting the 10BX" record-
    ing sheet and pencils to students.
Instruct students to record the
    number of repetitions they complete
in a one minute time period in the
    appropriate area under sit-ups,
    side leg raising, and push-ups.

Remind students to exhale on
    exertion. Do not hold breath.

A.  • Demonstrate sit-ups. (Refer
    to Chart I, 10BX, #5)
    • Ensure knees are bent. Do
      not hold breath.
    • Each subject should demon-
      strate one repetition. Check
      for correct technique.

COMMENTS

- stop watch or clock
  with seconds required.
CHEST DISCOMFORT STUDY
Session #8
AGENDA

7:15-8:40  10BX Assessment (cont'd)

NOTE:

If an individual cannot do the partial sit-up:

Instruct them to contract their abdominals while doing a pelvic tilt. Hold 6 seconds. (Indicate this change on their recording sheet).

* SUBJECT INSTRUCTIONS:

- Instruct subjects to do as many repetitions as they can comfortably in the next minute.

- TIME ONE MINUTE

- Remind subjects to record the repetitions. Estimate if they cannot recall the exact number.

- BREAK, 2 MINUTES.

B. • Demonstrate side leg raising. (Refer to Chart I, 10BX, #7).

- Use left leg for right-handed people, and vice-versa.

- Raise leg 18-24". Ensure leg does not laterally rotate and raised foot points down.

- Have each subject demonstrate one repetition. Check for correct technique.

* Repeat SUBJECT INSTRUCTIONS as above.
CHEST DISCOMFORT STUDY
Session #8
AGENDA

7:15-8:40 10BX Assessment (cont'd)

C. • Demonstrate push-ups.
   (Refer to Chart I, 10BX, #8).
   • Remind to exhale on effort or as they "push-up."
   • Each subject should demonstrate one repetition.
     Check for correct technique.

NOTE:

If an individual is unable to push their body off the floor in any way possible, instruct them to do push-ups against the wall. (Indicate this change on their recording sheet).

* Repeat SUBJECT INSTRUCTIONS as above.

TO DETERMINE STARTING LEVEL OF 10BX:

• Handout 10BX books.

• Fill in "Starting the 10BX" sheet.

• Assist individuals in determining their starting level and rate of progression.

NOTE:

To those individuals who required a modification to the 10BX exercises, instruct them to use the same number of repetitions (and progression rate) as the original exercise.
CHEST DISCOMFORT STUDY
Session #8
AGENDA

7:15-8:40  10BX Assessment (cont'd)

- Demonstrate the final exercise in 10BX, leg lifting, #9.
- Review Modifications to the 10BX and give out handout.
- Hand out activity guidelines.
- Suggest doing 10BX daily if progression too fast or too slow, adjust accordingly.

/mp
Apr. 29th/85
CHEST DISCOMFORT STUDY

Session #9

AGENDA

Course Leader - Margaret Goldrick
Team Leader - Lorraine Oliver

MAIN BOARD INFORMATION - Chest Discomfort Study
DATE: Tuesday May 7th, 1983
TIME: 7:00 - 9:00 p.m.

TUTORIAL SESSION - Green Group - Classroom 5
Pink Group - Classroom 1

TONIGHT'S HANDOUT'S
Sessional Questionnaire
Tutorial Evaluations
Self-Monitoring Books

7:00 Prior to Tutorial (L.O., M.G.)

1. Check attendance
2. Give out handouts
3. Collect S.M. books

7:05-7:15 Problem Solving

Identify problems from group to work on and write on board.

7:15-8:15 Select A Problem

1. Operationally define
2. Generate alternatives (Brainstorm)
3. Select a course of action.
4. Test the outcome

- Put 4 steps on board
- How to change behaviour:
  - find the right price
  - set up contingencies & reinforcers
CHEST DISCOMFORT STUDY
Session #9
AGENDA

7:15-8:15  Select A Problem (cont'd)  COMMENTS
- start slowly, small steps to reach goal.
- replace unwanted behaviour with incompatible responses.

8:15-8:25  BREAK

8:25-8:45  10BX

8:45-9:00  • PMR without muscle tensing and with imagery - Practice
• Discussion re: Generalization

Blackboard Information

Empirical Problem Solving:

1. Define the problem.
2. Generate alternatives (Brain-storm)
3. Select a course of action
4. Test outcome

Operational Definition:

- observable  - deal with behaviours not inferences.
- measurable  - quantify
- don't make assumptions

Ask:  • What do you mean by that?
• How do you know that?
• How do you know when the problem is solved?

/mp
May 3/85
CHEST DISCOMFORT STUDY

Session #11

AGENDA

Course Leader - Marg Goldrick
Team Leader - Lorraine Oliver

Main Board Information:
Chest Discomfort Study
DATE: Tuesday, May 21, 1985
TIME: 7:00-9:00 p.m.
Tutorial Session - Green Rm. #5
Pink Rm. #1

TONIGHT'S HANDOUTS
Sessional Questionnaires
Tutorial Evaluations
Heart Rate - A measure of Intensity
Exercise Programs - Exercise Diaries

Prior to Tutorial (L.O., H.G.)

7:00
1. Check Attendance
2. Give out handouts

7:05-7:20 Instruction for calculating H.R.

7:20-7:35 Relaxation

7:35-8:15 EXERCISE PROGRAM

1. Rationale
   - take mystery out of exercise
   - locus of control - students learn how to do it
   - won't have to depend on someone else
   - even if currently engaged in exercise program, useful to evaluate whether it is meeting the goals you would like to achieve with exercise.
   - learn a process of how to design your own program - if stop your activity or want to shape up a new activity.

2. Process - What are your goals and benefits.
   - C-V conditioning
   - increase flexibility
   - increase strength
   - anxiolytic
   - incompatible/competing response

COMMENTS

Remind to check H.R. following PHR and Reord.

Refer to Activity Questionnaire.
- increase energy
- improve sleep
- fun
- social
- lose weight

Refer to:
* List the activities you are currently doing on the Activity Questionnaire.
* Match the activities with the goals/benefits they fulfill using the Activity Questionnaire.
* See which goals are left over.
* Think of new activities you would like to begin to meet your goals and record them beside the goals.
  - look at what you have done in the past.
  - look at what is available, i.e.,
  - cost
  - location

BE REALISTIC! - seasonal
  - time
  - appropriate equipment and/or facility

- consider physical limitations and/or contraindications.
* Record these activities on your EXERCISE PROGRAM.

8:15-8:25 BREAK

8:25-9:00 EXERCISE PROGRAMS CONT'D

1. Determine THR ranges

FORMULA:

(Max. H.R. - R.H.R.) x .60 +
R.H.R. = Lower Limit

(Max. H.R. - R.H.R.) x .70 +
R.H.R. = Upper Limit
Max. H.R. = 220 - age.

Maximum HR from stress tests
8:10-9:00 EXERCISE PROGRAMS CONT'D

2. Shaping - What are your actual goals in measurable terms i.e., time, distance, # reps, # laps? walking - 40-60 minutes, jogging - 20 mins, swimming - 30 mins., cycling 30 mins. weight training 2 x 15 reps., flexibility - 3-5 reps, hold stretch 30 secs. General Calisthenics 2 sets of 25 reps. - 10BX age adjusted goals.

- BE REALISTIC - Record at bottom of Exercise Program.

- Determine your starting levels for each activity and record under # reps. for flexibility, muscle strength & endurance and under DURATION for aerobic

  o Refer to your baselines - for aerobic programs, for 10BX - use as a model - take prerequisites into account.

  o Discuss how to determine rate of progression using walking as an example - empirical - see sample programs.

  o Record rate of progression on Exercise Program Sheet under # reps. or Duration

- BE REALISTIC - avoid overdoing it.
8:10-9:00  EXERCISE PROGRAMS CONT'D

3. Plan & Schedule - How often will student complete each activity per week?
   
   e.g., AEROBIC 4-5 x once per week, every other day or daily (behavioural benefits)
   
   e.g., WEIGHT TRAINING - 3 x once per week
   
   - determine time of day for each activity
   - consider - lunch hours
   - babysitting
   - is special equipment needed?
   - allow sufficient time

4. Students complete Exercise Program and checked by leaders.

5. Discuss use of Exercise Diary

6. Contingencies
   
   - pay in advance
   - join a league/club
   - do it with a friend
   - buy expensive equipment/clothing
   - set up a system of rewards
   - tell you worst enemy (F of F)

7. Activity Guidelines - discuss each point.
CHEST DISCOMFORT STUDY

SESSION #12

AGENDA

Course Leader M. Goldrick
Group Leader L. Oliver

MAIN BOARD INFORMATION:

Chest Discomfort Study
DATE--Tuesday, May 28, 1985
TIME--7:00-10:00 p.m.

TOPIC-- Behavioural Principles
SPEAKER--Jane McCully

TONIGHT'S HANDOUTS:

Lecture Evaluation
Sessional Questionnaire

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<td>7:00-7:05</td>
<td>Check Attendance</td>
<td>MG,LO</td>
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<td>Give out handouts</td>
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<td>7:05-8:15</td>
<td>Review of Study</td>
<td>JMc</td>
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<td></td>
<td>Review of Behavioural Approach</td>
<td>JMc</td>
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<tr>
<td>8:15-8:25</td>
<td>Energy Break</td>
<td>LO</td>
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<td>8:25-8:35</td>
<td>Break</td>
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<tr>
<td>8:35-9:30</td>
<td>Behavioural Changes Relevent to Study</td>
<td>JMc</td>
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<td>a)examples</td>
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<td>b)elicit from group</td>
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<td>c)ID how changes made</td>
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<td>d)elicit desired changes &amp; how to's</td>
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CHEST DISCOMFORT STUDY

Session #13

AGENDA

Course Leader - Margaret Goldrick
Team Leader - Lorraine Oliver

MAIN BOARD INFORMATION:
Chest Discomfort Study
DATE: Thursday, June 4, 1985
TIME: 7:00 - 9:00 p.m.

Tutorial Session

TONIGHT'S HANDOUTS:
Tutorial Evaluation
Sessional Questionnaire

PLACE: Green - Classroom #5
Pink - Classroom #1

COMMENTS

7:00-7:05 Prior to Lecture (L.O., M.G.)
1. Check attendance
2. Give out handouts

7:05-7:15 Discussion of Exercise Programs:
* problems?
* setting realistic goals: - anyone need to adjust rate of progression?
* scheduling?

7:15-7:30 Self-Monitoring
* Review individuals books (group)
* Look for relationships/possible hypothesis e.g., pain - fatigue, exercise.
* Classical Conditioning - Antecedents - "Bells."
CHEST DISCOMFORT STUDY
SESSION #13
AGENDA

7:15-7:30 Cont'd...

* Operant Conditioning - Consequents - "Payoffs"

* Failure to find "bells"
  - not enough data recorded
  - not classically conditioned - look for things that follow behaviour and serve as reinforcers.
  - possibility of generalized response to so many situations, impossible to I.D. stimuli.
  - can still do something about problem - use incompatible/competing response strategies.
  - another problem - many behaviours are maintained on an intermittent schedule of reinforcement.
  - c- behaviour may be followed by covert self-reinforcement.

7:30-8:00 Group Task

* What would you like to do that you are not currently doing?
  e.g., - increase physical activities
        - change career
        - improve work performance
        - increase social activities
        - increase leisure time

* Based on what you have learned what can you do about it?

8:00-8:10 BREAK

8:10-8:50 * Define goal in behavioural terms:
  - observable - focus on what you will be doing.
  - specific & concrete
  - can be broken down into small steps

  Purpose - gives you a place to start and helps you recognize when you have arrived at end.

WRITE ON BOARD
1. Build a Plan
2. EPS steps
8:10-8:50 Cont'd...

* Select a target date for your goal
  e.g., 6 months, 2 weeks, after 20 times.

* Build a Plan
  a. I.D. the main components of your
     goal and what steps are involved
     for each component.
  b. Shaping
     - Break down goal into small steps -
       gives you a realistic idea of what
       is ahead or may tell you that your
       goal is more complicated than you
       thought.
     Start with first step and work
     forward or start with last step
     and work backward.
     Check: Is your goal still realistic?
     Should you look at accomplishing
     your minimal goal first.
     Set yourself up to succeed.
     - Steps should be small
       e.g., work for 5 minutes - all you
       need to do, start and you can
       that in 5 minutes.
     - No matter how small the effort is,
       it is a step in the right direction.
  c. Control the environment:
     Plan when you will start and be
     realistic e.g., don't decide to
     start at 6:00 a.m. if you usually
     don't get out of bed until 7:00 a.m.
     Schedule - same time every day works
     well to develop a new habit.
     Plan where you will start and be
     realistic e.g., don't plan to do your
     work that involves intense concentration
     around someone who would rather chat.
8:10-8:50 Cont'd...

Plan how long you will work at your task -
- set a time limit and be realistic
- don't approach - do less than what you
  expect you could tolerate.
- avoid doing more even if it feels
good at the time - the next time
you will expect just as much from
yourself and this may not be realistic.
- set up your tasks so you can quit
"comfortably": after the planned goal
is achieved.
- work according to time or your
  preset small goal (e.g., with
  exercise, # reps.) not with the
  "set" that the entire task must
  be completed today.
- if you stop after achieving your
  preset small goal you will feel
  successful that you have controlled
  your behaviour.

d. Arrange Contingencies

- find your price
- Reinforce your efforts - avoid
  punishment
  (reinforcer - anything that makes you
  feel good or that you enjoy)
- reward after completing the small goal
  e.g., don't plan to do studying after
  after going out to a movie.
- start with immediate, frequent,
  reinforcement and later change to
  intermittent - plan it.

e. Use Incompatible/Competing Response
   Strategies
- Used to extinguish unwanted behaviour
8:10-8:50 Cont'd...

- Change your behaviour so that it is compatible with how you think.

f. Monitor your progress

- Try to never go backwards - always move forward but if encounter any difficulty, hold or readjust rate of progression, take smaller steps.
- Look at what worked (successes) and what did not (setbacks)
- Don't be overly critical of yourself or judgemental.

Mistakes/difficulties should be viewed as problems to be solved, not something to be upset about.

REMAINING TIME?
Solicit ideas for Lecture Review

8:50-9:00 DIFFERENTIAL RELAXATION
CHEST DISCOMFORT STUDY

SESSION #15

TUTORIAL AGENDA

Course Leader: M. Goldrick
Group Leader: L. Oliver

Handouts: Discomfort Questionnaire
Relaxation Overview
Sessional Questionnaire
Tutorial Evaluation

7:00-7:05 Check Attendance
Give out Handouts

7:15-7:20 Review Group Task (Agenda #13)

7:20-7:35 Discomfort Questionnaire - complete
Post-Q's and distribute Pre-Q's for
discussion.

7:35-8:00 Demo - iCBT

8:00-8:15 BREAK

8:15-8:25 Relaxation Overview

8:25-9:00 Individual Tasks and report back to
group.

COMMENTS

Steps of Build a Plan on the board.
Appendix F

Chest Discomfort Intervention Study

Exercise Programme Materials
OUTLINE OF EXERCISE COMPONENT

Session I: Deliver Flexibility exercises

- rationale for exercises - physical expectations
- rationale for flexibility exercises
- demonstrate flexibility exercises
  outline daily plan

Session II: Complete Activity Questionnaire

Session III: Demonstrate and deliver 10BX exercises

- rationale for 10BX exercises
- provide 10BX modifications
- determine appropriate 10BX level
- demonstrate 10BX exercises and use of book
- outline daily plan

Introduce walking programme
- rationale for aerobic activity
- instruct how to take baseline and shape walking time
- explain how to take heart rate
- distribute daily walking diary and discuss
- outline daily plan
- provide sheet on fit tips

Session IV: Participants hand in walking records

- discuss walking progress

Session V: Provide individual training heart rate

- explain concept of training HR
- review benefits of aerobic activity
- instruct to walk within training HR and continue to monitor progress
- review daily activity plan

Session VI: Individual aerobic programme

- provide rationale
- identify plan for programme
INTRODUCTION: Education re: activity
Participation: optional, voluntary
Only you can decide what you want to get out of it -
what your goals are - whether they be improving cardiac
fitness or simply being more limber. Even if you know you
don't want to be a marathon runner, an exercise program can
↑ your physical potential - you can do more with less effort -
no matter what physical demands are placed on you.

Once you've decided on your goals, we can help you achieve
them, using some of the strategies that Dr. Anchel outlined
in the last lecture. We will be educating you with regard
to the best way to go about setting up an exercise program
and then show you how to employ it successfully. Behavioural
principles are very useful in carrying out activity programs.
Once you understand them, you have increased the probability
of successfully carrying out a program and can avoid useless
attributions like "I don't have the willpower".

RATIONALE: Dr. Goldberg mentioned several benefits of exercise:

- do more with less effort.
- increase work capacity of your heart.
- ↑ energy level, ↓ fatigue
- anxiolytic (endorphins)

We can add a few more to his list:

- sleep better (more slow wave sleep)
- ↑ your flexibility
- ↑ strength and endurance
- an incompatible/competing response.

THE PROGRAM: A complete program has 3 components: flexibility, muscle
strength and endurance and aerobics. You may not all want
to go the whole way - and on the other hand, some of you may
already be at the final stage.

(1) Flexibility exercises - which we'll be doing tonight - are
useful to ease people into an exercise routine. Their purpose
is to ↑ range of movement in a series of joints through
bending and stretching. They can be done without strain
and will prepare you for the next level of exercise.
(2) Muscle strength and endurance (e.g., situps and pushups) - these exercises will increase your muscle strength and endurance (tone?) - but do not place great demands on your heart. Use small groups. If these muscle groups are not toned, you will not be able to carry out the next phase - aerobics - for which you need a great deal of endurance & strength. (Will need to work up to 20 minutes or more at a time before they can begin aerobics).

(3) Aerobics - aerobic activity makes your heart stronger and more efficient (with proper conditioning) - your heart will be able to pump more at one "stroke". Aerobic activities include such things as swimming, running and cycling. Each of these involve large muscle groups and require a high level of muscle strength and endurance.
DISCOMFORT QUESTIONNAIRE

Most people have some ideas about what affects or causes their discomfort such as what brings it on, what makes it worse, and what they can do to relieve it or prevent it from getting worse.

1. I have found that the following situations/activities are often related to my discomfort (please check appropriate space):

<table>
<thead>
<tr>
<th>Activity</th>
<th>YES</th>
<th>NO</th>
<th>NOT APPLICABLE</th>
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<tbody>
<tr>
<td>Shopping</td>
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<td>Gardening</td>
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<td>Vacuuming</td>
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<td>Cooking</td>
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<td>Dusting</td>
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<td>Driving</td>
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<td>Public speaking</td>
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<td>Doing dishes</td>
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<td>Doing laundry</td>
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<td>Feeling tired</td>
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<td>Feeling anxious</td>
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<td>Feeling depressed</td>
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<td>Feeling frustrated</td>
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<td>Feeling excited</td>
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<td>Being in crowds</td>
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<td>Being alone</td>
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<td>Feeling lonely</td>
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<td>Being in open places</td>
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<td>Relaxing (not engaged in activity, &quot;taking it easy&quot;)</td>
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<td>Telephoning</td>
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<td>Being with friends</td>
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<td>Being with parents</td>
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<td>Being with children</td>
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<td>Being with relatives</td>
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<td>(other than parents)</td>
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<tr>
<td>Exercising (calisthenics, working out)</td>
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<td>Walking</td>
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<td>Running</td>
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<td>Cycling</td>
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<td>Playing tennis/squash</td>
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<td>Reading</td>
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<td>Watching T.V.</td>
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<td>Working at job</td>
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2. I have found that the following things relieve my discomfort or prevent it from getting worse.

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Appendix G

Chest Discomfort Intervention Study

Relaxation Component
RELAXATION OVERVIEW

RELAXATION - A skill that can be learned to control responses associated with tension and discomfort. Once the response is learned, it is a useful incompatible/competing response strategy.

STEP I - Learn relaxation under ideal conditions

1) all body parts supported
2) dark, quiet, room
3) tense muscles, then let go to increase your awareness of the feelings of tension and relaxation
4) practice at least twice daily for 15-20 minutes for 1 or 2 weeks until you begin to feel you are very relaxed

STEP II - Omit tensing part and practice the relaxation by focusing on the muscles and progressively letting them go.

-practise STEP II for 1 or 2 weeks.

STEP III - Once relaxation has been learned in a controlled environment it is then possible to extend the skill to real life situations.

GENERALIZATION - refers to the practise of systematically increasing the situations in which you are able to relax. It is important to practise in the easiest situations before progressing to more difficult ones.

-e.g. -sitting in chair
-lights on
-radio playing softly
-eyes open
-another person present
-watching T.V.
-talking with someone
-walking
-driving
-when experiencing discomfort

DIFFERENTIATION - refers to relaxing those muscles that are not essential to given activities. (e.g., when standing it is not necessary to tense arm, shoulder, and neck muscles)
HOW TO USE IT?

- as you become more and more skilled the response will become automatic

- certain responses that have become paired with the relaxation responses act as cues that trigger the response

 e.g., - breathing exercises
       - mental repetition of certain words - heavy; warm
       - imagery - warm, sandy, beach; ragdoll
RELAXATION TECHNIQUE

1. Be patient. Relaxation is a skill and like any other skill it takes time and practice to learn. In addition like any other skill, people learn at varying rates.

2. Choose a quiet, darkened room with no distractions as you start to practice relaxation techniques. Take the telephone off the hook. Ask your family not to disturb you for 20 minutes.

3. Assume a comfortable position. Uncross your arms and legs and ensure that your body is fully supported. Do not rest your limbs on your body. Loosen clothing. Remove shoes, glasses or contact lenses, heavy jewellery, etc.

4. Adopt a passive attitude – let things happen.

5. Change your position as necessary so that you are comfortable.

6. Imagine words such as heavy, warm, limp, comfortable, relaxed, loose and tired to facilitate a relaxed feeling.

7. Focus on tensing and relaxing various muscle groups. It is natural for your mind to wander. When it does gently bring it back to a point of focus such as your breathing pattern.

8. Tense your muscles but do not strain them. Do not tense muscles which aggravate pain.

9. For this technique to become effective, it is important to practice at least twice daily for 15 to 20 minutes each time. It is especially important to practice during times of difficulty.

10. You may encounter unusual feelings such as lightheadedness, floating, or a tingling feeling. It is nothing to be frightened of but rather a sign that your muscles are loosening up.

11. Quick shallow breathing is related to arousal; therefore, allow your breathing to become deep and slow. Don’t force it. Learn to associate deep breathing with relaxation. In everyday situations, let slow deep breathing become a signal for relaxation.

12. After two weeks of practice begin relaxing the muscles directly, omitting the tensing part of the training.

TERMINOLOGY

GENERALIZATION: Refers to the practice of systematically increasing the situations in which you are able to relax. When you have learned the technique in a controlled environment, practice it in increasingly demanding situations.
DIFFERENTIATION: Refers to the technique of relaxing the muscles that are not essential to given activities, (i.e., when sitting and speaking with another person, you can inconspicuously relax many facial, back, stomach, and leg muscles.)

EXAMPLE OF PROGRESSIVE MUSCLE RELAXATION

1. Breathe in slowly, then let the breath out slowly through your mouth - repeat twice.

2. Curl toes of right foot - hold - relax toes.

3. Point toes of right foot downward - hold - relax.

4. Pull toes of right foot toward head, stretching the back of the leg - hold - relax.

5. Press lower right leg into bed or chair - hold - relax.

6. Press entire right leg into bed or chair - hold - relax.

7. Lift entire right leg a few inches, keep leg straight - hold - relax.

8. Repeat for left leg.

9. Clench right hand into a fist - hold - relax.

10. Tighten biceps of right arm - hold - relax.

11. Raise entire right arm - hold - relax.

12. Repeat for left arm.


14. Turn head slowly from side to side - relax.

15. Lift head slightly off the floor - hold - relax.


17. Open mouth as far as possible - hold - relax.


20. Push small of back into floor - hold - relax.


22. Allow the muscles of the body to remain in this total state of looseness for a comfortable length of time and then gradually start to move about again.
1. Create environment conducive to relaxation.
   - dark, quiet, room.
   - discuss: e.g. phone off hook, ask people not to disturb you.
   - loosen clothing, tie, belt, shoes off, glasses off.
   - assume a comfortable position - uncross arms and legs.
     Change your position as necessary to be comfortable.
     (In group situation we'll have to have people lay on carpeted floor initially).

2. Adopt a passive attitude - let things happen.
   - natural for mind to wander. When it does, gently bring it back to a point of focus such as your breathing pattern.

   Be patient. Relaxation is a skill and like any other skill, it takes time to practice and learn. In addition, like any other skill, people learn at varying rates.

3. Initially, when learning this skill, you will be asked to tense various muscle groups so that you will become very aware of muscular tension. Please, only tense the muscles to about 2/3 of your maximum capacity. Example, do not tense them as hard as you can. You will then be asked to relax those muscles so that you will become very aware of the difference between tension and relaxation. Phrases such as "LET GO" and "RELEASE THE TENSION" will be suggested to facilitate the relaxation of your muscles. It is also useful to imagine yourself feeling heavy, warm, loose and comfortable (or light as some describe it).

   Begin by closing your eyes in order to concentrate more easily.

   Take a deep breath in, hold, and now slowly exhale. Quick, shallow breathing is related to arousal or a state quite opposite to relaxation. Allow your breathing to become deep and slow.

   Take another deep breath in slowly, then let the breath out slowly through your mouth. Relax.

   Concentrate now on the muscles involved in your feet and legs. Point your toes downward, away from your body. Notice the muscle tension created. Now release the tension by letting the feet return to their normal resting position. Relax. Notice the difference between the tension and now the relaxation.

   Point your toes toward your head. Hold. Relax. Let go.

   Now focus on your right leg. Press the right leg into the floor (or chair) and hold. Study that sensation of muscle
tension, and now let it go. Relax. Feel the muscles loosening up. Relax. Now lift your right leg off the floor (chair) and hold. Feel how heavy your leg becomes, almost uncomfortable. Now let it drop. Repeat for left leg. Let your lower body feel heavier and heavier, and sink into the floor.

Next concentrate on the stomach muscles. Tense these muscles. Make the stomach very hard. Press the small of your back into the floor (chair) as well. Hold it. Now relax. Just let go and relax.

Focus your attention on the muscles of the right hand and arm. Increase the tension thereby making a fist with the right hand and hold. Be aware of those sensations of tension in the right hand and forearm. And now, let it go. Notice the difference between tension and now relaxation. Feel the relaxation spreading right down to the fingertips. Repeat for left hand and forearm.

Now tighten the muscles in both arms by making fists with both hands and bring the fists up to touch your shoulders. Hold. Relax. Notice the difference as you release the tension. Feel the warmth spreading to your fingertips. Feel the muscles loosen up. Notice the comfortable heaviness in your arms as you let them go, deeper and deeper. Wiggle your fingers a bit. Now just let them relax.

Shrug your shoulders up towards your ears. Study that tension, and now relax. Let the shoulders drop lower and lower as they relax more and more, heavier and heavier. Now round your shoulders, pulling them forward while pushing the upper back into the chair. Feel the tension and hold it. Now, relax and let go.

Put your hands out in front of you and press them together. Direct your attention to the chest muscles. Notice the muscular tension, and now relax your arms. Notice the chest muscles relax. Feel them loosen up, let go, let go.

And now take a deep breath, filling your lungs, and hold it. Study the tension all through your chest and down into your stomach area. Slowly exhale. Release the tension. Notice the muscles of respiration letting go, slowly, comfortably. Notice the muscles becoming more and more relaxed, each time you exhale.

Press your chin to your chest. At the same time press the back of you neck into the chair. Hold. Focus on the neck muscles and your upper back. Study the tension and let it go. Enjoy the contrast between the tension you created before, and the relaxation you can feel now. Just keep letting go, further and further. Notice the loose muscles, the heaviness of the neck and head.
Clench your jaw. Relax it now. Press your tongue against your bottom teeth. Release it. Pull your mouth back in a wide grin. Study the tension; feel it spread; then let it go again. Let your lips part slightly. Let your jaw feel heavier and heavier.

Direct your attention to the upper part of your face. Wrinkle your nose up. Feel the tension, then let it go. Squeeze your eyes tightly shut. Study that sensation. Let it go. Let your eyes remain comfortably closed. Notice now the heaviness of relaxation. Now, keeping your eyes closed, raise your eyebrows and hold. Feel the tension in your forehead. Now, let go.

Turn your head slowly from side to side. Let it fall gently. Relax. Relax. Just continue to let go, further and further, more and more. Enjoy the comfortable heaviness. Think of calmness, peacefulness. And relax.

It's time now to come out of the relaxation state. You should do so very gradually - don't suddenly jump up. Open your eyes slowly and start to stir. Stretch a little, then eventually sit up.
Relaxation via Letting Go, Imagery

You are lying comfortably with your eyes closed, all parts of your body supported so there is no need to tense any muscles. Just let go as best as you can.

Take a deep breath in, expand your lungs, hold, slowly exhale.

Take another deep breath in slowly, then let the breath out slowly through your mouth. Relax.

Continue to breathe slowly and rhythmically.

For the next time that I ask you to take a deep breath, think about letting go of all the tension in your body with the air that you slowly release. Think also of becoming heavier and heavier.

Now take in a long, deep breath and ... let it go... heavier, heavier.

For the next few minutes try to imagine being in the relaxing, peaceful, situation that I will now describe. Imagine that at this moment you are lying on a warm, sandy beach, soaking up the sun. Think about all the pleasant sensations you have experienced in the past when lying on this beach. Feel the warm sun on your skin. Notice the warmth spreading over your body—your feet, legs, abdomen, chest, arms, neck and face. Feel the comfort of the warm sand underneath your body, the heaviness of your body making it's own imprint in the white, sparkling sand, the sand enveloping your body, supporting it so comfortably. Notice how you can hear the waves of the water splashing onto the shore and flow back out again. In and out.
Rhythmically, peacefully. Take a deep breath in of the fresh sea air. Let it go.

Now, draw all of your attention down to your feet. Focus in on the feelings in your feet - the arches of your feet, the toes, the ankles. Notice any tension in these areas, then let it go. Let the feet fall in their most normal resting position. Concentrate now on the calves and shin's. The calf muscles are flaccid, limp. Continue to let them go, further and further. Relax the shin muscles to the best of your ability. Notice the lower legs becoming heavier and heavier, the relaxation deeper and deeper.

Feel the relaxation spread into your thighs, those muscles also beginning to relax further and further, more and more. Now just imagine all the tensions in your legs are now flowing down the legs, down the legs, from the top of your legs down and right out your toes. Notice how this leaves your legs heavier and heavier.

Feel the relaxation now spreading into your hips and buttocks, as you are resting heavily and comfortably. Further and further relaxed. Feel your lower back sink closer and closer to the floor. Let go, relax.

Focus on the stomach muscles now, notice any tightness, then let it go. As you think of letting go you somehow are able to let go further and further, more and more than before. Feel the stomach muscles sag deeper towards the back.
Notice next the chest muscles. Feel the relaxation spread into the left chest, across to the right chest. Take a deep breath in slowly. Feel the chest muscles stretch gently - expand like an elastic band. Slowly exhale and let the chest muscles become limp, and loose.

Focus now on the hands. Feel the relaxation spreading through each finger, right down to the fingertips. Focus in on the feelings in your forearms and let go of whatever tensions might be there. Just relax ... Notice the upper part of your arms and any tensions there. Let them go. Just let go of all the arm muscles, more and more, relaxation spreading deeper and deeper. Imagine all the muscle tension now flowing down the arms, through the limp muscles and right out the fingertips. Notice how this leaves the arms heavier and heavier, the warmth of relaxation spreading through the arms.

Relax now both your left and right shoulders, and feel the soft heaviness, the warm relaxation coming more and more into both your left and right arms, hands, fingertips.

Feel the relaxation moving calmly into your neck, those muscles looser and looser. Even when it seems impossible to relax any further, there is always that extra bit of calm and relaxation that you can enjoy, just by letting go further and further.

Feel your upper back and head become heavier, as if melting into the floor.

Now turn your attention to the muscles in the face. Smooth out your forehead, just relax those muscles. Feel the eyebrows drop - the eyes become heavier, the muscles at the temples, loose. Relaxation now spreading warmly to your cheeks, those muscles looser and looser. Your jaws loosely relaxed, more and more, dropping further and further, your lips slightly parting.

Just continue to relax, heavier and heavier.

Let's now try to deepen the relaxation. In a few minutes I am going to become silent so that you can practise the following exercise. I want you to think clearly of the word "relax" every time you exhale. I would like you to let go a little bit more each time you exhale and at the same time to think to yourself the word "relax". This will enable you to associate in your mind the word "relax" with the relaxed state you are now in. Each time you exhale I would like you to think silently to yourself the word "relax". Go ahead and take a deep breath in, and relax.

In a state of perfect relaxation you should feel unwilling to move a single muscle in your body. Think about the effort that would be required to raise your right arm. As you just think about raising your right arm, see if you can notice any tensions that might have crept into your shoulder and your arm .... Now you decide not to lift the arm but to continue relaxing. Observe the relief and the disappearance of the tension.

Continue to relax. Perhaps scan your entire body for any muscle tension creeping in. Release that tension. Let go, relax.
It's now time to come out of the relaxation gradually. Try to maintain the relaxation but slowly open your eyes and sit up. You should feel refreshed, wide awake and calm.

Further Suggestions:

With subsequent repetition of the above script it may be useful to try other techniques to deepen the relaxation, for example, by counting slowly from 1 to 10 suggesting to the person to try to relax a little more with each number, suggesting that the person can let go more and more.
After you have learned to relax with all of your body parts supported, it is often desirable to extend your relaxation skills to other situations in which it is impossible to lie down and relax. The term "differential relaxation" refers to relaxing those muscles that are not essential to given activities. For example, when sitting and speaking with another person, one can inconspicuously relax many facial, back, stomach, and leg muscles.

It should be stressed at this point that this is also a skill which requires practice. It is analogous to learning to drive a car. Initially a person finds himself very much aware of what he/she is doing and has difficulty coordinating everything. With more and more practice, however, the procedure involved in driving becomes easier and more automatic. You may find the same thing occurring to you when you try to relax in those situations associated with your discomfort. As you persist however, it should become easier and the relaxation response more automatic.

The main points to remember during differential relaxation are:

1) learn to assess which muscles need not be tense at any given time.
2) note whether they are tense.
3) let go of them selectively, analogous to the letting go you have already learned.

Begin by spending the first 10 minutes or so just relaxing on your own. Be sure to include the breathing exercises you have learned. Imagine you are in that very comfortable situation that you know has been most relaxing for you. I will tell you when 10 minutes have elapsed.

(This initial relaxation may be done lying down and after 10' the students could be asked to sit in chairs or they could be asked to sit in the chairs from the start.)

Now open your eyes and sit up in a (your) chair. I would like to point out a few things to you as you just sit there in the chair.
DIFFERENTIAL RELAXATION

Remember now your eyes are open. Perhaps you could focus on an object such as the chair in front of you or a spot on the wall. Now, while doing this, notice there is no need to tense the muscles in your forehead, jaws, and shoulders. If they are tense, let them go. Notice too that it is still possible to keep your arm muscles and leg muscles relaxed. Are you clenching the sides of the chair? Are your shoulders drawn back unnaturally? Let them go. Just as with other styles of relaxation, do not cross your legs. Let them hang loosely.

You'll notice that you probably have to keep the muscles of your neck somewhat tense so that your head will remain upright, but there is really no need to tense your face, or your shoulders, or your arms, chest, stomach, legs. Just notice how relaxed you can remain in many parts of your body and still continue to keep your eyes open. Frequently scan your body for any signs of tension creeping in and let it go, switch it off. Remember that just as the tensing of a voluntary muscle is under your control, so also is the relaxation of that muscle. But it just takes practice to be able to relax as many muscles as possible and still be able to do a variety of activities.

Now let's try to assess which muscles need not be tense when standing upright. Would everyone please stand and again you may find it less distracting if you choose a certain spot to focus on. Notice that you tense various muscles in your legs and stomach in order to remain standing, but there is really no need to have your arms and shoulders tense. Try to relax as many muscles as you can in the upper part of your body, especially in your face, shoulders, and arms.

To help reinstate the relaxation use your breathing exercises that you have practised many times and which may now be useful to signal the relaxation response. First take a deep breath in and expand the lungs, feel the chest expand. Slowly exhale all your air while at the same time think clearly to yourself the word relax. Let go alittle more each time you exhale.
Feel your muscles become looser and looser. Repeat some of those words you associate with relaxation: heavy, warm, peaceful, limp, comfortable.

There are many situations that you may find it useful to practise this skill. To maximize success it is advisable to practise under the easiest circumstances then to move to more problematical situations. For example you may want to try practising this skill while talking to someone at home. Success here could be followed by attempts to relax while sitting in a restaurant. The more you practise, the better you'll get at it, and the more likely it will become a habit.
Appendix H

Chest Discomfort Intervention Study

Attrition Data
Table H.1

Gender and Diagnosis by Participant Status, Before Intervention

<table>
<thead>
<tr>
<th>Participant status</th>
<th>Gender</th>
<th>Diagnosis</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Male</td>
<td>Female</td>
</tr>
<tr>
<td>Non-dropout (n = 69)</td>
<td>14</td>
<td>55</td>
</tr>
<tr>
<td>Dropout (n = 35)</td>
<td>5</td>
<td>30</td>
</tr>
</tbody>
</table>

a
Gender: $X^2 (1) = 0.33$, n.s.

b
Diagnosis: $X^2 (1) = 0.00$, n.s.
Table M.2

Mean Subjective Ratings of Disability Attributed to Fatigue and Physical Activity Level, Duration of Chest Discomfort, and Age by Participant Status, Before Intervention

<table>
<thead>
<tr>
<th>Participant Status</th>
<th>n</th>
<th>Disability Attributed to Fatigue</th>
<th>Physical Activity Level</th>
<th>Duration of Chest Discomfort in Months</th>
<th>Age in Years</th>
</tr>
</thead>
<tbody>
<tr>
<td>Non-Dropout</td>
<td>69</td>
<td>54</td>
<td>39</td>
<td>62.5</td>
<td>42.5</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(28)</td>
<td>(26)</td>
<td>(44)</td>
<td>(12.2)</td>
</tr>
<tr>
<td>Dropout</td>
<td>35</td>
<td>47</td>
<td>46</td>
<td>47.5</td>
<td>39.9</td>
</tr>
<tr>
<td></td>
<td></td>
<td>(27)</td>
<td>(26)</td>
<td>(40.5)</td>
<td>(12.1)</td>
</tr>
</tbody>
</table>

Note. The (a) values represent mean ratings of disability/physical activity level from 100mm visual analogue scales (0 = not disabled/active; 100 = totally disabled, active). No between group differences were found for any of these measures using one-way ANOVA's.
Table H-3

Mean Subjective Ratings of Disability and Limitations on Activities Attributed to Chest Discomfort by Participant Status, Before Intervention

<table>
<thead>
<tr>
<th>Participant status</th>
<th>Limitations on</th>
<th>Limitations by</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Work activity for income</td>
<td>Routine daily activities</td>
</tr>
<tr>
<td>Non-Dropout 69</td>
<td>a</td>
<td>(26)</td>
</tr>
<tr>
<td>M</td>
<td>27</td>
<td>32</td>
</tr>
<tr>
<td>SD</td>
<td>(26)</td>
<td>(24)</td>
</tr>
<tr>
<td>Dropout 35</td>
<td>b</td>
<td>(31)</td>
</tr>
<tr>
<td>M</td>
<td>38</td>
<td>34</td>
</tr>
<tr>
<td>SD</td>
<td>(31)</td>
<td>(25)</td>
</tr>
</tbody>
</table>

Note. The values represent mean ratings of limitations on 100mm visual analogue scales (0 = not limited; 100 = totally limited).

\[ a \quad b \]
\[ n=53 \quad n=35 \]
Table H-4

A Comparison of Proportions of Subjects on Cardiac Medications by Participant Status, Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cardiac Medication</th>
<th>Group</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
</tr>
<tr>
<td>Non-dropouts</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(n)</td>
<td>(18)</td>
<td>(51)</td>
</tr>
<tr>
<td>Dropout</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(n)</td>
<td>(17)</td>
<td>(18)</td>
</tr>
<tr>
<td>Total</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(n)</td>
<td>(35)</td>
<td>(69)</td>
</tr>
</tbody>
</table>

Chi-square (1) = 4.79, p < .05
Table H-5

Reported Number of Visits to Physicians for Chest Discomfort in Two Months Prior to Intervention By Participant Status

<table>
<thead>
<tr>
<th>Participant Status</th>
<th>Visits to Physicians for Chest Discomfort</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>0</td>
</tr>
<tr>
<td>Non-Dropout (n=69)</td>
<td>%</td>
</tr>
<tr>
<td>Dropout (n=35)</td>
<td>%</td>
</tr>
<tr>
<td>Total (n=104)</td>
<td>%</td>
</tr>
</tbody>
</table>

Chi-square (1) = 3.79, n.s.
Table N=6

A Comparison of Believed Cause of Chest Discomfort by Participant Status Before Intervention

<table>
<thead>
<tr>
<th>Participant Status</th>
<th>Believed cause</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heart</td>
<td>Other</td>
</tr>
<tr>
<td>Non-Dropout</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(n)</td>
<td>(42)</td>
<td>(27)</td>
</tr>
<tr>
<td>Dropout</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(n)</td>
<td>(24)</td>
<td>(11)</td>
</tr>
<tr>
<td>Total</td>
<td>%</td>
<td></td>
</tr>
<tr>
<td>(N)</td>
<td>(66)</td>
<td>(38)</td>
</tr>
</tbody>
</table>

Chi-square (1) = 0.74, n.s.
### Reasons Provided by Subjects for Dropping Out of Study

<table>
<thead>
<tr>
<th>n</th>
<th>Reason provided</th>
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<tbody>
<tr>
<td>3</td>
<td>Geographical change</td>
</tr>
<tr>
<td>3</td>
<td>Marital separation/difficulties</td>
</tr>
<tr>
<td>2</td>
<td>Change in work schedule</td>
</tr>
<tr>
<td>1</td>
<td>Cause of chest discomfort identified and treated</td>
</tr>
<tr>
<td>1</td>
<td>Belief in medical problem as cause for chest discomfort that behavioural strategies wouldn't alter</td>
</tr>
<tr>
<td>1</td>
<td>Fear of night driving</td>
</tr>
<tr>
<td>6</td>
<td>No time</td>
</tr>
<tr>
<td>2</td>
<td>Other medical problems</td>
</tr>
<tr>
<td>1</td>
<td>Wanted education, no tutorials</td>
</tr>
<tr>
<td>1</td>
<td>Questions asked during sessions too personal</td>
</tr>
<tr>
<td>1</td>
<td>Denied having problems after intervention started</td>
</tr>
<tr>
<td>1</td>
<td>Psychiatric problems</td>
</tr>
<tr>
<td>8</td>
<td>Not interested</td>
</tr>
<tr>
<td>1</td>
<td>Wanted &quot;more&quot; from intervention (SMAC)</td>
</tr>
<tr>
<td>2</td>
<td>Unknown</td>
</tr>
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</table>
Appendix I

Chest Discomfort Intervention Study

Pre-intervention Summary Data
Table 1.1

Gender, Diagnosis and Age by Condition, Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Gender Male</th>
<th>Gender Female</th>
<th>Diagnosis NCA</th>
<th>Diagnosis MVP</th>
<th>Age (mean)</th>
<th>Age (sd)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Education</td>
<td>5</td>
<td>37</td>
<td>7</td>
<td>35</td>
<td>44.5</td>
<td>(11.9)</td>
</tr>
<tr>
<td>(n = 42)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Individual</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Treatment</td>
<td>6</td>
<td>19</td>
<td>6</td>
<td>19</td>
<td>40.7</td>
<td>(13.1)</td>
</tr>
<tr>
<td>(n = 25)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Self-Monitoring</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Attention Control</td>
<td>4</td>
<td>14</td>
<td>0</td>
<td>18</td>
<td>37.3</td>
<td>(11.2)</td>
</tr>
<tr>
<td>(n = 18)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wait List</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td>4</td>
<td>15</td>
<td>1</td>
<td>18</td>
<td>40.4</td>
<td>(11.5)</td>
</tr>
<tr>
<td>(n = 19)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

a
Gender: X (3) = 6.60, n.s. Diagnosis: X (3) = 7.44, n.s.

b

f(3,102) = 1.70, n.s. (data were missing on one subject).
Table 1.2

Mean Subjective Ratings of Disability and Limitations Attributed to Chest Discomfort on Activities by Condition, Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Disability Attributed to worst symptom</th>
<th>Limitations Attributed to chest discomfort</th>
<th>Work Activity for income</th>
<th>Routine daily activities</th>
<th>Leisure exercise</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Group Education</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>62</td>
<td>44</td>
<td>34</td>
<td>35</td>
<td>44</td>
</tr>
<tr>
<td>SD</td>
<td>(25)</td>
<td>(22)</td>
<td>(34)</td>
<td>(25)</td>
<td>(29)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>56</td>
<td>50</td>
<td>32</td>
<td>36</td>
<td>55</td>
</tr>
<tr>
<td>SD</td>
<td>(27)</td>
<td>(21)</td>
<td>(26)</td>
<td>(25)</td>
<td>(29)</td>
</tr>
<tr>
<td>Attention Placebo Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>48</td>
<td>37</td>
<td>21</td>
<td>26</td>
<td>49</td>
</tr>
<tr>
<td>SD</td>
<td>(26)</td>
<td>(20)</td>
<td>(22)</td>
<td>(27)</td>
<td>(32)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>57</td>
<td>41</td>
<td>27</td>
<td>28</td>
<td>35</td>
</tr>
<tr>
<td>SD</td>
<td>(25)</td>
<td>(22)</td>
<td>(17)</td>
<td>(21)</td>
<td>(26)</td>
</tr>
</tbody>
</table>

Note. The values represent mean ratings of disability and limitations on 100mm visual analogue scales (0 = not disabled/limited; 100 = totally disabled/limited). No between-group differences were found for any of the measures using one-way ANOVA.

n = 30  n = 21  n = 14  n = 12
Table 1-3

A Comparison of Mean Time Since Onset of Chest Discomfort and Subjective Ratings of Disability Attributed to Fatigue, by Condition, Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Time Since Onset</th>
<th>Disability attributed to fatigue</th>
</tr>
</thead>
<tbody>
<tr>
<td>Condition</td>
<td>n</td>
<td>( # mo)</td>
</tr>
<tr>
<td>Group</td>
<td>Education</td>
<td>42</td>
</tr>
<tr>
<td>M</td>
<td>54.3</td>
<td>50</td>
</tr>
<tr>
<td>SD</td>
<td>(41.5)</td>
<td>(26)</td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>25</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>63.8</td>
<td>54</td>
</tr>
<tr>
<td>SD</td>
<td>(42.5)</td>
<td>(29)</td>
</tr>
<tr>
<td>Attention Placebo Control</td>
<td>18</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>53.3</td>
<td>52</td>
</tr>
<tr>
<td>SD</td>
<td>(44.7)</td>
<td>(26)</td>
</tr>
<tr>
<td>Wait List Control</td>
<td>19</td>
<td></td>
</tr>
<tr>
<td>M</td>
<td>60.9</td>
<td>52</td>
</tr>
<tr>
<td>SD</td>
<td>(49.1)</td>
<td>(25)</td>
</tr>
</tbody>
</table>

Note. Fatigue ratings represent mean ratings from 100mm visual analogue scales (fatigue: 0 = no fatigue, 100 = totally fatigued). No between-group differences were found on one-way ANOVA's.
Table 1-4

A Comparison of Proportions of Subjects on Cardiac Medications by Condition Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Cardiac Medication</th>
<th>Group</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Yes</td>
<td>No</td>
<td>Total</td>
</tr>
<tr>
<td>Group Education</td>
<td>%</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>%</td>
<td>38%</td>
<td>(16)</td>
<td>(42)</td>
</tr>
<tr>
<td>Treatment</td>
<td>%</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Individual</td>
<td>36%</td>
<td>(9)</td>
<td>(25)</td>
</tr>
<tr>
<td>Self-monitoring</td>
<td>%</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Attention</td>
<td>%</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Control</td>
<td>%</td>
<td>(n)</td>
<td>(n)</td>
</tr>
<tr>
<td>Wait List</td>
<td>26%</td>
<td>(5)</td>
<td>(19)</td>
</tr>
<tr>
<td>Control</td>
<td>26%</td>
<td>(5)</td>
<td>(19)</td>
</tr>
</tbody>
</table>

Total          | %     | (n)   | (n)  |

Chi-square (3) = 1.37, n.s.
Table 1-5
A Comparison of Believed Cause of Chest Discomfort by Condition, Before Intervention

<table>
<thead>
<tr>
<th>Condition</th>
<th>Believed Cause</th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Heart</td>
<td>Other</td>
<td>Total</td>
<td></td>
</tr>
<tr>
<td>Group Education</td>
<td>64%</td>
<td>36%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Education (n)</td>
<td>(27)</td>
<td>(15)</td>
<td>(42)</td>
<td></td>
</tr>
<tr>
<td>Individual Treatment</td>
<td>72%</td>
<td>28%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Treatment (n)</td>
<td>(18)</td>
<td>(7)</td>
<td>(25)</td>
<td></td>
</tr>
<tr>
<td>Self-monitoring</td>
<td>50%</td>
<td>50%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Attention (n)</td>
<td>(9)</td>
<td>(9)</td>
<td>(18)</td>
<td></td>
</tr>
<tr>
<td>Control</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Wall: List Control</td>
<td>58%</td>
<td>42%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>Control (n)</td>
<td>(11)</td>
<td>(8)</td>
<td>(19)</td>
<td></td>
</tr>
<tr>
<td>Total</td>
<td>66%</td>
<td>34%</td>
<td>100%</td>
<td></td>
</tr>
<tr>
<td>(n)</td>
<td>(65)</td>
<td>(39)</td>
<td>(104)</td>
<td></td>
</tr>
</tbody>
</table>

Chi-square (3) = 1.59, n.s.
Appendix J

Chest Discomfort Intervention Study

Outcome Data F-Tables
Table J-1

Summary of One-way Analyses of Variance Performed on Mean Pre-post Change Scores of Subjective Ratings of Disability and Limitations on Activities Attributed to Chest Discomfort

<table>
<thead>
<tr>
<th>Source</th>
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<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>7240.19</td>
<td>3</td>
<td>2413.40</td>
<td>3.09*</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>50782.44</td>
<td>65</td>
<td>781.27</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>58022.63</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>2275.41</td>
<td>3</td>
<td>758.47</td>
<td>1.50</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>24728.07</td>
<td>49</td>
<td>504.65</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>27003.48</td>
<td>52</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>5108.54</td>
<td>3</td>
<td>1702.85</td>
<td>3.10*</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>35739.90</td>
<td>65</td>
<td>549.85</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>40848.44</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .05  ** p < .01
Table J-2

Summary of One-way Analyses of Variance Performed on Mean Pre-post Change Scores of Subjective Ratings of Limitations on Leisure Exercise, Disability Attributed to Fatigue, and Activity Level

<table>
<thead>
<tr>
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<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>13052.61</td>
<td>3</td>
<td>4350.87</td>
<td>4.21**</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>67187.15</td>
<td>65</td>
<td>1033.65</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>80239.76</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>6543.61</td>
<td>3</td>
<td>2181.20</td>
<td>5.75***</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>24640.21</td>
<td>65</td>
<td>379.08</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>31183.82</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
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<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>5375.44</td>
<td>3</td>
<td>1791.81</td>
<td>2.95*</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>39459.90</td>
<td>65</td>
<td>607.08</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>44835.34</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

p < .05       ** p < .01       *** p < .001
Table J-3

Summary of One-way Analyses of Variance Performed on Mean Pre-post Change Scores of Mean Number of Episodes of Physical Activity per Week, Number of Episodes of Chest Discomfort per Month, and Number of Physician Visits per Two Months (Questionnaire Data)

<table>
<thead>
<tr>
<th>Source</th>
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</thead>
<tbody>
<tr>
<td>Episodes of physical activity per week</td>
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<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions (between groups)</td>
<td>78.67</td>
<td>3</td>
<td>26.22</td>
<td>1.17</td>
</tr>
<tr>
<td>Error (within groups)</td>
<td>1454.88</td>
<td>65</td>
<td>22.38</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>1533.55</td>
<td>68</td>
<td></td>
<td></td>
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</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Episodes of chest discomfort per month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions (between groups)</td>
<td>34423.99</td>
<td>3</td>
<td>11474.66</td>
<td>1.07</td>
</tr>
<tr>
<td>Error (within groups)</td>
<td>676795.35</td>
<td>63</td>
<td>10742.78</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>712219.34</td>
<td>66</td>
<td></td>
<td></td>
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<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
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<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Episodes of worst symptom per month</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions (between groups)</td>
<td>9830.76</td>
<td>3</td>
<td>3276.92</td>
<td>0.85</td>
</tr>
<tr>
<td>Error (within groups)</td>
<td>248213.85</td>
<td>64</td>
<td>3878.34</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>258044.61</td>
<td>67</td>
<td></td>
<td></td>
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</tbody>
</table>

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of physician visits per two months</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions (between group)</td>
<td>11.97</td>
<td>3</td>
<td>3.99</td>
<td>1.63</td>
</tr>
<tr>
<td>Error (within group)</td>
<td>159.01</td>
<td>65</td>
<td>2.45</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>170.98</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
Table 1:4

Summary of One-way Analyses of Variance Performed on Mean Pre-post Change Scores of Mean Number of Non-cardiac Pills Ingested per 14 Days (Questionnaire Data), and Mean Subjective Magnitude Ratings of Intensity of Worst Symptom and Energy Level per 14 Days (Self-monitoring Data)

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Number of non-cardiac pills ingested per 14 days</strong></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Conditions</td>
<td>1619.35</td>
<td>2</td>
<td>809.67</td>
<td>0.95</td>
<td>Conditions</td>
<td>3.17</td>
<td>3</td>
<td>1.06</td>
<td>0.74</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>23948.39</td>
<td>28</td>
<td>855.30</td>
<td></td>
<td>Error</td>
<td>65.69</td>
<td>46</td>
<td>1.43</td>
<td></td>
</tr>
<tr>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>(within groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>25567.74</td>
<td>30</td>
<td></td>
<td></td>
<td>Totals</td>
<td>68.86</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

| **Intensity of worst symptom per 14 days** |        |    |     |       |              |        |    |     |       |
| Conditions   | 11.81  | 3  | 3.94 | 1.41  |              |        |    |     |       |
| (between groups) |        |    |     |       |              |        |    |     |       |
| Error        | 125.57 | 45 | 2.79 |       |              |        |    |     |       |
| (within groups) |        |    |     |       |              |        |    |     |       |
| Totals       | 137.38 | 48 |       |       |              |        |    |     |       |
### Table J-5

Summary of One-way Analyses of Variance Performed on Mean Pre-post Change Scores of Mean Number of Episodes of Leisure Exercise per 14 Days, Hours of Worst or Any Symptom per 14 Days, and Number of Non-cardiac Pills Ingested per 14 Days (Self-monitoring Data)

#### Episodes of leisure exercise per 14 days

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions (between groups)</td>
<td>914.82</td>
<td>3</td>
<td>304.94</td>
<td>3.82*</td>
</tr>
<tr>
<td>Error (within groups)</td>
<td>3676.00</td>
<td>46</td>
<td>79.91</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>4590.82</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hours of any symptom per 14 days

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions (between groups)</td>
<td>7534.63</td>
<td>3</td>
<td>2511.54</td>
<td>1.00</td>
</tr>
<tr>
<td>Error (within groups)</td>
<td>115200.25</td>
<td>46</td>
<td>2504.35</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>122734.88</td>
<td>49</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

#### Hours of worst symptom per 14 days

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions (between groups)</td>
<td>1268.10</td>
<td>4</td>
<td>422.70</td>
<td>0.31</td>
</tr>
<tr>
<td>Error (within groups)</td>
<td>63410.48</td>
<td>46</td>
<td>1378.49</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>64678.58</td>
<td>50</td>
<td></td>
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</tr>
</tbody>
</table>

#### Number of non-cardiac pills ingested per 14 days

<table>
<thead>
<tr>
<th>Source</th>
<th>SS</th>
<th>df</th>
<th>MS</th>
<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions (between group)</td>
<td>26.34</td>
<td>2</td>
<td>13.17</td>
<td>0.05</td>
</tr>
<tr>
<td>Error (within group)</td>
<td>7050.09</td>
<td>25</td>
<td>282.30</td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>7076.43</td>
<td>27</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

* p < .025
Table J-6

Summary of One-way Analyses of Variance Performed on Mean Pre-post Change Scores of Health Locus of Control Scale

<table>
<thead>
<tr>
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<th>df</th>
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<th>F</th>
</tr>
</thead>
<tbody>
<tr>
<td>Conditions</td>
<td>484.16</td>
<td>3</td>
<td>161.39</td>
<td>4.72*</td>
</tr>
<tr>
<td>(between groups)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Error</td>
<td>2221.66</td>
<td>65</td>
<td>34.18</td>
<td></td>
</tr>
<tr>
<td>(within groups )</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Totals</td>
<td>2705.82</td>
<td>68</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>