EFFECTS OF EXERCISE TEST INFORMATION ON SELF-EFFICACY AND ANXIETY IN PATIENTS WITH MYOCARDIAL INFARCTION

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BY

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ABSTRACT

The primary purpose of this study was to examine the effects of preparatory information regarding the cycle ergometer exercise tolerance test on self-efficacy and anxiety of patients following a myocardial infarction (MI). The study also examined the effect self-efficacy on exercise test performance. A secondary purpose of the study was to investigate the effects of preparatory information and coping style on anxiety associated with the exercise test.

Male cardiac patients (N =30) ages 40-66 years ($\bar{X}$=55 yrs.) who had documented MI based on at least two of the following: 1. a significant increase in cardiac enzyme levels 2. ECG diagnostic of MI or 3. chest pain and who were referred for a maximum performance exercise tolerance test two to six weeks post-infarction ($\bar{X}$=4 weeks) were eligible for the study. Exclusion criteria consisted of unstable angina and/or uncontrolled dysrhythmias.

All patients completed three self-report psychological questionnaires upon arrival at the laboratory: the A-state and A-trait portions of the Spielberger State-Trait Anxiety Inventory (STAI), the Miller Behavioral Style Scale (MBSS) and the physical self-efficacy assessment. Based on their pre-intervention cycling self-efficacy scores, patients were then randomly assigned to the experimental or control conditions. The experimental videotape included detailed procedural and sensory information about the exercise tolerance test as it was being performed by

a cardiac patient. The control videotape included information about nutrition as it relates to coronary heart disease. Subsequent to viewing either the experimental or control videotapes, the A-state portion of the STAI and the self-efficacy assessment were re-administered. Patients then performed the exercise tolerance test on the cycle ergometer.

Cycling self-efficacy of patients in the experimental condition (preparatory information) decreased whereas the cycling self-efficacy of patients in the control condition increased minimally resulting in a significant difference in self-efficacy between the two intervention groups ($p < .04$). Anxiety of patients in the experimental intervention increased while there was virtually no change in anxiety in patients in the control condition ($p < .01$). Patients with high pre-intervention cycling self-efficacy achieved higher mean maximum power output ($p < .001$) than patients with low pre-intervention cycling self-efficacy. No interactions were found between coping style and preparatory information on the relative change in state anxiety. Anxiety in patients in the experimental group increased whereas anxiety in patients in the control group remained virtually unchanged, regardless of coping style ($p < .01$).

The data suggest that there is no basis for providing preparatory information regarding the exercise tolerance test to increase self-efficacy and to lower anxiety. The results indicate that self-efficacy is important in predicting exercise test performance. Preparatory information about the exercise tolerance test appears to increase anxiety regardless of coping style.

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And last but most importantly Steve - for supporting and encouraging me, laughing and crying with me, listening and believing in me.

Dedication

To dearest Dad - who someday I know I will see again.

It was a Sunday evening
seven years ago...
He fell asleep
so soundly...as always,
For the last time...
without warning,
Heart Attack.
so young...so healthy,
I didn't understand
why Lord?...he was invincible,
Never complained...only
worked so hard...for me, for us.
So it's for you Dad, for Mom
...for me,
I've worked so hard
to try to understand...
Why?

I think I do...
A little.

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Introduction

For the majority of patients, a myocardial infarction (MI) is an event which produces significant psychological stress for patients and their families. Follow-up studies of post-MI patients describe persistent and substantial psychological and social disability virtually unrelated to cardiac state (Billing, Lindell, Sederholm & Theorell, 1980; Cay, Philip & Dugard, 1972; Goldberg, 1982; Granger, 1974; Hackett & Cassem, 1975; Mayou, Williamson & Foster, 1976; Mayou, Foster & Williamson, 1978; Mayou, 1981; Naismith, Robinson, Shaw & McIntyre, 1979; Wishnie, Hackett & Cassem, 1971). During the acute phase including the hospital period and up to three months post-infarct, significant anxiety and/or depression are reported to be present in approximately two-thirds of patients (Cay et al., 1972; Stern, Pascale & McLoone, 1976).

The hospital experience for the post-MI patient has been described as a situation which imposes indignity and stress (Cousins, 1983). Lack of privacy, separation from family and friends, encouragement of dependency, disruption of sleep, painfulness of procedures, adverse effects of drugs, loss of control and uncertainty of recovery are factors which have been described as resulting in the mobilization of diverse emotions some of which include, "anxiety, guilt and shame often leading to a sense of helplessness, regression and depression" (Cousins, 1983, p. 20). Hackett and Cassem (1975) describe other potential stressors associated with the hospitalization period of a cardiac patient. These stressors include the fears associated with the continuous cardiac monitoring in the coronary care unit (CCU), the omnipresent threat of recurrence (perhaps reinforced by the witnessing of a cardiac arrest), the prospect of having to limit food intake, salt intake, alcohol, sex, cigarettes together with possible anxiety and depression due to inactivity, job uncertainty and disruption in interpersonal relationships.

Other researchers report that anxiety and/or depression are still prominent in approximately one-third to one half of patients as long as one year post infarction (Cay et al., 1972; Mayou et al., 1978; Stern et al., 1976). Patients frequently report fears of recurrence and lack of confidence in resuming their normal daily activities, including sexual and recreational habits (Cay et al., 1972; Mayou et al., 1976; Mayou et al., 1978; Stern et al., 1976; Stern, Pascale & Ackerman, 1977).

Clinically, one can assume that depressed and anxious post-MI patients suffering from fatigue, weakness, loss of self-confidence and self-esteem would be reluctant to resume normal pre-illness physical and recreational activities (Gentry, 1979). However, physical activity is widely prescribed as one important component in the physical and psychological rehabilitation of the cardiac patient (Kavanagh, Shephard, Doney & Pandit, 1973; Roviaro, Holmes & Holmsten, 1984).

One of the immediate and routine procedures for cardiac patients referred to an exercise rehabilitation program is the evaluation of exercise tolerance. The exercise tolerance test is undoubtedly a major stressor in the rehabilitative course and the cardiovascular response to exercise. The psychological strain and emotional stress associated with the treadmill test are perhaps more important than the physiological manifestations of the cardiovascular system (Cousins, 1983). The patient's underlying cardiac problem is made palpable and dramatic in the presence of the treadmill. "The ambience in the testing room, the running blood pressure readings, the mysterious markings on the cardiograph are all emphatic and omnipresent reminders of a prevailing heart problem" (Cousins, 1983, p.48). In addition, the exercise tolerance test represents a situation over which cardiac patients are unable to exercise control. The perception of the inability to be in control over one's life is a common experience for patients with a serious illness. "It is difficult to think of a more pervasive or dismal aspect of a life-threatening disease than loss of control" (Cousins, 1983, p.48). This perceived inability to exert control in the exercise test situation, whether it be due to patients' psychological and/or cardiac state, may result in an increased anxiety level. Thus, a practical contribution would be to reduce the anxiety associated with the exercise tolerance test following an MI.

A variety of intervention strategies have demonstrated effectiveness in reducing anxiety and stress in clinical procedures. The common link and underlying theoretical basis among these strategies is the notion of perceived control, which suggests that individuals who are confident in their ability to exert control over their actions will experience less stress in taxing situations. Miller (1979a) proposed the "minimax hypothesis" to account for the relationship between controllability and human stress. The hypothesis postulates that having control is stress reducing because it provides an individual with a guaranteed upper limit on the severity of the situation. A major premise of the hypothesis suggests that individuals who have control attribute this control to an internal, stable factor: namely their own response (Miller, 1980a).

Three distinct but related areas of research on interventions designed to reduce anxiety through increasing control will be reviewed. One strategy which has proven to be effective in reducing the anxiety associated with stressful events is to strengthen an individual's sense of personal efficacy or perceived ability. Self-efficacy is commonly defined as the ability to execute a behaviour required to produce the necessary outcome (Bandura, 1977a). Self-efficacy theory (Bandura, 1977a, 1977b) is compatible with the "minimax hypothesis", suggesting that personal control endows individuals wih a high sense of self-efficacy, or perceived ability for coping with an aversive event. Conversely, individuals who judge themselves to be low in perceived ability (or low in self-efficacy) expect a more aversive event, thereby generating more stress-inducing thoughts and thus maintaining a high level of anxiety. Furthermore, Bandura (1982) maintains that psychological recovery is often slow for post-MI patients because they lack the physical efficacy to resume their customary activities.

A second method of increasing perceived control and thus minimizing stress is the provision of accurate preparatory information about the event to be encountered. The theoretical rationale for preparatory techniques is based on the assumption that providing precise procedural and sensory information about a stressful event will minimize anxiety before, during and after the event (Anderson & Masur, 1983). Studies using preparatory techniques typically have examined the effects of procedural information (Andrew, 1970; Vernon & Bigelow, 1974), sensory information (Auerbach, Kendall, Cuttler & Levitt, 1976; Johnson & Leventhal, 1974; Johnson, Morrissey & Leventhal, 1973; Siegel & Peterson, 1980; Wilson, 1981) and combined procedural and sensory information (Kendall, Williams, Pechacek, Graham, Shisslak & Herzoff, 1979) in various stressful medical and dental procedures. These include information regarding hernia surgery (Andrew, 1970; Vernon & Bigelow, 1974), abdominal surgery (Sime, 1976; Shipley, Butt, Horowitz & Farbry, 1978; Shipley, Butt & Horowitz, 1979; Cohen & Lazarus, 1973), dental surgery (Siegel & Peterson, 1980; Auerbach et al., 1976; Auerbach, Martelli & Mercuri, 1983), endoscopy (Johnson et al., 1973; Wilson, Moore, Randolph & Hanson, 1982), colposcopy (Miller & Mangan, 1983) and cardiac catheterization (Kendall et al., 1979). Although most studies support the stress-reducing properties of preparatory information, others have found that personality factors may interact with this stress-control relationship (Miller & Mangan, 1983; Miller, 1980b; Taylor, Odegaard & Watkins, 1983). Information that reduces stress for some subjects may actually increase stress and anxiety for others. That is, whether control is stress reducing or stress-inducing is dependent on the individual's cognitive appraisal of the situation.

The third research area to be reviewed examines individual differences in coping style. The particular meaning an individual attaches to personal control in stressful situations depends on a number of situational and personality variables. One notion is that differences in coping style interact with and determine the impact of information. Miller (1981) proposed the "blunting hypothesis" to suggest that individuals vary in the extent to which they actively seek information (monitor) or avoid information (blunter) in the face of aversive events. This hypothesis not only identifies individual differences in coping style, but specifies the conditions under which predictability has stress-reducing or stress-enhancing effects (Miller & Grant, 1979).

Clinical evidence confirms that blunters prefer to cope with anxiety or threat by not dealing with it and thus show reduced arousal with low information. This allows them to cognitively avoid threat-relevant cues. They are more aroused with high information, which interferes with distraction and forces them to deal cognitively with the event (Miller & Mangan, 1983). Conversely, monitors do not chose to distract themselves, but prefer voluminous preparatory information which provides them with increased certainty. Colposcopy patients identified as monitors who were given detailed information about the surgical procedure, showed both reduced behavioural and psychophysiological arousal during and after the procedure (Miller & Mangan, 1983).

This thesis is designed to test four primary hypotheses:

1. Preparatory information about the cycle ergometer exercise tolerance test will increase self-efficacy in cardiac patients who are low in self-efficacy.
2. Preparatory information will not affect the self-efficacy in cardiac patients who are high in self-efficacy.
3. Cardiac patients high in self-efficacy about their performance on the exercise tolerance test will report less anxiety after receiving the preparatory information than patients low in self-efficacy.
4. Cardiac patients high in self-efficacy on the initial assessment will achieve a greater maximum power output than patients low in self-efficacy.

Secondary hypotheses are as follows:

5. Monitors receiving preparatory information (experimental condition) will report less anxiety than monitors who do not receive the information.
6. Blunters who do not receive preparatory information (control condition) will report less anxiety then blunters who receive the information.

Review of Literature

Self-Efficacy Theory

The self-efficacy theory of behavioural change was introduced by Bandura (1977a) as part of social learning theory to explain and predict psychological changes achieved by different modes of treatment. According to social learning theory, behavioural change is mediated and motivated by internal cognitive mechanisms (Bandura, 1977a). These cognitive mechanisms help determine what is attended to, how it is centrally processed, whether it will be remembered and how it affects efficacy and outcome expectancies (Wilson, 1978). Perceived self-efficacy is one determinant of behaviour and is concerned with individual judgements about how well courses of action required to cope with prospective situations can be executed (Bandura, 1982).

The theory differentiates two types of expectancies: self-efficacy expectancies and outcome expectancies (Bandura, 1977a). An outcome expectancy is defined as an individual's estimate that a given behaviour(s) will lead to a desired outcome(s). An efficacy expectancy, on the other hand, is the conviction that one can successfully execute the behaviour(s) required to produce the desired outcome(s) (Bandura, 1977b). Thus, an important conceptual and operational distinction is made between estimating one's ability or competence to execute certain behaviours (self-efficacy) and estimating the consequence of that behaviour (outcome expectancy) (Rosenthal, 1978). Figure 1 illustrates the difference between efficacy and outcome expectancies.

Figure 1: Diagrammatic representation of the difference between efficacy and outcome expectancies.

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PERSON-----┬---BEHAVIOUR-----┬---OUTCOME
           |                 |
           |                 |
           |                 |
           |                 |
           |                 |
        EFFICACY          OUTCOME
      EXPECTANCIES      EXPECTANCIES
```

Efficacy expectancies are specific beliefs about one's ability to perform particular behaviours. Outcome expectancies, on the other hand are the likely consequences of the behaviour and not the behaviour itself. For example, the belief that one can jump six feet is a self-efficacy judgement; the social recognition, applause, trophies and self-satisfaction anticipated for such a performance are the outcome expectancies (Bandura, 1984). This differentiation is important because individuals believe that a particular course of action will produce certain outcomes, but if they doubt their own ability to perform the necessary activities, such efficacy information will not influence their behaviour. For example, while cardiac patients may believe in the efficacy of the exercise test as a necessary step to evaluate their physical working capacity, they may have serious doubts about their physical ability to perform the test (efficacy expectancy) and the ensuing outcomes (outcome expectancy) so early in their rehabilitative course.

Although efficacy and outcome expectancies are assumed to operate concurrently, Bandura proposes that the central determinants of behaviour are efficacy expectancies (Goldfried & Robins, 1982). Self-efficacy theory suggests that individuals have efficacy expectancies about their ability to perform specific behaviours. It is the level and strength of self-efficacy for that behaviour that determines whether or not it will be attempted, how much persistence will be shown, and what the final result will be (Bandura, 1977a). Efficacy expectancies represent a synthesis of information from a variety of sources which include previous experience, performance, observation, verbal inputs, and emotional states (Teasdale, 1978; Maddux, Sherer & Rogers, 1982). It is the changing of self-efficacy that is regarded as the mechanism by which behaviour is changed. Efficacy expectancies are, therefore, measures of individual conceptions of capabilities, not substitute measures of behaviour (Bandura, 1978). An efficacy expectancy corresponds closely to the notion of perceived control insofar as it relates to an individual's belief that a particular response can increase the probability of obtaining positive outcomes or avoiding negative ones (Bandura, 1977b; Thompson, 1981). Empirical evidence indicates that self-efficacy determines individual choice of behavioural settings and activities, the amount of effort individuals will expend and how long they will persist in the face of obstacles and aversive situations (Bandura & Adams, 1977; Bandura, Adams & Beyer, 1977; Brown & Inouye, 1978; Condiotte & Lichtenstein, 1981; Weinberg, Gould & Jackson, 1979).

Efficacy expectancies vary on several dimensions which have important performance implications. Efficacy expectancies differ in magnitude, i.e., when tasks or subskills are ordered in varying levels of difficulty, efficacy expectancies may include the simpler tasks but exclude the more difficult ones. Secondly, efficacy expectancies differ in generality or the degree to which similar expectancies are held for behaviours in other situational contexts. For example, an increase in patients' cycling self-efficacy would not necessarily be expected to transfer to activities that involve lifting or moving heavy objects, or activities that involve different muscle groups and movements. However, cycling self-efficacy measured in the laboratory would be expected to transfer to cycling on the road. Finally, efficacy expectancies also differ in strength or the extent to which individuals believe they can perform the behaviour. Patients who have recently suffered an MI may be 100 percent confident in their ability to cycle for two minutes with no leg fatigue but only 10 percent confident in their ability to cycle for eight minutes.

Therefore, self-efficacy is assessed in terms of the magnitude, generality and strength of efficacy expectancies under different situations. It is important to recognize that personal efficacy, as viewed by Bandura, is not a motive, a disposition nor personality trait. It is a highly situation specific expectancy that does not operate independently of contextual factors and their cognitive processing (Bandura, 1984; Poser, 1978). Bandura (1977a) further suggests that weak efficacy expectancies are easily extinguishable by disconfirming experiences, whereas individuals who possess strong expectancies will persevere despite discouraging experiences. For example, cardiac patients with weak self-efficacy before the cycle ergometer exercise tolerance test and who do poorly on the test would further doubt their physical capabilities and perhaps choose not to attempt subsequent activity.

In terms of a social learning analysis, self-efficacy is achieved on the basis of four main sources of information. Performance accomplishments provide the most influential and dependable sources of efficacy information because they are based on personal mastery experiences. Bandura (1977a) sees mastery experiences as leading to self-efficacy. That is, self-efficacy as a concept is inferred not only from what subjects say about their expected future performance in a given situation, but also from the congruence of that verbal report with subsequent performance (Poser, 1978). Vicarious experiences or observing others through their efforts is a second source of efficacy information. Other sources include verbal persuasion or persuasive suggestion that one can cope or perform successfully and finally, physiological or emotional arousal from which people judge their level of anxiety and vulnerability to stress. That is, stressful and taxing situations generally elicit emotional arousal that, depending on the circumstances, might have informative value concerning personal competency. Therefore, emotional arousal can be a source of information and affect perceived self-efficacy in coping with threatening situations.

Efficacy information for judging personal performance capabilities, regardless of the method by which it is conveyed, only becomes instructive through cognitive appraisal. Bandura (1977a) notes that information about personal efficacy can either be enhanced or attenuated by a number of cognitive factors. For example, the extent to which individuals alter their self-efficacy from performance experiences depends on a number of cognitive and situational factors. Some of these include: the perceived difficulty of the task, the amount of effort that is required, the situational circumstances surrounding the performance, the pattern of an individual's successes and failures and his or her physical and psychological condition at the time (Bandura, 1984). The self-efficacy of cardiac patients about to undergo a cycle ergometer exercise tolerance test may be affected by a number of factors. These may include their perceptions of their pre-MI fitness or athletic abilities, their current perceptions of their physical capabilities, real or imagined fears of outcome, and their psychological condition as a result of their cardiac condition. Self-efficacy theory suggests that individuals process, weigh and integrate efficacy information concerning their capabilities and regulate their choice behaviour and effort expenditure accordingly (Bandura, Adams, Hardy & Howells, 1980).

Accurate appraisal of one's personal efficacy has considerable functional value since acting on misjudgements of personal capabilities can produce detrimental consequences. Individuals who overestimate their capabilities may become demoralized through repeated task failures, whereas those who underestimate their capabilities may shun their achievements, precluding opportunities for adaptive coping or skill development (Schunk, 1981). Individuals' beliefs about their capabilities have been shown to influence how they behave, their thought patterns and the emotional reactions they experience in taxing situations (Bandura, 1984). Those who possess high levels of self-efficacy have been shown to behave quite differently from individuals low in self-efficacy. For example, highly efficacious individuals set challenges (Bandura, 1977a), intensify their efforts when performance falls short of their goals (Bandura & Cervone, 1983), persevere despite repeated failures (Brown & Inouye, 1978) approach threatening tasks non-anxiously and experience little in the way of stress reactions (Bandura, 1982). Indeed, research indicates that high self-efficacious cardiac patients perform better on a treadmill test than patients low in self-efficacy (Taylor, Bandura, Ewart, Miller & Debusk, 1985).

Self-efficacy and its role in mediating behaviour change has been tested with a number of different populations and in a variety of situations. Initial experimental studies were conducted on snake phobic subjects (Bandura & Adams, 1977; Bandura et al., 1977) and later by further studies on snake-phobic and on agoraphobic subjects (Bandura et al., 1980). Results from these studies confirm that different treatment approaches alter expectations of personal efficacy. The more dependable the source of efficacy information, the greater the change in self-efficacy. For example, efficacy expectancies and actual performance accomplishments were higher when subjects observed and performed the threatening activity than when subjects only observed (modelling). However, subjects on the modelling alone condition exceeded the expectancies and performance of those in the no-treatment group (Bandura et al., 1977). Recall that participant modelling (observation plus performance accomplishments) is the most dependable source of efficacy information. Subjects with a high level of self-efficacy at the completion of treatment had higher levels of approach behaviour, lower anticipatory fear and a greater sense of personal efficacy in coping with the situation than subjects with a low level of perceived efficacy. Bandura and his colleagues (1977) found that in the treatment of snake phobias, subjects were able to accurately appraise their capabilities to perform given activities. There was high agreement between self-efficacy judgements and subsequent performance on each individual task. In agoraphobic subjects, perceived inefficacy was accompanied by high anticipatory and performance fear arousal, as assessed by a self-report activity rating. As strength of perceived efficacy increased, fear arousal declined (Bandura et al., 1980). These findings were supported across four different treatment modalities: enactive mastery (involving field mastery experiences), cognitive modelling, participant modelling and desensitization.

Self-Efficacy and Physical Performance

Self-efficacy and its effect on physical performance also have been of major interest to researchers, coaches and physical educators (Weinberg et al., 1979; Weinberg, Yukelson & Jackson, 1980; Weinberg, Gould, Yukelson & Jackson, 1981). In addition, a strong sense of self-efficacy as a key to optimal performance has long been recognized among athletes (Lee, 1982; Feltz, Landers & Raeder, 1979; Feltz & Mugno, 1983). Research indicates that individuals' perceptions of their efficacy to attain personal standards determine whether negative discrepancies between the standards and performance are motivating or discouraging.

Self-efficacy and its effect on athletic performance has been investigated in controlled laboratory studies (Weinberg et al., 1979; Weinberg et al., 1980). Weinberg et al. (1979) examined the association between self-efficacy and changes in motor performance in a competitive situation. Self-efficacy was manipulated by having subjects compete face-to-face against a confederate on a muscular leg-endurance task. The confederate was said to be either a varsity track athlete who exhibited high performance on a related strength task (hypothesized to produce low self-efficacy in the real subject), or an individual who was injured and exhibited poor performance on a related strength task (hypothesized to produce high self-efficacy in the real subject). Results supported self-efficacy predictions. The high self-efficacy subjects extended their legs significantly longer than low self-efficacy subjects. Also, after failing on the first trial, high self-efficacy subjects extended their legs for a longer period of time than low self-efficacy subjects on the second trial. These findings support Bandura's prediction (1977a) that efficacy expectancies influence an individual's effort and persistence in the face of failure and aversive consequences.

In a subsequent investigation using the same task, pre-existing self-efficacy was shown to have the greatest impact on initial competitive performance, whereas manipulated self-efficacy affected the subsequent course of competitive endurance (Weinberg et al., 1981). Although both initial and manipulated self-efficacy influenced performance, subjects' efforts were dependent on the trial being performed. High initial self-efficacy subjects differed from low initial self-efficacy subjects in leg performance on the first trial only. In contrast, high manipulated self-efficacy subjects (i.e. those who were performing against a subject with an injury who demonstrated a lower level of objective performance on a related leg-strength task) extended their legs longer on the second trial only. In addition, after subjects experienced failure on the first trial of the new task, high manipulated self-efficacy subjects intensified their efforts, whereas low manipulated self-efficacy subjects exhibited a slight decrease in performance (Weinberg et al., 1981).

Finally, Bandura and Cervone (1983) found that a strong sense of self-efficacy for goal attainment fostered sustained effort, strong goal committment and superior performance in subjects performing on a Schwinn Air Dyne Ergometer. The condition combining performance feedback and a standard selected by the subjects had a stronger motivational impact than the conditions of goals alone, feedback alone or the control condition (a self-judgement condition designed to determine whether recording one's self-satisfaction and efficacy expectancies in themselves, would have any reactive effects on performance). Subjects who were dissatisfied with their performance but who were highly self-efficacious displayed large performance gains by the end of the training session. The results suggest that setting goals enhances performance on a muscular task only if combined with performance feedback information. In addition, the higher the self-dissatisfaction with performance below the personal standard in subjects with high self-efficacy for attaining the goal, the greater was the intensity of effort.

The relationship between efficacy expectations and physical performance was also demonstrated in two sport situations. Lee (1982) in a study of fourteen female gymnasts found that efficacy expectations made by coaches and athletes were more accurate predictors of competition performance than were previous gymnastic scores. However, in a study that examined students who were learning a springboard-diving task (Feltz et al., 1979), the results were equivocal. Subjects were randomly assigned to one of three treatment conditions: participant modelling (consisting of verbal explanation, live modelling and actual performance by the subject with careful guidance), live modelling (no guidance or safety features) and videotape modelling (viewed the dive on a videotape). Diving self-efficacy was assessed prior to treatment, and after four and eight dives. The participant modelling treatment produced more successful dives and stronger expectations of personal efficacy than the other two conditions. Subjects' self-efficacy and heart rates were the major predictors of performance on trial one, while back-diving performance on a previous trial was the major predictor of performance on trial two (Feltz & Mugno, 1983). Finally, in accordance with Bandura's theory (1977a), a reciprocal relationship was found between self-efficacy and performance over trials. However, as subjects experienced greater mastery on the dive, self-efficacy became less of a direct cause of performance.

These studies provide strong support for the importance of efficacy expectancies on effort of learning, execution of physical skills and performance among athletes. These findings have practical value for coaches and physical educators and suggest that intensity of effort may be reduced in athletes who are plagued with self-doubts.

These self-efficacy observations also have important implications for cardiac patients who are expected to perform a symptom-limited exercise tolerance test. Given the lack of self-confidence about resuming physical activity or self-doubts about how much activity is safe, patients may limit their effort on the exercise tolerance test to ensure their own comfort and safety. This in turn would affect the interpretation of the test, decrease its diagnostic potential and limit its usefulness in defining management strategies such as exercise prescription. It may also reduce the validity of the test in assessing the effectiveness of the intervention or management strategies that were prescribed. Thus, efforts to raise the physical efficacy of cardiac patients who are low in self-efficacy may be warranted.

Self-Efficacy and Health Behaviour

Research that examines the manner in which perceived self-efficacy mediates changes in health behaviour is particularly relevant to this thesis. The relationship between self-efficacy and health behaviour change has been investigated in studies of relapse and maintainance of smoking cessation (Condiotte & Lichtenstein, 1981; Nicki, Remington & MacDonald, 1984), compliance with an exercise program for pulmonary disease patients (Kaplan, Atkins & Reinsch, 1983), exercise test performance of post-MI patients and their spouses (Ewart, Taylor, Reese & Debusk, 1983; Taylor, Bandura, Ewart, Miller & Debusk, 1985), overexertion of cardiac patients during exercise (Ewart, Stewart, Gillilan, Keleman, Valenti, Manley & Keleman, 1986), proficiency in breast self-examination (Alagna & Reddy, 1984), mood states and end-stage renal disease and compliance with dialysis treatments (Devins, Binik, Gorman, Dattel, McCloskey, Oscar & Riggs, 1982) and pain control in childbirth (Manning & Wright, 1983).

In an investigation of the relationship between perceived self-efficacy and smoking behaviour, the higher the level of perceived self-efficacy at the completion of various smoking control programs, the greater was the probability that subjects remained abstinent throughout the experimental three month follow-up period (Condiotte & Lichtenstein, 1981). For example, eight subjects who smoked at least one cigarette after termination but did not relapse demonstrated significantly greater post-treatment efficacy than subjects who relapsed completely. These eight subjects had post-treatment self-efficacy scores similar to subjects who did not smoke at all. Subjects who relapsed completely had the lowest post-treatment efficacy scores. In addition, perceived self-efficacy at the end of treatment predicted how participants handled a subsequent relapse. The high self-efficacious subjects reinstated control following a slip, whereas the low self-efficacious subjects displayed a marked decrease in perceived self-efficacy and relapsed completely.

In a study with 60 adult patients suffering from chronic obstructive pulmonary disease (COPD), Kaplan et al. (1984) examined the effect of specific vs. generalized expectancies as mediators of change in exercise behaviour. Results showed that compliance with an exercise prescription was associated with the expectation of performing this behaviour in the future. After three months this expectation was significantly associated with performance on a treadmill exercise test. Changes in self-efficacy were specific to physical activity, which was the target of intervention, with efficacy expectancies for the performance of other behaviours (e.g. climbing stairs, moving things) changing as a function of their similarity to walking (Kaplan et al., 1984). That is, after three months COPD patients showed the least improvement for behaviours that were not the focus of training (e.g. moving furniture, climbing stairs)(Kaplan et al., 1984). This is consistent with self-efficacy theory (Bandura, 1977a) which suggests that specific rather than generalized expectancies mediate behaviour change. Self-efficacy gained through the accomplishment of one new behaviour does not often generalize to dissimilar behaviours without additional training.

Self-efficacy expectancies are also predictive of proficient technique in breast self-examination (Alagna & Reddy, 1984). The strongest determinant of proficiency in 72 female subjects was the regularity of practice and their self-confidence about performing the technique, even more than their belief in the examination as a successful detection method. The more confident subjects were in performing the technique correctly, the more frequently and the more proficiently it was performed. These results suggest that self-efficacy is an important factor in determining how often a woman performs breast examinations which in turn affects how adequately she performs it (Alagna & Reddy, 1984).

Self-efficacy was also found to predict the persistence of pain in childbirth (Manning & Wright, 1983). Self-efficacy expectancies predicted persistence in pain control without medication, that is the amount of time women spent in labor without pain medication better than outcome expectancies and locus of control.

Self-efficacy has also been used to predict negative mood states in patients receiving hemodialysis and renal transplantation (Devins et al., 1982). Weak efficacy expectancies were associated with increased depression, lower self-esteem and subjective feelings of helplessness (Devins et al., 1982). Thus, strong efficacy expectancies made an important contribution to increasing the psychological well-being of patients suffering from kidney disease.

Results of these studies provide strong evidence to support the notion that efficacy expectancies are useful in mediating changes in health and coping behaviour.

Self-efficacy and Cardiac Rehabilitation

The role of self-efficacy in the rehabilitation of the cardiac patient has been examined in recent research. Two studies with cardiac patients and patients and their spouses have examined the relationship between self-efficacy and treadmill performance, counselling and subsequent physical activity. Results suggest that self-efficacy is important in the post-MI rehabilitative process (Ewart et al., 1983; Taylor et al., 1985). A third study examined the role of self-efficacy in predicting overexertion during exercise (Ewart et al., 1986).

Of particular relevance to the present research, Ewart et al. (1983) tested the relationship between self-efficacy and treadmill performance in 40 cardiac patients three weeks after the acute event. Secondary goals of the study were to examine the effects of treadmill performance and subsequent counselling on self-efficacy and whether subsequent physical activity was more closely related to exercise performance or self-efficacy.

The self-efficacy assessment included a set of six self-efficacy scales developed to measure patients' perceived ability to carry out the following activities: walking, running distances from one block to five miles, climbing stairs, sexual intercourse, lifting objects and general physical exertion. Patients completed the self-efficacy measure three times: before and after the treadmill test and following the counselling session. Patients' perceptions of their physical capacity, as measured by peak treadmill heart rates and workload, correlated highly with their level of physical activity within the following week. Efficacy expectancies increased significantly after the treadmill exercise testing. Patients with low self-efficacy scores before treadmill testing who performed well on the test exhibited proportionately larger increases in self-efficacy than those who performed more poorly on the treadmill test. Similarily, patients high in self-efficacy before treadmill testing and who performed well on the test sustained high levels of self-efficacy, whereas if they performed less well on the test, self-efficacy tended to decrease (Ewart et al., 1983). Based on the self-report activity logs of 18 patients, self-efficacy scores following the counselling sessions, and not peak treadmill heart rates, predicted subsequent changes in activity levels. A major drawback of the study however was the absence of a control group to determine whether self-efficacy scores would have increased regardless of the interventions.

This study by Ewart et al. (1983) has several practical implications concerning the rehabilitation of cardiac patients. To date, the potential of exercise testing to shape patients' expectations and attitudes regarding their capacity for physical activity soon after an MI has been largely overlooked. Results of this study suggest that exercise testing and counselling influence patients' expectations (Ewart et al., 1983). Furthermore, patients' actual performance of physical activity in their home environment correlated more highly with their post-treadmill and post-counselling self-efficacy scores than with their peak treadmill heart rates.

A subsequent study from the same laboratory was designed to test the effect of the exercise test on strengthening spouse perceptions of patients' physical and cardiac capability (Taylor et al., 1985). Spouses of male cardiac patients ($\underline{N}$ =30) were randomly assigned to three groups. Spouses in group one waited in an adjoining room during their husbands' exercise test. Wives in group two observed the test, and those in group three observed the test and walked for three minutes on the treadmill at the same peak workloads that their husbands had achieved. Self-efficacy scores of patients and spouses were measured on three separate occasions: before and after treadmill testing and subsequent counselling sessions. Patients' perceptions of their own capabilities predicted their treadmill performance, i.e. the higher their physical self-efficacy prior to testing, the higher their peak workload on the treadmill. Furthermore, both the treadmill test and counselling session contributed significantly to the change in patients' perceptions of their physical capacity as measured by their perceived cardiac efficacy.

It has been suggested that wives' notions about their husbands' physical capabilities can assist or impede the recovery process (Krantz, 1980). Taylor et al. (1985) found that spouses' efficacy ratings of their husbands physical and cardiac efficacy (i.e. heart rate) were substantially lower than their husbands' self-reports. However, spouses who participated in the treadmill exercise test significantly raised their self-efficacy as compared to the other two groups. This study supports the notion that psychological recovery from a heart attack is an interpersonal rather than strictly an intrapersonal matter. These results extend the findings of Ewart et al. (1983) in emphasizing the value of early post-MI treadmill testing and counselling in reassuring low risk patients and their spouses about the capacity of patients to resume their customary activities.

In a recent study, Ewart et al. (1986) examined the role of self-efficacy in predicting overexertion i.e., the number of minutes patients spent above their prescribed exercise heart rate range to programmed exercise. Results indicated that jogging self-efficacy was significantly correlated with treadmill test performance. Furthermore, patients with low and medium self-efficacy underachieved wheras patients with high self-efficacy overachieved (i.e. spent more time above their prescribed heart rate range).

The results of these studies suggest that efficacy expectancies provide an important link between the functional status and physical performance of the cardiac patient. Self-efficacy judgements predict both patients' exercise test performance and are also modified by the test performance.

Controllability

The notions of perceived self-efficacy and perceived control are related in that an individual with a strong sense of personal efficacy also has a strong sense of personal control (Miller, 1979a). The notion of perceived control has, in essence, provided the basis for Bandura's self-efficacy theory (Goldfried & Robins, 1982). Exercising control is only stress reducing, however, when the cause of relief is attributed to an internal stable force, i.e. the confidence in one's ability to execute the behaviour required to produce the desired outcome (Bandura, 1977a).

The notion of controllability is defined in the literature in three ways: a) as an "instrumental training space", where the individual can make a response which modifies the event (Miller, 1980a); b) self-administration, referring to individuals delivering the aversive event to themselves (Miller, 1980a) or c)"potential or perceived control", where individuals believe that some controlling response is available if they need to use it (Miller, 1980a).

Traditional controllability theories (information-seeking, relevant feedback and safety signal) generally agree that individuals prefer and experience less stress when they have instrumental control over an aversive event (Miller, 1979a; Miller, 1980b). These theories suggest that control is stress-reducing because it provides a person with predictability, i.e. knowing when and under what circumstances an event will occur (Miller, 1981). Miller (1979a) proposed the minimax hypothesis to suggest that having control is stress-reducing because an individual with control expects a less aversive outcome than an individual without control. Specifically, the minimax hypothesis was developed to explain the stress-reducing effects of unexercised potential or perceived control (Miller, 1979a). This hypothesis postulates that in stressful situations individuals choose control only when they believe that their responses will provide the most stable guarantee of a maximum upper limit of danger or threat. Similarily, control should be relinquished to an individual who is perceived as being more competent and who provides a more stable guarantee for minimizing the stress.

Self-efficacy theory is compatible with the minimax hypothesis in that self-efficacy theory states that personal control endows individuals with a high sense of self-efficacy. Self-efficacy theory states that if individuals doubt their own self-efficacy to execute a behaviour necessary to produce the desired outcome, they will relinquish control to an individual whom they perceive as being more competent (Bandura, 1977a). In contrast to self-efficacy theory however, the minimax hypothesis suggests that arousal is reduced when an individual has control because the anticipated danger is minimized. Self-efficacy theory places greater emphasis on negative self-referrent cognitions as mediators of anticipatory arousal (Miller, 1980).

Predictability

The minimax hypothesis is unique among the controllability theories because it distinguishes between controllability and predictability. Controllability suggests that an individual is able to "do something" about an aversive event, whereas predictability means that an individual merely knows exactly what the event will be like and under what circumstances it will occur (Miller & Grant, 1979). It is obvious from these distinctions that controllability by its very nature increases predictablity. However, the opposite is not true. Being able to predict the occurrence of an event does not necessarily enable an individual to control or modify it (Miller & Grant, 1979).

Traditional theories of predictability and human stress (i.e. information-seeking, preparatory response, preparatory set, uncontrollability and safety signal theory) share the view that predictable aversive events are less stressful than unpredictable aversive events (Miller, 1981). Predictability is defined as consisting of two distinct classes: 1. contingency predictability or knowing when and under what circumstances the event will occur and 2. what-kind-of-event predictability or knowing what the event will be like and what effects it will have (Miller, 1981). Unpredictability, on the other hand is knowing little or nothing about the event or procedure in question.

Traditional theories of predictability (Miller, 1981) suggest that predictability reduces stress for one of two reasons: a) because it enables an individual to make a response which reduces or alters the impact of the event (e.g. tensing of muscles) or b) because an individual who knows what to expect attends less to the danger involved and more towards external safety signals.

Preparatory Information for Stressful Medical Procedures

One key situational property that has consistently been found to affect stress is whether the individual has maximal information (predictability) or minimal information (unpredictability) about the task or procedure (Miller & Mangan, 1983). What-kind-of-event predictability concentrates on giving subjects stimulus or procedural information, i.e. information about the physical characteristics of the event and/or sensory information,i.e. information about the effects the event is likely to have (Miller, 1981). Several studies have examined the effects of procedural information, sensory information and a combination of procedural and sensory information on stress before (anticipatory), during (impact), and after the event or procedure.

Procedural Information

The literature examining the effect of procedural information provides somewhat inconclusive evidence of its importance in reducing anxiety associated with hernia surgery. Two controlled studies that examined the effects of procedural information found that patients who received information scored only slightly better on the indices of recovery (number of days to discharge, medication required and postoperative attitudes) than control patients (Andrew, 1970; Vernon & Bigelow, 1974). Based on a self-report attitude measure, Vernon and Bigelow (1974) found that 20 patients randomly assigned to a procedural information group were more likely to express favourable pre and postoperative attitudes than the control patients i.e. those patients who did not see the preparation videotape. The attitude measure was designed to assess patient attitudes towards the physicians in charge, the nurses and the actual procedure. The two groups differed significantly on postoperative anger. Similarily, on a diverse sample of patients scheduled for various minor surgeries, Andrew (1970) found that those identified as having a neutral coping style on a personality test recovered in less time and required fewer medications when given instruction. The personality test was a sentence-completion test which divided subjects into three coping styles, depending on the extent their completions reflected a move "toward" or "away" from possibly threatening emotions such as love, hate, sex, fear or disgust. Those subjects whose completions were personalized and specific were called "sensitizers" and those whose responses were arbitrary or stereotypic were considered "avoiders". Middle scorers were considered to be "neutrals". Those identified as avoiders required more medication after listening to the audiotape (procedural information) though time for recovery did not change.

Sensory Information

Several studies have examined the effects of sensory information in reducing anxiety associated with medical or dental procedures. Sensory information typically prepares the individual with a detailed description of the tactile, thermal and visual changes that he or she will experience during the procedure. In two studies (Johnson, Morrissey & Leventhal, 1973; Johnson & Leventhal, 1974), endoscopy patients who received sensory information showed significantly lower levels of behavioural distress (e.g. gagging, restlessness, number of tranquillizers) than control patients who received procedural information. The effect of the interventions was reduced because all patients had previously undergone the procedure.

Similar results were found in studies with children in a dental environment (Siegel & Peterson, 1980) and undergoing removal of a cast (Johnson, Kirchhoff & Endress, 1973). In the former study, behavioural signs of anxiety and stress were assessed in children who were visiting the dentist for the first time. Two groups of children who received either sensory information or instruction regarding self-control coping skills exhibited significantly fewer disruptive responses, lower heart rates and less anxiety than a control group. There were no differences in these measures between the two experimental groups.

Similar results were found by Johnson et al. (1973). Children who received sensory information regarding removal of an orthopedic cast showed significantly lower signs of behavioural distress than a control condition. The sensory information group was not significantly different than the procedural information group. While various methodological problems exist in these studies there is the suggestion that preparatory information containing a description of the sensations patients may experience is important in reducing anxiety associated with stressful medical procedures.

Procedural and Sensory Information

There is evidence to suggest though that a combination of procedural and sensory information may or may not be important in reducing the stress associated with various medically-related procedures. Results from studies which have combined procedural and sensory information suggest that the sensory component is an essential part of the preparatory information (Cohen & Lazarus, 1973; Johnson, 1973; Johnson, Morrissey & Leventhal, 1973; Johnson & Leventhal, 1974; Leventhal, Brown, Schachen & Engquist, 1979; Sime, 1976; Staub & Kellett, 1972). Based on a series of experiments, Johnson (1973, 1975) postulated that sensory information increases expectancies about sensations likely to occur and decreases expectancies about sensations unlikely to occur.

In a laboratory setting with male college students, Johnson (1973) studied the effects of procedural and sensory information on tolerance for ischemic pain produced by a blood pressure cuff. Distress ratings of subjects who received sensory information about the intensity and nature of arm pain reported lower distress than those who received only procedural information. These results were supported by Leventhal et al. (1979) who found that subjects given sensory information about a cold pressor test reported less distress, had higher finger temperatures and reported somewhat weaker sensations than subjects given arousal information (pain warning) or control subjects who received procedural information. Similar results were reported by Staub and Kellett (1972) who found that subjects who received both sensory information about exposure to electrical stimulation and procedural information about the apparatus to be used and its safety features endured more intense shocks than those in either the sensory only, procedural only or no information controls. Thus, in a laboratory setting, there is some evidence to suggest that preparatory information combined with accurate expectations about sensations that may be experienced diminishes the stress and arousal of an aversive event.

In a study of 99 patients scheduled for endoscopy, Johnson et al. (1973) studied the effects of sensory and procedural information on several recovery indices. Patients in the sensory group scored significantly lower on several behavioural indicators of distress and fear than both the procedural and no information controls and had lower heart rate acceleration during the endoscopy. The information intervention in this study may have been contaminated because all patients had previously undergone the procedure. When naive patients were used, results were not as clearcut (Johnson et al., 1974). Sensory information had a significant effect on only two of the recovery indicators, i.e., number of tranquillizers and heart rate. Sensory combined with behavioural instructions were needed to reduce time for the passage of the tube.

Kendall et al. (1979) found that procedural information about cardiac catheterization was more beneficial than professional attention alone on various adjustment and recovery indices. These included self-report state anxiety and behavioural adjustment ratings. Both the patient education and the cognitive-behavioural (instruction in coping techniques) groups received higher adjustment ratings than subjects in the control groups (attention placebo control or relaxation group and a current hospital conditions control group). In addition, patients' retrospective self-reported state anxiety during catheterization was significantly lower for both the patient education and cognitive-behavioural interventions as compared to the control groups. Results of the information intervention may have been biased because two-thirds of the patients had previously undergone the procedure.

On the other hand, there are studies in health care settings which have found either a linear relationship or no relationship between information, preoperative anxiety and recovery. In a study of abdominal surgery patients, Langer, Janis and Wolfer (1975) found no differences in physiological response measures (heart rate, blood pressure) between a group that received procedural and sensory preparatory information and a control group. Patients in the experimental group in this study received higher anticipatory stress ratings based on nurses' observations.

Sime (1976) reported a linear relationship between preoperative fear and amount of information regarding abdominal surgery. The more information patients received, the lower their fear level. Low fear patients scored more favourably than moderate or high fear patients on all the recovery measures including self-ratings of postoperative negative affect, number of analgesics and total number of days to discharge. In this study, the amount of information received was not adequately controlled for and was assessed by a self-report preoperative information scale. Subjects reported from a selected list those events about which they had received information and whether their expectations of postoperative events had been accurate. The nature of the information actually received was unknown. In addition, the study failed to control for previous surgical history of abdominal surgery.

Wilson (1981) found that patients randomly assigned to a procedural/sensory information group about elective abdominal surgery did not differ from no preparaory information control patients or from patients assigned to a relaxation training group on amount of pain medication required, self-report measures of recovery and emotional arousal based on post-operative epinephrine levels. The information and relaxation training significantly reduced the length of hospital stay in comparison to the control group.

It is apparent that results of studies which have combined procedural and sensory information in medical, surgical and dental patients are somewhat unclear. In several of the studies (e.g. Johnson et al., 1974; Siegel & Peterson, 1980; Wilson, 1981) providing preparatory information affected only a portion of the recovery indicators. The evidence indicates that increasing predictability by providing information can sometimes increase as well as decrease the stress associated with aversive events or procedures (Bandura, unpublished manuscript).

A variable which cannot be ignored and which has been cited by several researchers as important in minimizing anxiety associated with aversive events or procedures is individual preference for information or individual coping style (Andrew, 1970; Cohen & Lazarus, 1973; Reading, 1979; Shipley et al., 1978; Shipley et al., 1979; Siegel & Peterson, 1980; Sime, 1976; Wilson, 1981; Wilson et al., 1982). For example, Cohen and Lazarus (1973) obtained self-report measures of the extent to which patients scheduled for various kinds of abdominal surgeries sought out or avoided information prior to surgery. They found that those who avoided information spent fewer days in hospital and had fewer postsurgical complications than those who sought out information.

Individual Differences in Preference for Information

The blunting hypothesis was proposed by Miller (1980) to specify the conditions under which predictability has stress-reducing or stress-inducing effects. The hypothesis emphasized the way in which individuals cognitively process information as a means of reducing stress. Specifically, the blunting hypothesis postulates that there are two main modalities for coping with aversive events: monitoring or actively seeking threat relevant information and blunting or cognitively avoiding threat relevant information.

According to the hypothesis, there are two circumstances in which predictability will be preferred and stress-reducing (Miller, 1980a). The first is situational, i.e. the conditions surrounding the threat may be too intense to allow distraction. The second and more important one in terms of this thesis is variability in an individual's ability or desire to distract in situations which are perceived as being a threat (Miller, 1981). Individuals who believe themselves to be ineffective at distracting or cognitively avoiding information should consistently choose predictability, whereas those who perceive themselves to be effective distractors should prefer to not know about the procedure or event in question or unpredictability. Specifically, the hypothesis suggests that arousal remains high in uncontrollable aversive situations to the extent that an individual is alert for, and sensitized to the negative aspects of the event. Conversely, arousal is reduced when an individual can cognitively avoid and psychologically blunt potential sources of danger. Thus, high information generally increases arousal because an individual is forced into the psychological presence of an unavoidable danger. Low information, on the other hand generally decreases arousal because it allows individuals to psychologically absent hemselves from potential danger cues.

However, the blunting hypothesis further suggests that individuals will experience less stress when their coping style is consistent with their preference for information (Miller, 1981). Conversely, if individuals are forced into their non-preferred condition, they will show higher stress than they did in their preferred condition (Miller & Wagner, 1980).

Evidence to support the importance of assessing coping style was provided in a study with endoscopy patients (Shipley et al., 1978; 1979). Patients' coping style was assessed using the repression/sensitization scale (Byrne, 1961). Adjustment and recovery measures taken before, during and after the procedure included self-report anxiety measures, heart rate, ECG readings and various behavioural ratings of distress (e.g. number of gags, number of insertion attempts, and total insertion time). Shipley et al. (1979) reported that sensitizers who viewed three showings of the information videotape experienced less heart rate acceleration, less distress and required less time for tube passage as compared with unprepared sensitizers. Further, heart rate and arousal ratings of avoiders increased as a function of the number of viewings of the videotape. Although the results of this study were somewhat contaminated because all patients had previously undergone the procedure, similar results were found in an earlier study with naive patients (Shipley et al., 1978).

Another study that emphasized the importance of matching coping style and preparatory techniques in order to minimize the stress associated with an endoscopy procedure used a different coping assessment scale (Wilson et al., 1982). Coping style was assessed by a 29 statement questionnaire that identified several individual coping styles. Avoidant patients exhibited significantly lower insertion and exploration distress when treated with relaxation, whereas patients identified as being low in avoidance showed less distress in the information condition. Similarily, patients low on the independence dimension required significantly more Valium during the procedure and demonstrated more distress during the insertion than high independent dimension patients. The emotional control dimension related only to Valium administration. Thus, no one particular coping style consistently predicted recovery.

Two studies examining the interactional effects of coping style and type of information (general, specific) on state anxiety (A-state) assessed by the Spielberger State-Trait Anxiety Inventory and adjustment to dental surgery, as assessed by dentist's ratings of patient adjustment used a four-item "Rating of Patient Behavior Form" (Auerbach et al., 1976; Auerbach et al., 1983). Preference for information was assessed by the information subscale of the Krantz Health Opinion Survey. Rotter's Internal/External Locus of Control Scale was used to assess locus of control. Internal subjects showed better adjustment during the surgery when they viewed the specific compared to the general information tape. The reverse was true for patients classified as externals. These individual differences in locus of control, however, did not affect anxiety. All of the subjects who received specific information adjusted better than subjects receiving the general information (Auerbach et al.,1983). In addition, those subjects with a high preference for information showed much better adjustment when they received specific vs. general information. Subjects low in preference for information adjusted slightly better when they received general as compared to specific informaton. These results are of practical importance because they suggest that patients may be defined and matched prior to surgery with preparatory procedures differing in specificity of informational content that is consistent with their coping style.

Coping Style as Assessed by the Miller Behavioral Style Scale (MBSS)

Several studies using the Miller Behavioral Style Scale (MBSS) (Miller & Mangan, 1983; Watkins, Weaver & Odegaard, 1985; Phipps, unpublished manuscript) to assess coping style have also demonstrated the importance of matching coping style and preference for information to reducing anxiety during stressful medical procedures. Colposcopy patients were divided into monitors (information seekers) and blunters (information avoiders) based on the MBSS. Half of each group was provided with either sensory and procedural information or the usual minimal information. Blunters given low information and monitors given high information showed decreases in heart rate, compared to blunters given high information and monitors given low information. Thus, when the amount of preparatory information was consistent with coping style, physiological stress was reduced. In addition, patients exposed to the high information condition reported significantly more anxiety, depression and discomfort based on both self-report and observer ratings, regardless of their coping style. However, monitors showed more anxiety before, during and after the procedure than blunters, regardless of the information received. Blunters in the minimal information condition maintained a low level of anxiety throughout the procedure. Blunters receiving high information showed a dramatic increase in anticipatory tension, an this is similar to monitors which is congruent with the blunting hypothesis. This study also suggests that monitoring is a more arousing coping style than blunting, at least in this setting because monitoring was associated with greater subjective and behavioural distress than blunting before, during and after colposcopy. These findings were also confirmed by Phipps (unpublished manuscript) who found that monitors were more anxious than blunters throughout an amniocentesis procedure.

In accordance with Miller's results, Watkins et al. (1985) found that blunters provided with procedural information and monitors provided with sensory information regarding cardiac catheterization had lower levels of anxiety and psychophysiological arousal prior to the procedure, based on heart rate and blood pressure response.

Similarily, in a randomized controlled trial of 86 cardiac catheterization patients, Miller (unpublished manuscript) found that monitors provided with sensory information had the lowest self-reported anxiety scores, before and after the procedure and the highest adjustment scores, based on physician observer ratings. In addition, heart rates during the procedure were lowest for monitors who received the sensory information and blunters who received no information. Blunters who received procedural information had lower anxiety levels than blunters who received sensory information. Results of these studies suggest that appropriate information should be given according to an individual's coping style.

In a third study with cardiac catheterization patients, Taylor et al. (1983) demonstrated that monitors receiving high levels of preparatory information before the procedure showed less physiologic and self-reported arousal than those receiving low levels of information. Also, monitors were less anxious than blunters based on the state anxiety scale (A-state) of the Spielberger State-Trait Anxiety Inventory. Significant differences were found among the three groups (procedural, sensory, control) in patients' anxiety during the procedure. These results were based on retrospective post-catheterization self-report measures.

In a laboratory study, the relationship between information and the monitor/blunter coping style was also demonstrated using a cold pressor task (Chorney, Efran, Ascher & Lukens, 1981; Efran, Chorney, Ashner & Lukens, 1985). Threshold and tolerance to an ice water bath were measured in seconds, corresponding to the point at which the first painful sensation was reported and the total time for immersion of the hand in the water, respectively. Results showed that blunters reported higher pain thresholds only when using distraction whereas monitors did better when observing or concentrating on their sensations. That is, when using the cognitive techniques that were compatible with their coping style (distraction-blunters; observation-monitors), subjects were better able to delay reporting of the onset of discomfort. Overall, blunters were able to keep their hands in the water for longer periods of time, regardless of any special instruction (Efran et al., 1985).

The results of these studies suggest that anxiety associated in stressful situations is minimized for blunters who receive low levels of information and for monitors who receive high levels of information. This research also suggests that the more adaptive coping mode with an uncontrollable event is blunting or distraction (Efran et al., 1985; Miller & Mangan, 1983), because monitoring involves greater increases in arousal and slower recovery than blunting (Miller & Mangan, 1983; Taylor et al., 1983). In a preliminary study to determine whether monitoring is indeed a more costly coping style, patients seeking treatment for acute medical problems who also had hypertension were divided into monitors and blunters (Miller, Brody, Leinbach, Laborte & Summerton, 1982). Based on self-report ratings of depression, heart rate and behavioural anxiety during physical examination, hypertensive patients were twice as likely to be characterized by a monitoring style than a blunting style. In addition, hypertensive monitors showed a slight increase in depression scores, whereas hypertensive blunters and normotensive monitors and blunters showed a reduction in depression (Miller et al., 1982). All patients in the hypertensive group were seeking treatment for problems independent of the hypertensive condition. These results, although preliminary, imply that hypertensives may be characterized by an information seeking style which may take its physical and psychological toll and subsequently affect coping behaviour.

Summary of Literature Review

In summary, the literature suggests that there are several important variables that mediate the stress-control relationship. Two situational variables include the perceived efficacy of the cardiac patient towards the stressful situation and the provision of accurate sensory and/or procedural information pertaining to the event. The research on self-efficacy and coping behaviour (Bandura et al., 1980; Bandura, 1982) suggests an inverse relationship between self-efficacy and anxiety, with high self-efficacious individuals having lower levels of anxiety than low self-efficacious individuals. Research with cardiac patients and their spouses demonstrates that patients' perceptions of their own capabilities predicts their peak performance on the treadmill (Ewart et al., 1983; Taylor et al., 1985; Ewart et al., 1986).

Research on the provision of preparatory information pertaining to the stressful event or procedure produces contradictory findings regarding the stress-reducing properties of control. While the literature does indicate that the sensory component of information is critical, it is apparent that in some situations having control may in fact increase stress. Researchers have suggested that the relationship between control and stress is primarily determined by the meaning of control to the individual facing the situation (Miller, 1979; Thompson, 1981; Folkman; 1984).

The importance of matching coping style and preference for information has been demonstrated in both laboratory and clinical settings with colposcopy patients (Miller & Mangan, 1983; Watkins et al., 1985), cardiac catheterization patients (Miller, unpublished manuscript; Taylor et al., 1983) and with subjects undergoing the cold pressor task (Chorney et al., 1981; Efran et al., 1985). Results suggest that anxiety associated with stressful procedures is minimized for blunters who receive low levels of information and for monitors who receive high levels of information.

The present study was designed to examine the effects of procedural and sensory information about the cycle ergometer exercise tolerance test on self-efficacy, anxiety and performance levels in male patients who have recently suffered an MI. In addition, the study investigated the interaction of preparatory information and coping style on anxiety levels.

Method

Subjects

Thirty male cardiac patients, ages 40-66 years ($\bar{X}$=55 years) participated in the study. Patients were referred by their physicians three to six weeks post MI for a symptom limited cycle ergometer exercise tolerance test. Patients without unstable angina and/or uncontrolled dysrhythmias and who had documented MI based on at least two of the following were included in the study: 1. blood enzyme levels, 2. ECG diagnostic of MI or 3. chest pain. Patients with orthopedic, neurological and/or respiratory problems were excluded from the study. Other inclusion criteria were a Beck Depression score greater than 5 and a Spielberger State-Trait Anxiety Inventory score greater than 30. This study was part of a larger study on which this specific inclusion criteria was established. Three patients who had previously undergone a submaximal exercise tolerance test were included in the study.

Experimental Procedures

The purpose of the study was explained to patients in order to clarify any misconceptions. Written consent was obtained from each patient prior to testing following explanation of the study protocol. All patients completed three self-report psychological questionnaires soon after arrival at the laboratory; the A-trait and A-state portions of the Spielberger State-Trait Anxiety Inventory, The Miller Behavioral Style

Scale (MBSS) and the physical self-efficacy assessment. Using a matching procedure (explained later), patients were then randomly assigned to the experimental or control conditions based on their pre-intervention cycling self-efficacy scores. After viewing either the preparatory information or the control videotape, the A-state portion of the Spielberger Anxiety Inventory and the self-efficacy assessment were re-administered. Patients then performed a symptom-limited exercise tolerance test on the cycle ergometer. All testing took place in the Cardiorespiratory Unit, McMaster University Medical Centre. Each of the experimental procedures in their order of administration, is described in detail.

1. Self-Report Psychological Questionnaires

Each patient completed four self-report measures prior to the preparatory interventions: 1 & 2. Spielberger State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch & Lushene, 1970) 3. Miller Behavioral Style Scale (MBSS) (Miller, 1980b) and 4. the physical self-efficacy assessment.

A. The State-Trait Anxiety Inventory (STAI) (Spielberger et al., 1970) (Appendix A)

Both trait and state versions were included in the study to measure the general level of anxiety as well as the anxiety specific to the exercise test situation. Validity and reliability information for both the A-state and A-trait anxiety portions are presented in Appendix B.

a) The state version of the State-Trait Anxiety Inventory (A-state) was used to measure the anxiety experienced by patients at the time of testing. The essential qualities evaluated by the A-state are feelings of tension, nervousness, worry and apprehension (Spielberger et al., 1970).

Standardized methods were used to score the inventory. The percentile rank of patients' A-state and A-trait raw scores were determined from the norm tables (Spielberger et al., 1970). The percentile ranks of the cardiac patients tested in this study were compared against the males only normative data on a general medical and surgery patient sample (Spielberger et al., 1970).

The dependent measure used in this study was the relative change in anxiety. This was calculated using the following formula:

$$\frac{\text{post state anxiety score} - \text{pre score}}{\text{pre score}} \times 100$$

b) The STAI A-trait scale is designed to assess how individuals generally feel. Trait anxiety (A-trait) refers to relatively stable individual differences in anxiety proneness, i.e., differences between people in the tendency to respond to situations perceived as threatening with elevated A-state intensity (Spielberger et al., 1970).

B. <u>Miller Behavioral Style Scale (Appendix C).</u>

The Miller Behavioral Style Scale (MBSS; Miller, 1980b) is a standardized measure designed to identify those who seek information ("monitor") or avoid information ("blunter") under stressful conditions. Individual differences in coping style have traditionally been operationalized on the basis of the Repression-Sensitization Scale (Byrne, 1961). Various psychometric problems have been found to exist with this measure including its high correlation with measures of trait anxiety and response set contamination (Miller & Mangan, 1983). Therefore, the MBSS was developed in an attempt to circumvent these problems. Validity and reliability information is presented in Appendix D.

The MBSS asks the individual to imagine four stress-evoking scenes of an uncontrollable nature. Each scene is followed by eight statements representing two different ways of coping with the situation. Four of the statements are of a monitoring or information seeking variety and four are of a blunting or information avoiding variety. Patients are asked to check all of the statements that would apply to them in each situation.

Three scoring techniques are used for this scale. An example of each scoring technique and the monitor-blunter classifications are illustrated in Appendix E.

1) The mean total monitoring score which is obtained by computing the mean of the total number of monitoring options endorsed across the four situations (the higher the score, the more monitoring);

2) The mean of the total blunting score, which is obtained by computing the mean of the total number of blunting options endorsed across the four

situations (the higher the score, the more blunting);
3) The mean of the total monitoring score minus the mean of the total blunting score (the higher score, the more monitoring).

The dependent measure used in this study was the mean difference between the number of monitoring and blunting items endorsed (Method 3)

C. Physical Self-Efficacy Assessment (Appendix F)

The physical self-efficacy scale was developed on the basis of a previous scale used by Ewart et al. (1983). A set of five self-efficacy scales were developed to measure patients' perceived ability to perform the following activities related to walking: 1. walking-distance, 2. walking-pace, 3. walking-up an incline, 4. walking-cool weather and 5. climbing. A sixth item requested an overall estimate of general exertion based on a 4-point scale ranging from mild to extremely hard exertion. In addition, a set of six self-efficacy scales were developed to measure patients' perceived ability to perform the following activities related to the cycle ergometer exercise tolerance test. These included: 1. cycling-leg fatigue, 2. cycling-breathing, 3. cycling-chest discomfort, 4. cycling-lightheadedness, 5. cycling-sweating, and 6. cycling-workload. Patients were asked to estimate their confidence in being able to cycle for a minimum of two minutes to a maximum of eight minutes, tolerating each of the stated conditions. An additional scale asked patients to rate their overall cardiac capability by estimating their capacity to tolerate increases in heart rate from 90-110, 111-120, 121-130, 131 or higher, beats per minute. Separate heart rate scales were included for those patients on beta blockade or calcium antagonists; 81-90, 91-100, 101-110, and 111 beats per minute or higher.

For each activity, patients rated the strength of their efficacy on a 100-point scale divided into 10-unit intervals; ranging from 0 (not at all confident) to 100 (extremely confident).

The self-efficacy assessment was scored in three separate parts: a) self-efficacy, general exertion (1 level), b) self-efficacy, walking (5 levels) and c) self-efficacy, cycling (10 levels). An example of the scoring procedures used for each part is presented in Appendix G.

Cycling self-efficacy was quantified by averaging the sum of the mean confidence scores for the six cycling self-efficacy sub-scales plus the four measures of cardiac capability (heart rate). In this study, self-efficacy was used as both a dependent and independent variable.

The relative change in cycling self-efficacy was used as the dependent variable and was calculated using the following formula:

$$\frac{\text{post self-efficacy score} - \text{pre score}}{\text{pre score}} \times 100$$

Throughout the analyses this will be referred to as the relative change in self-efficacy (DV).

Self-efficacy was also used as an independent variable, in that patients were divided into high and low self-efficacy based on their pre-intervention cycling self-efficacy scores. Throughout the analyses this will be referred to as pre-intervention cycling self-efficacy (IV).

2. Randomization Procedures.

Following completion of the self-report questionnaires, patients were randomized according to their pre-intervention cycling self-efficacy scores into one of the two intervention conditions using a matching procedure. In order to distribute the patients equally in each group, self-efficacy scores were divided into five unit intervals (e.g. 0-5, 6-10, 11-15, 16-20....96-100). Every odd numbered patient in each five unit block was randomly assigned to either the experimental (information) or the control condition (no information). Even numbered patients in each interval block were matched into the other condition. Patients were categorized into high and low self-efficacy groups on the basis of a median split of the pre-intervention cycling self-efficacy scores. This was done after the total number of patients ($\underline{N}$ =30) was tested. Low self-efficacy scores ranged from 26-51 ($\underline{n}$ =15; $\bar{X}$=40.13); high self-efficacy scores ranged from 52-86 ($\underline{n}$ =15; $\bar{x}$=58.9). The randomization procedure is illustrated below.

Example of Randomization Procedure

Cycling Self-Efficacy Scores

	.36-40.	.41-45.	.46-50.	.51-55.	.56-60.	.61-65.	.66-70.
n =	4	5	2	3	4	4	2

e.g. Score 41-45	Patient 1 randomized to Experimental (E)
	Patient 2 matched to Control (C)
	Patient 3 randomized to C
	Patient 4 matched to E
	Patient 5 randomized to C
Score 46-50	Patient 1 randomized to E
	Patient 2 matched to C
Score 51-55	Patient 1 randomized to C
	Patient 2 matched to E
	Patient 3 randomized to E

3. Preparatory Interventions

a. Experimental Intervention

The experimental (preparatory information) group viewed a nine-minute fifteen second videotape illustrating both the procedural and sensory components of the cycle ergometer exercise tolerance test. Accompanying the visual procedures was a detailed description of the sensory components commonly experienced by patients undergoing the exercise test. The sensory information consisted of simple and accurate statements that were designed to prepare but not frighten the patient. The information was directed to an eighth grade level of education. The verbal script which accompanied the visual presentation is presented in Appendix H. Each statement describing a physical sensation accompanied the appropriate procedure as the patient viewed it on the screen. Examples of the sensory statements were: "You may feel slightly lightheaded; You may feel a burning sensation in your legs; Your mouth may feel quite dry; You may feel a tingling sensation in your fingers as your blood pressure is taken, which will go away in a few seconds; You are free to stop the test at any time."

b. Control Condition

The control (no information) group viewed a ten-minute videotaped and edited version of the film entitled "Weighing the Choices; Positive Approaches to Nutrition" (Spectrum Films, 1982). The film is an informative guide to balanced nutrition as it relates to coronary heart disease. Specifically, it presents practical guidelines on wise choices for reducing fat, salt, sugar and cholesterol in the diet.

4. Selected Self-report Questionnaires Repeated

Subsequent to the information interventions and prior to the cycle ergometer test, patients completed the state anxiety (A-state) portion of the Spielberger State-Trait Anxiety Inventory (STAI) and the self-efficacy assessment a second time.

5. Cycle Ergometer Exercise Tolerance Test

Following completion of the two psychological assessments and after having received one of the two interventions, patients performed a Stage 1 cycle ergometer exercise tolerance test with standardized routine measures of cardiovascular performance (Jones & Campbell, 1982). This protocol requires the patient to cycle at a constant speed of 60 revs./min., starting with 0 kpm. and increasing by 100 kpm. each minute. Patients were encouraged to cycle for as long as possible. Reasons for terminating the test included: discretion of the attending physician, ST-T segment horizontal displacement of .2mv or more above or below the resting isoelectric line for at least 0.08 secs. duration after the "J" joint, ventricular dysrhythmias, a drop in systolic blood pressure of 10mm.Hg. or more from the peak measurement recorded previously, a diastolic blood pressure of more than 120mmHg and patient symptomatology including chest pain, dyspnea, nausea, fatigue, legs cramps and dizziness.

The dependent measure used in this study was maximum power output (kpm./min.).

Summary of Dependent and Independent Measures

The dependent variables used in this study were 1) the relative change in self-efficacy (DV), 2) the relative change in state anxiety, 3) maximum power output. The independent variables are 1) intervention; (experimental and control), 2) pre-intervention cycling self-efficacy (IV); (high and low) and 3) coping style; (monitor and blunter). A-trait was a covariate.

Statistical Analyses

a) Baseline Comparability Analyses

Descriptive statistics and baseline comparability analyses were conducted to ensure that there were no differences between intervention (information) or self-efficacy groups for demographic variables. These included age, number of weeks patients were tested post-infarction, occupation, marital status and work status.

i) Two 2 (self-efficacy: high, low) x 2 (intervention: experimental, control) analyses of variance were used to test for age differences and number of weeks patients were tested post-infarction.

ii) Chi-square analyses were used to test for differences in group proportions for occupation, marital status and work status.

b) Main Hypotheses

i) A 2 (intervention: experimental, control) x 2 (self-efficacy: high, low) analysis of variance was used to test the effect of preparatory information and pre-intervention cycling self-efficacy (IV) on the relative change in self-efficacy (DV)(Hypotheses 1 & 2).

ii) A 2 (self-efficacy: high, low) x 2 (intervention: experimental, control) analysis of variance was used to test the effects of pre-intervention cycling self-efficacy (IV) and preparatory information on the relative change in anxiety (Hypothesis 3).

iii) A 2 (self-efficacy: high, low) x 2 (intervention: experimental, control) analysis of variance was used to test the effect of pre-intervention cycling self-efficacy (IV) and preparatory information on maximum power output (kpm./min.)(Hypothesis 4).

iv) In order to examine the amount of variance in the relative change self-efficacy (DV) accounted for by several independent variables, Hypotheses 1, 2, 3 & 4 were also tested using stepwise regression procedures. The independent variables included intervention received, the number of weeks patients were tested post-infarction, the relative change in anxiety, maximum power output, coping style, and pre- and post-intervention general exertion and walking self-efficacy. These variables were selected by the experimenter as being the most logical predictors of the dependent variable based on the literature and the exercise test stituation (Hypotheses 1 & 2).

Stepwise regression procedures were also used to examine the amount of variance in the relative change in anxiety accounted for by the following independent variables: intervention received, trait anxiety, coping style, the number of weeks patients were tested post-infarction, age, the relative change in self-efficacy, maximum power output, pre-and post-intervention cycling, walking and general exertion self-efficacy. These variables were selected based on the exercise testing situation and the literature (Hypothesis 3).

Stepwise regression procedures were also used to test the amount of variance in maximum power output accounted for by the intervention received, pre-and post-intervention and the relative change in anxiety, coping style, the number of weeks patients were tested post-infarction, pre- and post-intervention and the relative change in cycling self-efficacy, pre-and post-intervention walking and general exertion self-efficacy. Again these variables were chosen based on the literature and the testing experience (Hypothesis 4).

c) Sub-Hypotheses

In order to test the effect of coping style (monitor, blunter) and intervention (experimental, control) on the relative change in anxiety, a 2 x 2 analysis of covariance was performed. Trait anxiety was used as the covariate.

d) Correlational Analyses

i) Correlational analyses were performed between all the self-efficacy measures, pre- and post-intervention.

ii) Correlational analyses were performed between the self-efficacy and anxiety measures.

iii) Correlational analyses were performed between the self-efficacy measures and maximum power output.

iv) Correlational analyses were performed between the three methods of scoring the Miller Behavioral Style Scale (MBSS) and the dependent measures.

Results

Baseline Comparability Analyses

The ANOVA testing the effects of intervention (experimental, control) and pre-intervention cycling self-efficacy (IV high, low) on age and the number of weeks patients were tested post-infarction indicated no main effects for intervention or self-efficacy (IV). There were also no significant interactions. Group means and standard deviations are presented in Table 1.

Chi-square analyses indicated no differences between the experimental and control groups in occupation, marital status or work status. There were also no significant differences in these variables between the high and low self-efficacy groups in either the control and experimental conditions. These results are presented in Table 2.

Main Hypotheses

Hypotheses 1 and 2 were tested using the same ANOVA. The ANOVA testing the effect of intervention (information: experimental, control) and pre-intervention cycling self-efficacy (IV) on the relative change in self-efficacy (DV) indicated a significant main effect for intervention [(F (1,26) = 4.80, p <.04)]. However, the direction of the effect was contrary to that which was predicted. Self-efficacy scores of subjects in the experimental condition decreased ($\bar{X}$=-8.03) whereas self-efficacy scores of patients in the control condition increased ($\bar{X}$=5.35). There were no main effects of pre-intervention cycling self-efficacy (IV) on the

Table 1

Table of Means (Standard Deviations) for Age and Number of Weeks Tested Post-Infarction

Variable	Experimental		Control	
	High Self-Efficacy (n=7)	Low Self-Efficacy (n=8)	High Self-Efficacy (n=8)	Low Self-Efficacy (n=7)
Age (yrs) $\bar{X}$=55 ($\pm$7.10)	60 (3.12)	53 (9.53)	52 (4.19)	56 (7.9)
Number of Weeks Post-Infarction $\bar{X}$=4.1 ($\pm$.90)	4.3 (1.1)	4.1 (.99)	4.0 (1.07)	4.1 (.38)

Table 2

Frequencies and Chi Square Analyses for Occupation, Marital Status and Work Status

Variable	Experimental		Control		
	High Self-Efficacy (n=7)	Low Self-Efficacy (n=8)	High Self-Efficacy (n=8)	Low Self-Efficacy (n=7)	
Occupation					
White Collar	2	1	1	3	x^2 (1) = 1.32, n.s.
Skilled Worker	2	2	2	1	x^2 (1) = 0.32, n.s.
Machine Operator	3	1	4	1	x^2 (1) = 2.80, n.s.
Unskilled	0	4	1	2	x^2 (1) = 4.32, n.s.
Marital Status					
Single	0	1	1	0	x^2 (1) = 2.00, n.s.
Separated	1	0	0	0	x^2 (1) = 1.00, n.s.
Married	6	7	7	7	x^2 (1) = 0.08, n.s.
Work Status					
Full-time	6	6	6	6	x^2 (1) = 0 , n.s.
Part-time	1	1	0	1	x^2 (1) = 1.00, n.s.
Retired	0	1	2	0	x^2 (1) = 3.00, n.s.

relative change in self-efficacy (DV). nor any significant interactions. The relative change in cycling self-efficacy of patients with low pre-intervention self-efficacy did not change while the cycling self-efficacy of patients with high pre-intervention self-efficacy in the experimental condition significantly decreased. Mean relative change in cycling self-efficacy (DV) scores for each of the four groups are shown in Table 3. The ANOVA table is presented in Appendix Ia. The raw data for the pre- and post-intervention cycling self-efficacy scores and the relative change in self-efficacy are presented in Appendix J.

The effect of pre-intervention cycling self-efficacy (IV) and intervention (information: experimental, control) on anxiety was examined (Hypothesis 3). There was a significant main effect for intervention [(F (1,26)=7.82, p <.01)] on relative change in state anxiety. Anxiety scores of patients in the experimental condition increased ($\bar{X}$=10.97) while anxiety of patients in the control condition remained essentially unchanged ($\bar{X}$=-.57). No main effects were found for pre-intervention cycling self-efficacy (IV) on the relative change in state anxiety. There were also no significant interactions. The relative change in state anxiety of patients with high pre-intervention cycling self-efficacy (IV) increased, although not significantly. The means for the relative change in anxiety of the four groups are shown in Table 3. The ANOVA table is presented in Appendix Ib. The raw data for the normalized state and trait anxiety measures are presented in Appendix J.

In examining the effects of pre-intervention cycling self-efficacy (IV) and intervention (information: experimental, control) on maximum

Table 3

Table of Means (Standard Deviations) for Relative Change in Self-Efficacy, Relative Change in Anxiety and Maximum Power Output

Variable	Experimental		Control	
	High Self-Efficacy (n=7)	Low Self-Efficacy (n=8)	High Self-Efficacy (n=8)	Low Self-Efficacy (n=7)
Self-Efficacy	-17.29(±10.16)	.07(±25.14)	1.53(±7.60)	9.73(±21.40)
-1.34(±19.40)	-8.03(±20.99)*		5.35(±15.59)*	
Anxiety	11.81(±12.20)	10.23(±11.35)	-2.61(±5.70)	1.77(±14.30)
5.20(±12.21)	10.97(±11.35)**		-.56(±10.44)**	
Maximum Power Output	843(±140)***	575(±128)	850(±207)***	728(±75)
747(±750)	700(±189)		793(±167)	

main effect for intervention; * $p < .04$
main effect for intervention; ** $p < .01$
main effect for self-efficacy; *** $p < .001$

power output (Hypothesis 4), analysis of variance indicated a significant main effect for self-efficacy [(F (1,26) = 12.99, p <.001)]. Patients with high pre-intervention cycling self-efficacy (IV) in both the experimental and control groups achieved a higher maximum power output ($\bar{X}$=846 kpm./min.) than patients with low self-efficacy ($\bar{X}$=651 kpm./min.). There was no main effect for intervention on maximum power output nor any significant interactions. Means of the four groups are shown in Table 3. The ANOVA table is presented in Appendix Ic. The raw data for maximum power output are presented in Appendix J.

Stepwise Regression Analyses

Stepwise multiple regression procedures were carried out in order to identify the predictors of the three dependent measures including the relative change in self-efficacy (DV), the relative change in anxiety and maximum power output.

Self-efficacy

Five independent variables (Table 4) which were entered into the regression equation accounted for 59% of the total variance in the relative change in self-efficacy (DV). These variables included the relative change in anxiety, the number of weeks patients were tested post-infarction, pre- and post-intervention walking self-efficacy and and pre-intervention general exertion self-efficacy. As shown in Table 4, the primary contributor to the relative change in self-efficacy (DV) was the relative change in anxiety which accounted for 46% of the variance. Variables that were excluded from the regression equation were coping style, intervention, maximum power output and post-intervention general

Table 4

The Squared Multiple Correlation, Beta Weights, R^2, R^2 Change, F and p Values of the Relative Change in Self-Efficacy

Variable	β	R^2	R^2 Change	F	p
1. Anxiety Relative Change	-.939	.463		24.08	.001
2. Walking Self-Efficacy Post-Intervention	-.518	.514	.040	13.80	.001
3. Weeks Tested Post-Infarction	-.603	.564	.050	10.89	.001
4. Walking Self-Efficacy Pre-Intervention	.406	.570	.014	8.30	.001
5. General Exertion Self-Efficacy Pre-Intervention	-.153	.590	.014	6.77	.001

exertion self-efficacy.

Anxiety

The following six variables (Table 5) accounted for 65% of the total variance in the relative change in anxiety: relative change in self-efficacy, the number of weeks patients were tested post-infarction, maximum power output, intervention, post-intervention cycling self-efficacy, and age. The greatest contributor to the prediction equation was the relative change in self-efficacy which accounted for 46% of the variance. Pre-and post-intervention general exertion self-efficacy, pre-and post-intervention walking self-efficacy, pre-intervention cycling self-efficacy and individual coping style did not significantly contribute to the prediction equation. Table 5 shows the initial steps of the analysis

Maximum Power Output

Stepwise multiple regression procedures for maximum power output are presented in Table 6. Six self-efficacy measures and intervention accounted for 63% of the variance. The primary contributor to the prediction equation of maximum power output was pre-intervention walking self-efficacy, accounting for 28% of the variance. Several variables were excluded from the prediction equation. These were pre-and post-intervention and the relative change in anxiety, trait anxiety, coping style, post-intervention walking self-efficacy and the number of weeks patients were tested post-infarction.

Table 5

The Squared Multiple Correlations, Beta Weights, R^2, R^2 Change, F and p for Relative Change in Anxiety

Variable	β	R^2	R^2 Change	F	p
1. Self-Efficacy Relative Change	.196	.462		24.10	.001
2. Intervention	6.480	.534	.066	15.16	.001
3. Post-Intervention Cycling Self-Efficacy	-1.270	.566	.034	11.18	.001
4. Maximum Power Output	.198	.612	.051	9.97	.001
5. Age	.330	.644	.027	8.59	.001
6. Number of Weeks Post-Infarction	-.874	.650	.007	7.08	.001

Table 6

The Squared Multiple Correlations, Beta Weights, R^2, R^2 Change, F and p Values for Maximum Power Output

Variable	β	R^2	R^2 Change	F	p
1. Self-Efficacy - Walking Pre-Intervention	2.050	.281		10.70	.003
2. Self-Efficacy General Exertion Pre-Intervention	5.653	.350	.074	7.27	.003
3. Intervention	-163.712	.444	.090	6.90	.001
4. Self-Efficacy Relative Change	13.300	.490	.040	5.95	.002
5. Self-Efficacy General Exertion Post-Intervention	-2.194	.524	.031	5.19	.002
6. Self-Efficacy - Cycling Pre-Intervetnion	30.990	.563	.037	4.82	.003
7. Self-Efficacy - Cycling Post-Intervention	-29.571	.633	.085	5.46	.001

Sub-Hypotheses

Analysis of covariance was performed to test the effects of coping style (monitor, blunter) and intervention (information: experimental, control) on the relative change in state anxiety while controlling for trait anxiety. Analysis of covariance indicated there was a significant main effect for intervention on the relative change in anxiety [(F (1,26)=7.6, p=.01)]. The relative change in anxiety of patients in the experimental condition increased ($\bar{X}$=10.97) whereas anxiety in patients in the control condition remained essentially unchanged ($\bar{X}$=-.57). There were no main effects for coping style on anxiety nor any significant interactions. There was an increase in the relative change in state anxiety in both monitors and blunters in the experimental condition, with essentially no change in state anxiety in either monitors or blunters in the control condition. The four group means are shown in Table 7. The ANCOVA table is shown in Appendix Id. These results were true for the standard scoring method of the Miller Behavioral Style Scale, as well as the two alternate methods (Appendix Ie & If).

Correlational Analyses

a) Correlation Coefficients for Self-Efficacy Measures

Correlation coefficients for pre- and post-intervention measures of walking, general exertion and cycling self-efficacy are presented in Table 8. Intercorrelations between all the self-efficacy measures were statistically significant at the p <.05 level.

Specifically, intercorrelations between pre-intervention cycling self-efficacy, and pre- and post-intervention walking self-efficacy were r

Table 7

Group Means (Standard Deviations) for Analysis of Covariance for the Relative Change in Anxiety

Variable	Experimental		Control	
	Monitor	Blunter	Monitor	Blunter
	n=6	*n*=9	*n*=7	*n*=8
Relative Change in Anxiety	12.55(±14.47)	9.91(±9.60)	-1.26(±10.59)	.04(±10.9)
	10.97(±11.35)*		-.57(±10.45)*	

(5.20±12.21)

main effect for intervention; * $p < .01$

=.74 and *r* =.68, respectively (*p* <.001). Pre-intervention cycling self-efficacy was also significantly correlated with pre-and post-intervention general exertion measures *r* =.54, *p* <.002 and *r* =.72, respectively (*p* <.001). Correlations between pre-intervention walking self-efficacy and pre-and post-intervention general exertion were *r* =.49,(*p* <.006) and *r* =.60,(*p* <.001).

b) Correlations between Anxiety and Self-Efficacy Measures (Table 9)

Trait anxiety was significantly correlated with both pre-intervention (*r* =.67, *p* <.001) and post-intervention (*r* =.65, *p* <.001) state anxiety. There was a significant negative correlation between pre-intervention state anxiety and pre-intervention cycling self-efficacy, (*r* =-.36, *p* <.05). Pre-intervention state anxiety was also significantly negatively correlated with pre-intervention general exertion self-efficacy (*r* =-.48, *p* <.008) and post-intervention general exertion self-efficacy (*r* =-.44, *p* <.01). Post-intervention state anxiety was significantly negatively correlated with pre-intervention cycling self-efficacy (*r* =-.39, *p* <.03) and post-intervention cycling self-efficacy (*r* =-.50, *p* <.005). The relative change in state anxiety was significantly negatively correlated with the relative change in cycling self-efficacy (*r* =-.68, *p* <.001) and post-intervention cycling self-efficacy (*r* =-.51, *p* <.004).

c) Correlation Coefficients Between Maximum Power Output and Self-efficacy Measures (Table 8)

Maximum power output was significantly correlated with pre-intervention cycling self-efficacy (*r* =.53, *p* <.003), pre- and post-intervention walking self-efficacy (*r* =.53, *p* <.003; *r* =.46. *p* <.01)

Table 8

Correlation Coefficients for Self-Efficacy Measures and Maximum Power Output

	INTER	SECYPR	SECYPO	SEPREW	SEPOSW	SEGEPR	SEGEPO	Relative Change in Self-Efficacy
Self-Efficacy-Cycling Pre-Intervention (SECYPR)	-.13							
Self-Efficacy-Cycling Post-Intervention (SECYPO)	-.36*	.79***						
Self -Efficacy-Walking Pre-Intervention (SEPREW)	-.23	.74***	.65***					
Self-Efficacy-Walking Post-Intervention (SEPOSW)	-.23	.68***	.51**	.88***				
Self-Efficacy-General Exertion, Pre-Intervention (SEGEPR)	.28	.54**	.28	.49**	.43**			
Self-Efficacy-General Exertion, Post-Intervention (SEGEPO)	.14	.72***	.54**	.60***	.54**	.89***		
Relative Change in Self-Efficacy	-.35*	-.19	.43**	-.08	-.21	-.30	-.19	
Maximum Power Output	-.26	.52**	.29	.53**	.46**	.49**	.43**	-.23

*** $p < .001$ ** $p < .01$ * $p < .05$

Table 9

Correlation Coefficients for Anxiety and Self-Efficacy Measures

Variable	STANXPR	STANXPO	Relative Change in Anxiety
State Anxiety Pre-Intervention (STANXPR)			
State Anxiety Post-Intervention (STANXPO)	.79***		
Trait Anxiety	.67***	.65***	
Relative Change in Anxiety	.24	-.02	
Cycling Self-Efficacy Pre-Intervention	-.36*	-.39*	.08
Cycling Self-Efficacy Post-Intervention	-.19	-.50**	.51**
Walking Self-Efficacy Pre-Intervention	-.20	-.24	.11
Walking Self-Efficacy Post-Intervention	-.25	-.25	.04
General Exertion - Pre-Intervention	-.48**	-.29	-.25
General Exertion - Post-Intervention	-.44**	-.34	-.11
Relative Change in Cycling Self-Efficacy	.20	-.24	-.68***

***p < .001 ** p < .01 * p < .05

and pre- and post-intervention general exertion self-efficacy (*r* =.49, *p* <.005; *r* =.43, *p* <.01).

d) Correlation Coefficients Between the 3 Scoring Methods of the MBSS, Pre- and Post-Intervention State Anxiety, Pre- and Post-Intervention Cycling Self-efficacy, Age and Maximum Power Output (Table 10).

Although coping style is a dichotomous variable, it was treated as a two level continuous variable for the purposes of this analyses. The standard method of scoring the Miller Behavioral Style Scale (MBSS) was significantly correlated with the two alternate scoring methods (*r* =.48, *p* <.007; *r* =.81, *p* <.001). Coping style was not significantly correlated with cycling self-efficacy, state anxiety, age or maximum power output.

Summary of Main and Sub-Hypotheses

1. There were no differences between the two experimental groups on any of the demographic variables, which demonstrates that the groups were comparable on the demographic variables that were measured and that no selection biases existed. There were no differences in the demographic variables between the high and low self-efficacy groups in either of the experimental groups.

2. Hypotheses 1 and 2 were not supported. In fact, preparatory information decreased cycling self-efficacy (DV) in patients in the experimental condition, whereas self-efficacy in patients in the control condition increased. There were no significant main effects of pre-intervention cycling self-efficacy (IV) on the relative change in self-efficacy (DV) nor any significant interactions.

Table 10

Correlation Coefficients of 3 Methods of Scoring MBSS, Pre & Post Intervention State Anxiety, Pre & Post Intervention Cycling Self-Efficacy, Maximum Power Output & Age

	Age	State Anxiety		Cycling Self-Efficacy		Maximum Power Output	Miller Behavioral Style Scale		
		Pre	Post	Pre	Post		MBDIFF (Standard)	MBSSA (Method A)	MBSSB (Method B)
Age									
State Anxiety PRE	-.29								
State Anxiety POST	-.14	.78***							
Cycling Self-Efficacy PRE	-.01	-.36	-.39						
Cycling Self-Efficacy POST	-.02	-.19	-.50*	.79***					
Maximum Power Output	-.13	-.31	.01	.52**	.29				
MBDIFF	-.31	.14	.14	-.14	-.15	-.11			
MBSSA	-.23	-.11	-.05	.09	.04	-.02	.48**		
MBSSB	-.22	.18	.23	-.22	-.10	-.09	.81***	.49**	

***$p < .001$ ** $p < .01$ * $p < .05$

3. Hypothesis 3 was not supported. There was a significant main effect for intervention on the relative change in anxiety. Anxiety scores of patients in the experimental group increased, whereas there was essentially no change in anxiety scores of patients in the control condition. There were no main effects for pre-intervention cycling self-efficacy (IV) on the relative change in anxiety nor any significant interactions.

4. Hypothesis 4 was supported such that there was a significant main effect for pre-intervention cycling self-efficacy (IV) on maximum power output. Patients with high pre-intervention cycling self-efficacy (IV) obtained a higher maximum power output than patients with low self-efficacy (IV).

5. Stepwise regression analyses for the dependent measures of the relative change in self-efficacy (DV), the relative change in anxiety and maximum power output confirmed the results of analyses of variance.

6. Sub-Hypotheses 1 and 2 were not supported. There was a significant main effect for intervention on the relative change in anxiety, such that anxiety scores of patients in the experimental condition increased, while anxiety scores of patients in the control condition remained essentially unchanged. There were no main effects for coping style nor any significant interactions.

Discussion

This study was designed to examine the effects of preparatory information about the cycle ergometer exercise tolerance test and pre-intervention self-efficacy (IV) on self-efficacy and anxiety. Another main purpose of the study was to determine the effects of pre-intervention self-efficacy on exercise test performance. A secondary purpose of the study was to examine the effects of coping style and preparatory information on anxiety.

The most important finding of this study was the unexpected decrease in self-efficacy and the corresponding increase in anxiety in cardiac patients who received the exercise test information. The most potent effect of the experimental intervention was in patients with high pre-intervention self-efficacy. There was an increase in anxiety (although not significant) and a significant decrease in self-efficacy of these patients. While these results are in direct constrast to the proposed hypotheses and the previous literature (Bandura & Adams, 1977; Bandura et al., 1977), the results may be explained by a number of factors.

One of the most parsimonious explanations for the failure to support the effect of the experimental intervention on self-efficacy as well as the hypothesized inverse relationship between self-efficacy and anxiety may have been the inadequate sample size. The size of the high and low self-efficacy groups within the control and experimental interventions were too small to yield sufficient power (i.e. the β was too high). For example, there was a trend but no main effect for self-efficacy ($p < .06$) on the relative change in self-efficacy (Appendix Ia). This may have been a significant result with the inclusion of more patients.

The verbal manuscript accompanying the visual presentation of the cycle ergometer exercise test contained procedural and sensory information designed to gently prepare but not frighten the patients. However, the impact of the information to early rehabilitation patients may have been more potent and negative than expected. The most important and fundamental issue for consideration of these results is the content of the information itself. Several aspects of the experimental videotape may have contributed to the decrease in self-efficacy and increase in anxiety in patients: the content of the information, the method of delivery and the credibility of the provider of the information.

One can only speculate on the differential effects of the information content on anxiety, i.e., the visual, procedural and/or sensory information. Previous research has demonstrated that sensory information is the essential component in reducing anxiety associated with stressful medical procedures (Johnson, 1973; 1975). Further study is required to determine which part(s) of the exercise test information patients found most anxiety provoking.

There is also the suggestion in the literature (Ewart et al., 1983; Taylor et al., 1985) that the method of delivery may be important particularly in increasing self-efficacy. For example, Ewart et al. (1983) demonstrated the importance of counselling sessions to increasing self-efficacy of post-MI patients. Perhaps individual or small group preparation sessions would have been more effective with this particular patient sample as compared to an information videotape. That is, the personal, intimate contact with patients provided by individual sessions may be more suitable and effective in addressing patients' individual concerns about the exercise tolerance test.

A final issue concerning the experimental intervention in this study was the credibility of the person providing the information. One might hypothesize that the effects of the intervention may have been quite different if the information were provided by someone with high credibility, i.e., a physician rather than a graduate student. This notion requires further investigation.

Various problems related to the particular characteristics of the patient sample may also explain these results. The decrease in self-efficacy may have been in part due to the denial phase that patients typically employ in the early stages of the rehabilitative process (Wishnie et al., 1971; Stern et al., 1976; Goldberg, 1982). The initial self-efficacy scores may have been a reflection of patients' confident yet unrealistic expectations of their ability to perform various subskills related to the exercise test. The exercise test information may have oversensitized these patients to their actual physical limitations. The decrease in self-efficacy post-intervention may more accurately reflect their self-doubts about their physical capabilities of performing an exercise tolerance test so soon after the acute event.

A second sampling problem which may influence the interpretation of these findings relates to the inclusion criteria of the larger project in which this study was conducted. Only patients with a Beck Depression score of greater than 5 and an STAI score of greater than 30 were included in the study. Therefore, the present sample consisted of patients who were relatively depressed and anxious based on the established criteria. Intervention strategies would not be expected to have the same effect on self-efficacy and anxiety in patients with elevated anxiety and depression as compared to a more psychologically stable sample. In fact, the results of this study may be more consistent with what one would expect in patients who present with a psychological profile as described. That is, one may expect that a vivid presentation of the exercise tolerance test to result in increased anxiety and decreased self-efficacy in overly anxious patients, particularly when it is presented three to six weeks post-MI. The point could therefore be made that this sample was not representative or typical of post-MI patients referred for an exercise tolerance test.

Problems in the assessment of self-efficacy and anxiety may also account for the results of this study. The self-efficacy assessment was designed under the assumption that patients were previously educated on various aspects of cardiac disease, including heart rate assessment. However, the measure of cardiac capability incorporated into the self-efficacy assessment, i.e., heart rate, presented problems for many of the patients. Most had little knowledge of their resting heart rate and thus had to guess at their ability to sustain appropriate exercise heart rates. Pilot testing may have detected and in turn, eliminated this problem. When the data were analyzed excluding the heart rate portion of the self-efficacy assessment, a significant interaction was found between self-efficacy and the intervention ($\underline{p}$ <.005)(Appendix I_g). In a post hoc analysis there was a significant difference (Tukey a, $\underline{p}$ <.05) in self-efficacy between patients with high self-efficacy in the control ($\bar{X}$=.50) and experimental groups ($\bar{X}$=-16.78).

Another assessment problem concerns the necessity of measuring self-efficacy specific to the task(s) or behaviour(s), therefore eliminating the possibility of a standardized measure. The self-efficacy assessment used in this study was modelled after one used in previous studies with cardiac patients (Ewart et al., 1983; Taylor et al., 1985). While guidelines exist as to the construction of a measurement tool for the exercise tolerance test (Ewart et al., 1983), there will always be validity and reliability concerns about an asssessment process constantly being changed to fit the task(s) and/or behaviours(s) under investigation.

The failure to obtain support for the hypothesized inverse relationship between self-efficacy and anxiety may have also been related to the conceptualization and operationalization of anxiety in this study. There were distinct differences in the manner in which anxiety was assessed in this study compared to the earlier studies which formed the theoretical basis of Bandura's self-efficacy theory (Bandura & Adams, 1977; Bandura et al., 1977; Bandura et al., 1980).

In Bandura's studies, anxiety was operationally defined as fear or anticipatory or performance fear arousal, and was assessed from subjects' verbal reports and observer ratings by the investigator. In this study, anxiety was assessed by the Spielberger State-Trait Anxiety Inventory; a standardized tool designed to assess trait and state estimates of generalized anxiety. It may have been presumptuous to hypothesize this inverse relationship between self-efficacy and anxiety given that fear in this study was assessed in terms of trait and state estimates of generalized anxiety. Incorporating verbal, behavioural and self-report assessments may have presented a more accurate picture of anxiety specific to the exercise tolerance test.

A final limitation of this study was the definition and subsequent division of patients into high (greater than 51) and low (less than or equal to 51) self-efficacy. This was necessary in order to equalize the number of patients in each intervention group. Conceptually, however, the division is not as clearcut. The size of the patient sample precluded the classification of patients into high, medium and low self-efficacy. It is unwise to hypothesize or conclude that a patient with a self-efficacy of 46 is considerably lower than someone with a score of 55. The considerable variability between high and low self-efficacy groups may dampen the effect of information designed to increase self-efficacy and subsequently lower anxiety.

Results of this study clearly demonstrate the importance of self-efficacy in predicting exercise test performance of post-MI patients. Patients with high pre-intervention self-efficacy achieved a greater maximum power output than patients with low pre-intervention self-efficacy. This finding was consistent with previous research (Taylor et al., 1985; Ewart et al., 1986). These results were also consistent with the generality of the self-efficacy construct or the degree to which efficacy expectancies are held for similar activities in other situations (Bandura, 1977a). In support of this premise, the data were analyzed to examine the effect of walking self-efficacy on maximum power output. There was a trend but no main effect for walking self-efficacy ($p < .08$), such that patients with high walking self-efficacy did not achieve a greater maximum power output than patients with low walking self-efficacy (Appendix Ih).

One particular limitation of this study was the failure to control for the differential effects of prescribed medications (e.g. beta blockers, calcium antagonists). Sixty percent (18/30) of patients on this study were using beta blockers (e.g. propranolol, Atenolol), 23% (7/30) were prescribed calcium antagonists (e.g. Verapramil, Nifedipine) and 17% were prescribed nitoglycerine only. The benefits of beta blockade medication to exercising cardiac patients include reduced heart rate and blood pressure for the same workload, an increased duration of exercise before the onset of angina and a reduced ST segment depression (Allen, Craven, Rosenbloom & Sutton, 1984; Shepherd, 1985; Wilmore et al., 1985). While the acute effect of beta blockade to peak workload on the exercise tolerance test may be different for each individual, peak performance would generally be reduced in patients because of the decrease in heart rate and blood pressure.

While the effect of calcium antagonists on exercise performance remains under investigation, research indicates that its effects are similar to beta blockade (Duffey, Horowitz & Brammel, 1984; Lossnitzer, Pfennigsdorf & Brauer, 1984; Connon, Watson, Rosing & Epstein, 1985; Leon, Rosing, Bonow & Epstein, 1985). Calcium channel blockers appear to be beneficial in controlling angina and improving exercise tolerance in patients with coronary heart disease (Cannon et al., 1985; Leon et al., 1985). Future research in the role of self-efficacy in exercising cardiac patients needs to control for the individual variability of prescribed medications.

Finally, the results of this study failed to support the coping style/intervention interaction on reducing anxiety associated with the exercise test. These results are in direct contrast to previous studies with medical and surgical procedures which have used the MBSS (Miller & Mangan, 1983; Taylor et al., 1985; Watkins et al., 1985; Phipps, unpublished manuscript). There are, however, several possible explanations for these results. The most plausible explanation already mentioned may have been the inadequate size of the monitor/blunter groups within the control and experimental interventions. Patients were not randomly assigned into interventions according to coping style and thus the coping style groups were too small to yield sufficient power.

These results also indicate that the MBSS may not be measuring coping style in the same way as it is in samples from previous studies (Miller & Mangan, 1983; Taylor et al., 1985; Watkins et al., 1985; Phipps, unpublished manuscript). That is, when the MBSS was scored by the standard scoring method (mean difference of monitors-blunters), 57% (17/30) of the cardiac patients are classified in this study as blunters and 43% (13/30) are classified as monitors. In the experimental intervention alone, two-thirds of the cardiac patients (9/15) were blunters. The increase in anxiety reported by these patients may not be surprising and, in fact, may be expected. That is, research demonstrates that blunters prefer and report less anxiety when provided with minimal information about the task and/or procedure (Miller & Mangan, 1983; Watkins et al., 1985). Thus, the increase in anxiety may have been a result of the number of blunters in the experimental condition who would not be in their preferred mode.

These findings suggest that something may be unusual about the use of the MBSS with this particular cardiac patient sample in the exercise test situation. Why did the MBSS identify a blunter/monitor ratio in this sample that was directly opposite to samples previously examined? What is inherent in this particular sample with an exercise test situation that produces results so different from previous research which has used the same tool?

While several reasons have already been considered for the failure to find a coping style/intervention interaction, another important issue that may be relevant to these findings is the socioeconomic status of this patient sample. Ninety per cent (27/30) of the patients in this study were blue collar workers. One can speculate that individuals with lower socioeconomic status are generally more accepting and trusting in the expertise of the medical profession.

Clinical Implications and Future Research Directions

Several limitations of this study have been discussed which may explain the unexpected effects of preparatory information on anxiety and self-efficacy in cardiac patients. In today's medical and legal climate, it is fashionable to regard patients as entitled to as much information about forthcoming tasks and/or preocedures as is available. However, within the limitations of this study, the results provide no basis for suggesting that exercise test information can psychologically benefit or adversely affect patients.

There are important implications of this study for clinicians regarding the psychological preparation of patients scheduled for various medical procedures. That is, various suggestions can be made on how to control for information content, the volume of information and the method of delivery.

It may have been more appropriate in this situation and indeed in other medical and surgical procedures to ask patients what specific questions they have concerning the procedures, sensations and potential outcomes. This may have to follow brief introductory statement(s) about the task/procedure in order to stimulate more in depth questions and/or discussion. In essence, coping style would be assessed by simply giving patients a choice over both the content of information and the amount of information they wished to receive. The literature and theory suggest (Miller, 1979) that anxiety is reduced if patients perceive themselves to be in control of the situation. Furthermore, increasing control also increases self-efficacy (Bandura, 1977a).

Future research could address this notion by giving patients a choice, but in fact give identical information to everyone (Thompson & Wankel, 1980). That is, to determine the effect of the choice element on anxiety, identical information could be imparted to everyone while one group perceives themselves to be more in control by being given a choice.

There is also the suggestion that the method and mode of delivery of the information is important. Results of previous studies with coronary patients (Ewart et al., 1983; Taylor et al., 1985) demonstrate the importance of counselling sessions to increasing self-efficacy. Both the credibility of the informer and the personalization of the information process are important issues to clinicians. For example, preparatory information imparted by a physician given in individual or group counselling sessions may have quite different effects on anxiety and self-efficacy as compared to the same information given by a graduate student on a videotape. These suggestions are important issues in reducing anxiety of patients referred for various medical and surgical procedures and require further study.

Further implications of this study is the effect of preparatory information on naive as compared to experienced patients. This has often been a confounding factor in the literature (Shipley et al., 1978; 1979; Johnson et al., 1974; Kendall et al., 1979). Except for three patients, all patients in this study had not previously undergone the exercise tolerance test. Information provided to patients who have previously undergone the procedure may further sensitize their past experience, either positively or negatively. Thus, it may be important to the psychological preparation of patients who are facing a potentially stressful task or procedure to consider their past experience. In this way, the content and volume of information may be tailored to the previous experience of the patient which may be obtained from patients or by referring to previous medical records.

Results of research on the role of self-efficacy in cardiac rehabilitation are preliminary. Results of the present study and previous studies (Ewart et al., 1983; Taylor et al., 1985) demonstrate the importance of self-efficacy in predicting exercise test performance. A recent study has demonstrated the usefulness of self-efficacy in predicting compliance with exercise prescription (Ewart et al., 1986). This study further demonstrates the effectiveness of intervention strategies to change and modify self-efficacy, albeit in the wrong direction. However, there may be implications from this preliminary research with cardiac patients for the use of self-efficacy as an assessment tool for high risk patients. Ewart et al. (1986) found that patients with high self-efficacy tended to be overachievers, that is, spent more minutes above their prescribed target heart rates. Appropriate precautionary advice may be suitable in this situation and by identifying high and low self-efficacy patients in advance, intervention strategies could then be targeted appropriately. Furthermore, interventions to increase self-efficacy of cardiac patients with low self-efficacy appear warranted because exercise test performance of these patients has been demonstrated to be somewhat impaired (Ewart et al., 1983; Taylor et al., 1985). Further research is required to examine the use of self-efficacy in this way.

In addition, the effect of an exercise rehabilitation program on self-efficacy needs to be determined.

Bandura (1977a) has repeatedly emphasized and insisted on the situation-specific nature of the self-efficacy construct. It appeared however, throughout the testing process that there were patients whose persistent response disposition was one of confidence. While this may have been a reflection of the denial phase, the implications of self-efficacy conceptualized in this way to both assessment and subsequent behaviour change are numerous. To discuss this notion in any depth would be to question the very essence of self-efficacy theory, an issue far beyond the scope of the present study.

Further research may also be warranted to investigate the effects of coping style and preparatory information on anxiety to post-MI patients with higher socioeconomic status. Furthermore, coping style in this study was assessed after the testing was completed. An additional study may more accurately determine the coping style/intervention relationship on anxiety if patients are randomized into intervention groups according to coping style. In addition, the assessment of anxiety needs to include several behavioural, verbal, self-report and psychophysiological measures in order to provide a more accurate and complete picture of anxiety associated with the specific task and/or procedure. Finally, the study should be replicated with patients who are not more anxious and depressed than normal.

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APPENDIX A

Spielberger State-Trait Anxiety Inventory

APPENDIX A

SELF-EVALUATION QUESTIONNAIRE

Developed by C.D. Spielberger, B.L. Gorsuch and R. Lushene
STAI FOR 1 X-1

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you feel right now, that is, at this moment. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe your present feelings best.

	Not At All	Somewhat	Moderately So	Very Much So
1. I feel calm	1	2	3	4
2. I feel secure	1	2	3	4
3. I am tense	1	2	3	4
4. I am regretful	1	2	3	4
5. I feel at ease	1	2	3	4
6. I feel upset	1	2	3	4
7. I am presently worrying over possible misfortunes	1	2	3	4
8. I feel rested	1	2	3	4
9. I feel anxious	1	2	3	4
10. I feel comfortable	1	2	3	4
11. I feel self-confident	1	2	3	4
12. I feel nervous	1	2	3	4
13. I am jittery	1	2	3	4
14. I feel "high strung"	1	2	3	4
15. I am relaxed	1	2	3	4
16. I feel content	1	2	3	4
17. I am worried	1	2	3	4
18. I feel over-excited and "rattled"	1	2	3	4
19. I feel joyful	1	2	3	4
20. I feel pleasant	1	2	3	4

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SELF-EVALUATION QUESTIONNAIRE
STAI FORM X-2

DIRECTIONS: A number of statements which people have used to describe themselves are given below. Read each statement and then blacken in the appropriate circle to the right of the statement to indicate how you generally feel. There are no right or wrong answers. Do not spend too much time on any one statement but give the answer which seems to describe how you generally feel.

	Almost Never	Sometimes	Often	Almost Always
21. I feel pleasant	1	2	3	4
22. I tire quickly	1	2	3	4
23. I feel like crying	1	2	3	4
24. I wish I could be as happy as others seem to be	1	2	3	4
25. I am losing out on things because I can't make up my mind soon enough	1	2	3	4
26. I feel rested	1	2	3	4
27. I am "calm, cool, and collected"	1	2	3	4
28. I feel that difficulties are piling up so that I cannot overcome them	1	2	3	4
29. I worry too much over something that really doesn't matter	1	2	3	4
30. I am happy	1	2	3	4
31. I am inclined to take things hard	1	2	3	4
32. I lack self-confidence	1	2	3	4
33. I feel secure	1	2	3	4
34. I try to avoid facing a crisis or difficulty	1	2	3	4
35. I feel blue	1	2	3	4
36. I am content	1	2	3	4
37. Some unimportant thought runs through my mind and bothers me	1	2	3	4
38. I take disappointments so keenly that I can't put them out of my mind	1	2	3	4
39. I am a steady person	1	2	3	4
40. I get in a state of tension or turmoil as I think over my recent concerns and interests	1	2	3	4

APPENDIX B

Validity and Reliability of the State-Trait Anxiety Inventory

Appendix B

Validity and Reliability of the Spielberger State-Trait Anxiety Inventory

A-State Anxiety Scale

The state anxiety scale was validated on undergraduate college students. Test-retest correlations ranged from *r* values of .16 to .54. Alpha reliability coefficients computed by the K-R 20 formula ranged from .83 to .92 (Spielberger et al., 1970).

When the scale was given under conditions of psychological stress, these coefficients were higher. For example, when the scale was given to a group of college males after an IQ test and a distressing film, the alpha coefficients were .92 and .94 respectively.

A-Trait Anxiety Scale

Test-retest reliability (stability) correlations for a sample of undergraduate college students for the A-trait scale ranged from .73 to .86. These students were tested and retested after one hour during which they underwent a difficult IQ test and viewed a film that depicted accidents resulting in serious injury or death (Spielberger et al., 1970). Alpha reliability coefficients, as measures of internal consistency ranged from .86 to .92.

Correlations between the A-state and A-trait scales varied from .44 and .55 for females and .51 and .67 for males. Under conditions of psychological stress, correlations varied between .11 and .53 (median *r* of .30) for females and .37 and .67 for males (median *r* of .47).

The A-trait scale is highly correlated with other A-trait measures such as the Taylor Manifest Anxiety Scale (Taylor, 1953) and the Cattell's IPAT Anxiety Scale (Cattell & Sheier, 1963). Correlations between these scales for college students and psychiatric patients vary between .75 and .85 (Spielberger et al., 1970).

APPENDIX C

Miller Behavioral Style Scale (MBSS)

Appendix C

Miller Behavioral Style Scale

1. Vividly imagine that you are afraid of the dentist and have to get some dental work done. Which of the following would you do? Check all of the statements that might apply to you.

M I would ask the dentist exactly what he was going to do.

B I would take a tranquillizer or have a drink before going.

B I would try to think about pleasant memories.

M I would want the dentist to tell me when I would feel pain.

B I would try to sleep.

M I would watch the dentist's movements and listen for the sound of his drill.

M I would watch the flow of water from my mouth to see if it contained blood.

B I would do mental puzzles in my mind.

2. Vividly imagine that you are being held hostage by a group of armed terrorists in a public building. Which of the following would you do? Check all of the statements that might apply to you.

B I would sit by myself and have as many daydreams and fantasies as I could.

M I would stay alert and try to keep myself from falling asleep.

B I would exchange life stories with the other hostages.

M If there was a radio present, I would stay near it and listen to the bulletins about what the police were doing.

M I would watch every movement of my captors and keep an eye on their weapons.

B I would try to sleep as much as possible.

B I would think about how nice it's going to be when I get home.

M I would make sure I knew where every possible exit was.

3. Vividly imagine that, due to a large drop in sales, it is rumored that several peaple in your department at work will be laid off. Your supervisor has turned in an evaluation of your work for the past year. The decision about lay - offs has been made and will be announced in several days. Check all of the statements that might apply to you.

M I would talk to my fellow workers to see if they knew anything about what the supervisor's evaluation of me said.

M I would review the list of duties for my present job and try to figure out if I had fulfilled them all.

B I would go to the movies to take my mind off things.

M I would try to remember any arguments or disagreements I might have had with the supervisor that would have lowered his opinion of me.

B I would push all thoughts of being laid off out of my mind.

B I would tell my spouse that I'd rather not discuss my chances of being laid off.

M I would try to think which employees in my department the supervisor might have thought had done the worst job.

B I would continue doing my work as if nothing special was happening.

4. Vividly imagine that you are on an airplane, thirty minutes from your destination, when the plane unexpectantly goes into a deep dive and then suddenly levels off. After a short time, the pilot announces that nothing is wrong, although the rest of the ride may be rough. You, however, are not convinced that all is well. Check all of the statements that might apply to you.

M I would carefully read the information provided about safety features in the plane and make sure I knew where the emergency exists were.

B I would make small talk with the passenger beside me.

B I would watch the end of the movie, even if I had seen it before.

M I would call for the stewardess and ask her exactly what the problem was.

B I would order a drink or tranquillizer from the stewardess.

M I would listen carefully to the engines for unusual noises and would watch the crew to see if their behavior was out of the ordinary.

M I would talk to the passenger beside me about what might be wrong.

B I would settle down and read a book or magazine or write a letter.

APPENDIX D

Validity and Realiability of the Miller Behavioral Style Scale (MBSS)

Appendix D

Validity and Reliability of the Miller Behavioral Style Scale (MBSS)

The MBSS has been validated in both laboratory and field settings. In the laboratory, the scale has been shown to predict those who seek out or avoid information about electric shock (Miller, 1980b). Subjects who had completed the MBSS were threatened with an electric shock and allowed to choose whether or not to monitor for information about the nature and onset of the shock. That is, subjects could either listen to a series of statements describing the electric shock and its effects as well as a warning tone that signalled its onset: or, they could listen to music on another channel with no preparatory statements and no warning signal. Results indicated that subjects identified as monitors on the MBSS spent significantly more time listening to the tone/information then blunters. Monitors almost exclusively opted for an information-seeking mode, whereas blunters generally preferred to distract themselves.

The validity of the MBSS was also tested in clinical setting in a study with gynecologic patients (Miller & Mangan, 1983). Psychophysiological arousal was reduced in gynecologic patients when the prepratory information they received was consistent with their coping style.

Internal consistency and test-retest reliability was assessed by administering the scale to 40 undergraduate psychology students twice, over a two-month interval. Intercorrelations of scores obtained in the four situations was .78 for the monitoring items and .66 for the blunting items. Test-retest reliability for the combined monitor-blunter score was .74.

APPENDIX E

Scoring Procedures for the Miller Behavioral Style Scale (MBSS)

Appendix E

Three Methods of Scoring the Miller Behavioral Style Scale

1. Standard Method (method used in the analyses)

   a) Mean of the total number of monitoring items endorsed

   $$\frac{297}{30} = 9.9$$

   b) Mean of the total number of blunting items endorsed

   $$\frac{236}{30} = 7.87$$

   c) $$9.9 - 7.87 = 2.03$$

   >2.03 = monitor
   <2.03 = blunter

2. Method A

   a) Mean of the total number of monitoring items endorsed

   $$\frac{297}{30} = 9.9$$

   >9.9 = monitor
   <9.9 = blunter

3. Method B

   a) Mean of the total number of blunting items endorsed

   $$\frac{236}{30} = 7.87$$

   >7.87 = blunter
   <7.87 = monitor

Appendix Ei

Monitor - Blunter Classifications Based on the three scoring methods

Intervention	Number of Items Endorsed Monitor (Method A)	Blunter (Method B)	Monitor-Blunter (Standard Scoring)
E	10 - M	10 - B	0 - B
E	10 - M	11 - B	-1 - B
E	8 - B	11 - B	-3 - B
E	16 - M	6 - M	10 - M
E	7 - B	11 - B	-4 - B
E	6 - B	9 - B	-3 - B
E	10 - M	6 - M	4 - M
E	7 - B	7 - M	0 - B
E	13 - M	5 - M	8 - M
E	9 - B	12 - B	-3 - B
E	9 - B	10 - B	-1 - B
E	12 - M	5 - M	7 - M
E	14 - M	5 - M	9 - M
E	9 - B	11 - B	-2 - B
E	11 - M	7 - M	4 - M
C	10 - M	10 - B	0 - B
C	10 - M	10 - B	0 - B
C	8 - B	11 - B	-3 - B
C	10 - M	4 - M	6 - M
C	9 - B	5 - M	4 - M
C	8 - B	10 - B	-2 - B
C	10 - M	10 - B	0 - B
C	9 - B	7 - M	2 - B
C	11 - M	7 - M	4 - M
C	13 - M	3 - M	10 - M
C	11 - M	5 - M	6 - M
C	13 - M	4 - M	9 - M
C	4 - B	9 - B	-5 - B
C	11 - M	6 - M	5 - M
C	9 - B	9 - B	0 - B

APPENDIX F
Physical Self-Efficacy Assessment

Appendix F

Physical Self-Efficacy Questionnaire

We are interested in how confident you are in your ability to exert yourself physically. Please write a number between 0 and 100 in the column provided, which reflects your level of confidence.

NOT AT ALL CONFIDENT	A LITTLE CONFIDENT	MODERATELY CONFIDENT	QUITE CONFIDENT	EXTREMELY CONFIDENT

0 10 20 30 40 50 60 70 80 90 100

GENERAL EXERTION	CONFIDENCE LEVEL
Capable of Mild Exertion	________
Capable of Moderate Exertion	________
Capable of Hard Exertion	________
Capable of Extremely Hard Exertion	________

We are now interested in how confident you feel in your ability to perform the following activities. Listed below are a number of situations related to walking. Using the above scale, please write a number between 0 and 100 which reflects your level of confidence in your ability to perform each task.

WALKING-DISTANCE	CONFIDENCE LEVEL
Walk 1 block (5 min.)	________
Walk 2 blocks (10 min.)	________
Walk 4 blocks (20 min.)	________
Walk 1 mile (30 min.)	________
WALKING-PACE	
Walk at your normal pace for 5 min.	________
Walk at your normal pace for 10 min.	________
Walk at your normal pace for 20 min	________
Walk at your normal pace for 30 min.	________
WALKING-UP A GRADUAL INCLINE	
i.e. Walking up 1' for every 10' along the flat	
Walk up a gradual incline for 2 min.	________
Walk up a gradual incline for 4 min.	________
Walk up a gradual incline for 6 min.	________
Walk up a gradual incline for 8 min.	________
WALKING-COOL WEATHER (10-15° C)	
Walk 2 min. in cool weather with no chest pain	________
Walk 4 min. in cool weather with no chest pain	________
Walk 6 min. in cool weather with no chest pain	________
Walk 8 min. in cool weather with no chest pain	________

CLIMBING

Walk 1/2 flight of (6-8 stairs) without stopping	________
Walk 1 flight of stairs (12-16 stairs) without stopping	________
Walk 2 flights of stairs without stopping	________
Walk 3 flights of stairs without stopping	________

Listed below are various sensations and/or components of the bicycle test which you may or may not experience. We would like to know how confident you are in your ability to perform the following activities. For each item, please write a number, using the same scale, between 0 and 100 in the column provided, which reflects your level of confidence in your abilities to perform each of the following:

LEG FATIGUE	CONFIDENCE LEVEL
Pedal for 2 min. with no leg fatigue	________
Pedal for 4 min. with no leg fatigue	________
Pedal for 6 min. with no leg fatigue	________
Pedal for 8 min. with no leg fatigue	________

BREATHING

Pedal for 2 min. without feeling out of breath	________
Pedal for 4 min. without feeling out of breath	________
Pedal for 6 min. without feeling out of breath	________
Pedal for 8 min. without feeling out of breath	________

CHEST DISCOMFORT

Pedal for 2 min. with no chest discomfort	________
Pedal for 4 min. with no chest discomfort	________
Pedal for 6 min. with no chest discomfort	________
Pedal for 8 min. with no chest discomfort	________

LIGHTHEADEDNESS

Pedal for 2 min. with no lightheadedness	________
Pedal for 4 min. with no lightheadedness	________
Pedal for 6 min. with no lightheadedness	________
Pedal for 8 min. with no lightheadedness	________

SWEATING

Pedal for 2 min. without sweating	________
Pedal for 4 min. without sweating	________
Pedal for 6 min. without sweating	________
Pedal for 8 min. without sweating	________

WORKLOAD

i.e. The workload is similar to biking on an incline 1' for every 10'

Maintain pedalling speed for 2 min. at set workload	________
Maintain pedalling speed for 4 min. at set workload	________
Maintain pedalling speed for 6 min. at set workload	________
Maintain pedalling speed for 8 min. at set workload	________

NOTE: If you are on beta blockade medication i.e. inderal/propranolol, blocadrin, timolol, metoprolol please proceed to the next page. If not, please proceed to the following:

We are interested in how confident you feel in your ability to handle the following situations. The following are the usual beats per minute (BPM.) for different levels of activity.

How confident are you in	CONFIDENCE LEVEL
Tolerating a heart rate of 90-110 BPM for	
2 min.	________
4 min.	________
6 min.	________
8 min.	________
Tolerating a heart rate of 111-120 BPM for	
2 min.	________
4 min.	________
6 min.	________
8 min.	________
Tolerating a heart rate of 121-130 BPM for	
2 min.	________
4 min.	________
6 min.	________
8 min.	________
Tolerating a heart rate of 131 BPM. or higher for	
2 min.	________
4 min.	________
6 min.	________
8 min.	________

NOTE: For those individuals on beta blockers i.e. inderal/propranolol, blocadrin, metoprolol, timolol the following are the usual beats per minute (BPM) for different levels of activity

RESTING HEART RATE: 60 BPM
MODERATE ACTIVITY: 90 BPM
STRENUOUS ACTIVITY: 111 BPM or higher

How confident are you in	CONFIDENCE LEVEL
Tolerating a heart rate of 81-90 BPM for:	
2 min.	____________
4 min.	____________
6 min.	____________
8 min.	____________
Tolerating a heart rate of 91-100 BPM for:	
2 min.	____________
4 min.	____________
6 min.	____________
8 min.	____________
Tolerating a heart rate of 101-110 BPM for:	
2 min.	____________
4 min.	____________
6 min.	____________
8 min.	____________
Tolerating a heart rate of 11 BPM or higher for:	
2 min.	____________
4 min.	____________
6 min.	____________
8 min.	____________

APPENDIX G

Scoring Procedure for the Physical Self-Efficacy Assessment

Appendix G

Example of Cycling Self-Efficacy Scoring Procedure

	CONFIDENCE LEVEL	MEAN
LEG FATIGUE		
Pedal for 2 min. with no leg fatigue	80	
Pedal for 4 min. with no leg fatigue	40	42.5
Pedal for 6 min. with no leg fatigue	30	
Pedal for 8 min. with no leg fatigue	20	
BREATHING		
Pedal for 2 min. without feeling out of breath	80	
Pedal for 4 min. without feeling out of breath	65	41.25
Pedal for 6 min. without feeling out of breath	10	
Pedal for 8 min. without feeling out of breath	10	
CHEST DISCOMFORT		
Pedal for 2 min. with no chest discomfort	90	
Pedal for 4 min. with no chest discomfort	50	55
Pedal for 6 min. with no chest discomfort	50	
Pedal for 8 min. with no chest discomfort	30	
LIGHTHEADEDNESS		
Pedal for 2 min. with no lightheadedness	80	
Pedal for 4 min. with no lightheadedness	80	65
Pedal for 6 min. with no lightheadedness	50	
Pedal for 8 min. with no lightheadedness	50	
SWEATING		
Pedal for 2 min. without sweating	70	
Pedal for 4 min. without sweating	40	32.5
Pedal for 6 min. without sweating	10	
Pedal for 8 min. without sweating	10	
WORKLOAD		
Maintain pedalling speed for 2 min. at set workload	80	
Maintain pedalling speed for 4 min. at set workload	40	35
Maintain pedalling speed for 6 min. at set workload	10	
Maintain pedalling speed for 8 min. at set workload	10	

How confident are you in

Tolerating a heart rate of 81-90 BPM for:		
2 min.	90	
4 min.	70	75
6 min.	70	
8 min.	70	
Tolerating a heart rate of 91-100 BPM for:		
2 min.	60	
4 min.	20	25
6 min.	10	
8 min.	10	
Tolerating a heart rate of 101-110 BPM for:		
2 min.	30	
4 min.	10	15
6 min.	10	
8 min.	10	
Tolerating a heart rate of 111 BPM or higher for:		
2 min.	10	
4 min.	10	10
6 min.	10	
8 min.	10	

	TOTAL	396.25
	MEAN	39.62

Appendix G (cont'd)

Example of Walking & General Exertion Self-Efficacy Scoring Procedure

Not at all Confident		A Little Confident			Moderately Confident		Quite Confident		Extremely Confident	
0	10	20	30	40	50	60	70	80	90	100

GENERAL EXERTION	CONFIDENCE LEVEL
Capable of Mild Exertion	100
Capable of Moderate Exertion	85
Capable of Hard Exertion	65
Capable of Extremely Hard Exertion	40
	------
	290 $\bar{x}$ = 72.5

We are now interested in how confident you feel in your ability to perform the following activities. Listed below are a number of situations related to walking. Using the above scale, please write a number between 0 and 100 which reflects your level of confidence in your ability to perform each task.

WALKING - DISTANCE	CONFIDENCE LEVEL	
Walk 1 block (5 min.)	95	
Walk 2 blocks (10 min.)	88	80.7
Walk 4 blocks (20 min.)	75	
Walk 1 mile (30 min.)	65	
WALKING - PACE		
Walk at your normal pace for 5 min.	85	
Walk at your normal pace for 10 min.	60	52.5
Walk at your normal pace for 20 min.	45	
Walk at your normal pace for 30 min.	20	
WALKING - UP A GRADUAL INCLINE		
i.e. Walking up 1' for every 10' along the flat		
Walk up a gradual incline for 2 min.	85	
Walk up a gradual incline for 4 min.	70	50
Walk up a gradual incline for 6 min.	35	
Walk up a gradual incline for 8 min.	10	

WALKING - COOL WEATHER (10-15° C)		
Walk 2 min. in cool weather with no chest pain	90	
Walk 4 min. in cool weather with no chest pain	85	
Walk 6 min. in cool weather with no chest pain	70	53.7
Walk 8 min. in cool weather with no chest pain	70	
CLIMBING		
Walk 1/2 flight of stairs (6-8 stairs) without stopping	85	
Walk 1 flight of stairs (12-16 stairs) without stopping	50	
Walk 2 flights of stairs without stopping	40	43.7
Walk 3 flights of stairs without stopping	0	
		$\bar{x}$ = 56.12

APPENDIX H

The Verbal Script Accompanying
the Experimental Videotape

Appendix H

The Verbal Script Accompanying the Videotaped Presentation of the Cycle Ergometer Exercise Tolerance Test

The following is the verbal script which accompanied the visual presentation of the cycle ergometer exercise tolerance test. The script describes both the procedures as they were viewed on the videotape, as well as the sensations which may be experienced by the patients. Each paragraph represents a major shift in scenes on the videotape.

Reception Area

Welcome the the Cardiorespiratory unit of McMaster Medical Centre where we are going to be testing how much work you can safely do on a stationary bike. The test will provide us and yourself with useful information about activities which are safe for you to do.

After giving the receptionist your name, you will have a few minutes to read a brief description about the tests you will do. If your wife is with you she is free to come into the test. Your technician will meet you and provide you with comfortable exercise clothes for your test. Shower and changing facilities are also available for your convenience.

Before the test commences, the technician will explain to you that a minimal risk is involved with the test, a risk comparable to crossing the street. Please feel free to ask any questions and your permission is required to carry out the test.

Exercise Laboratory

As you enter the testing room, you will notice several pieces of equipment that will be used to monitor your breathing pattern and heart rate as you cycle.

a. Preparation for the Cycle Ergometer Test

The test begins with standard height and weight measurements. These are followed by a series of three tests of breathing. The tests measure the size of the lungs, the strength of the muscles which aid in breathing and the maximum pressures as you breathe in and breathe out.

The test you see here requires you to take as deep a breath as possible and blow all your air into the cardboard mouthpiece as quickly as possible. You are given two attempts. You may experience some lightheadedness for only a few seconds.

Your skin is then prepared by gently rubbing twelve specifically located areas with a special pad. This is to remove any excess dead skin and oil from the surface. It may also be necessary to shave the hair from these areas to ensure the best possible contact for the recording of the heart rate.

The electrodes are then placed over the prepared areas and attached to the electrocardiograph machine which will monitor your heart rate throughout the test. You will not feel any sensations while attached to the machine.

An elastic netting may be placed over the electrodes to minimize any excess movement while you are exercising.

b. Electrocardiogram and Blood Pressure

A tracing of your heart rate is taken while you are sitting in a relaxed position. A doctor is present throughout the test to monitor your heart rate, check for any electrocardiogram changes and to watch for any warning signals that require you to stop the exercise. It is important for you to know that you are free to stop the exercise for whatever reason you think is necessary.

The equipment is checked before each test to ensure it is in proper working order.

The seat of the cycle is adjusted according to your height in order to ensure maximum comfort. Your knees should almost be fully extended as you are pedalling.

The first of several blood pressure readings is taken by the doctor and recorded. The cuff is left on your arm throughout the test.

c. Measurements during the test

The rubber mouthpiece and padded noseclip are put into place and can be adjusted until they feel comfortable. Throughout the test you are required to breathe through your mouth into the mouthpiece. As you are cycling you will be looking at the equipment that is used to measure your breathing pattern, heart rate as well as the workloads at which you will be pedalling. Here, the technician is recording your breathing pattern before you begin to pedal.

You will then begin to pedal at a speed of 60 revs./min. You must try to maintain this pace throughout the test. Each minute the workloads will be increased on the cycle which will feel like you are going uphill.

Your blood pressure is checked regularly while you are pedalling. You may feel slight numbness in your forearm and hand while the pressure in the cuff is increased. This sensation will go away in a short time when the pressure is let out of the cuff and the blood returns to your hand and fingers.

As the cycling becomes harder you will begin to sweat. Your mouth may feel quite dry and it may be difficult to swallow. Excess saliva is sometimes produced around the mouthpiece and tissues are provided if this should occur. You may feel a burning or heavy sensation in your legs, particularly the upper thighs as your legs become tired. The doctor will ask you to rate your sense of effort according to a chart located in front of you. The doctor will continually be asking you how you feel and you are free to stop the test at any time.

As the pedalling becomes harder your heart will beat faster. The doctor will compare any changes that may be occuring in your heart as you proceed with the test. If necessary, the doctor will stop you however, both the doctor and technician will encourage to cycle for as long as possible so we can get an accurate idea of how much work you can do.

Towards the end of the test, the pedalling will become harder. At this point you may be sweating quite heavily and your legs may be quite tired. Remember you may stop the test at any time. The doctor will take a last blood pressure reading while you are still pedalling.

d. Post-test Measurements

When the doctor stops you or when you decide to stop the test is over and there will no longer be any load to pedal against. You are free to remove the mouthpiece and noseclip. You may feel slightly lightheaded and out of breathe. Your mouth may feel quite dry and your legs heavy. You may also notice further sweating. You will remain on the bike for a short time, pedalling slowly against no load to allow your heart rate and blood pressure to return to normal.

As you get off the bike your legs may feel somewhat weak and rubbery. This sensation will last for a short while following the test. Further measurements of heart rate are taken for five minutes while you are sitting. The doctor will check the electrocardiogram for any changes that may be occuring in your heart during recovery.

The skin and hair may be pulled slightly as the electrodes are removed.

The doctor will then briefly explain the test results to you and you may ask any questions.

When you feel ready, you are free to shower, change and leave the unit. These results will be sent to your own doctor as well.

We hope this film has been of value to you in helping you nto understand the procedures involved with the exercise test.

APPENDIX Ia

ANOVA Table for the
Relative Change in Cycling
Self-Efficacy

Appendix Ia

Analysis of Variance (ANOVA) for Relative Change in Self-Efficacy (DV)

Variable	*df*	*SS*	*F*	*p*
Total	29	10913.55		
Intervention	1	1512.67	4.804	.04
Self-Efficacy (IV)	1	1219.35	3.872	.06
Self-Efficacy x Intervention	1	156.68	.501	.49
Residual	26	8194.54		

APPENDIX Ib

ANOVA Table for the

Relative Change in State Anxiety

Appendix Ib

Analysis of Variance (ANOVA) for Relative Change in Anxiety

Variable	df	SS	F	p
Total	29	4326.56		
Self-Efficacy (IV)	1	14.56	.123	.74
Intervention	1	977.16	7.825	.01
Self-Efficacy x Intervention	1	66.13	.534	.47
Residual	26	3248.30		

APPENDIX Ic

ANOVA Table for Maximum Power Output

Appendix Ic

Analysis of Variance (ANOVA) for Maximum Power Output

Variable	*df*	*SS*	*F*	*p*
Total	29	32919.54		
Self-Efficacy	1	282880.95	12.980	.001
Intervention	1	48214.29	2.214	.15
Self-Efficacy x Intervention	1	40023.81	1.845	.19
Residual	26	21785.71		

APPENDIX Id

ANCOVA Table for the

Relative Change in State Anxiety

using

Standard Scoring Method of the

Miller Behavioral Style Scale (MBSS)

Appendix Id

Analysis of Covariance (ANCOVA) for Relative Change in Anxiety

Variable	*df*	*SS*	*F*	*p*
Covariate - Trait Anxiety	1	2.22	.017	.89
Total	29	4326.56		
Coping Style	1	2.35	.018	.89
Intervention	1	1003.26	7.610	.01
Coping Style x Intervention	1	24.93	.189	.66
Residual	25	3295.86		

APPENDIX Ie

ANCOVA for the Relative Change

in State Anxiety using

Scoring Method A of the

Miller Behavioral Style Scale (MBSS)

Appendix Ie

Analysis of Covariance (ANCOVA) for Relative Change in Anxiety using Scoring Method A for Miller Behavioral Style Scale

Vairable	df	SS	F	p
Covariate Trait Anxiety	1	2.22	.017	.89
Total	29	2278.97		
Coping Style	1	39.45	.310	.58
Intervention	1	972.94	7.500	.01
Coping Style x Intervention	1	64.05	.497	.48
Residual	25	3219.65		

APPENDIX If

ANCOVA Table for the

Relative Change in State Anxiety

using

Scoring Method B of the

Miller Behavioral Style Scale (MBSS)

Appendix If

Analysis of Covariance (ANCOVA) for Relative Change in Anxiety using Scoring Method B for Miller Behavioral Style Scale

Variable	df	SS	F	p
Covariate - Trait Anxiety	1	2.22	.02	.89
Total	29	4326.56		
Coping Style	1	1.11	.008	.92
Intervention	1	991.95	7.460	.01
Coping Style x Intervention	1	.05	.000	.98
Residual	25	3321.98		

APPENDIX I_g

ANOVA Table for the Relative Change in Cycling Self-Efficacy (excluding heart rate)

Appendix Ig

Analysis of Variance (ANOVA) for Relative Change in Cycling Self-Efficacy excluding Heart Rate Component

Variable	df	SS	F	p
Total	29	2975.59		
Intervention	1	467.82	6.604	.02
Self-Efficacy	1	2.65	.037	.85
Self-Efficacy x Intervention	1	655.48	9.250	.005
Residual	26	1842.82		

APPENDIX Ih

ANOVA Table for Maximum Power Output
(with walking self-efficacy)

Appendix Ih

Analysis of Variance (ANOVA) for Maximum Power Output with Walking Self-Efficacy

Variable	df	SS	F	p
Total	29	954666.67		
Intervention	1	34722.22	1.155	.29
Self-Efficacy	1	102722.22	3.401	.08
Intervention x Self-Efficacy	1	500.00	.023	.90
Residual	26	786111.11		

APPENDIX J

Raw Data for the Pre-and Post-Intervention
Cycling Self-Efficacy Scores
and the
Relative Change in Cycling Self-Efficacy

Appendix J

Normalized Data for State and Trait Anxiety Measures

Subject	Intervention	State Anxiety pre	State Anxiety post	% Change	Trait
15	E	53	60	13	59
10	E	61	63	3	43
30	E	59	63	6	57
14	E	41	44	7	40
2	E	59	59	0	59
3	E	34	44	29	34
8	E	31	31	0	31
24	E	48	60	25	42
20	E	48	49	2	48
19	E	46	46	0	37
28	E	51	59	16	51
13	E	44	46	4	48
5	E	39	41	5	47
25	E	44	54	23	48
6	E	40	53	33	53
12	C	50	59	18	57
11	C	44	44	0	46
7	C	59	48	-19	50
18	C	48	50	4	49
27	C	50	59	18	48
16	C	50	43	-14	42
22	C	51	51	0	65
9	C	57	51	-11	52
17	C	40	41	3	42
1	C	50	50	0	54
23	C	59	60	2	49
4	C	34	34	0	32
29	C	39	34	-13	45
26	C	42	42	0	41
21	C	51	51	0	52