EARLY ADHERENCE TO PHYSICIAN PRESCRIBED EXERCISE BY HIGHER RISK RCMP MEMBERS: The Effect of Fitness and Adherence Counselling Provided by a Conditioning Therapist

by

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ABSTRACT

A number of physically demanding occupations (ie. military, fire fighters and police) are now using specific performance tests to screen recruits and test for ongoing physical readiness. One such test is the PARE, currently being used by the RCMP. Testing has identified many members who are deemed medically at risk for participation in strenuous job related activity. These members are usually assigned to sedentary desk jobs and are faced with the psychological and professional concerns related to "failing" a performance test. There is no structured path of rehabilitation. Intervention is usually left to the member and his/her personal physician.

The purpose of this research was to examine the effect of regular meetings with a fitness consultant on adherence to a progressive exercise program. Specifically the initial consultations were designed to determine health risk and fitness level. Time was spent developing an understanding of the principles of fitness programming, goal setting, and the benefits of regular exercise to health. The meetings reviewed practical adherence strategies.

Using a single subject, changing criteria design, four subjects were monitored by self and spousal report during a baseline period of six weeks. The direction of activity during this period was left to the discretion of the subjects based on the advice of their personal physician.

The intervention period began with a modified Balke graded exercise test to determine current fitness level and screen for abnormal responses to exercise. Anthropometric measures were taken following the Canadian Standardized Test of Fitness. The results of fitness evaluation were utilized during counselling and for determination of fitness changes in each subject.

Self and spousal report were continued during the intervention period with the addition of objective monitoring of exercise sessions by microprocessor.

Finally a maintenance phase examined the independent exercise behavior of each subject following the intervention. Self reported adherence was measure continuously with the inclusion of a one week probe of spousal report and microprocessor recording. A final fitness evaluation was carried out to complete the data gathering.

Three of four subjects increased their exercise levels from pre-research levels. Variable baseline measures did not allow testing of the hypothesis that counselling after physician prescription improved levels of exercise adherence. The combination of physician prescription and fitness consultant involvement did provide three subjects with increased early adherence and longer term maintenance of exercise. The three subjects showed positive changes in the measured fitness evaluation. Individual subject results provide limited support for intervention program effectiveness. Objective measurement of baseline behaviors would provide a clearer view of changes in fitness behavior.

The research provides a model of sensitive intervention with individuals at a vulnerable point in their professional and personal lives.

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Dedication

This thesis is dedicated to the memory of My Father who encouraged the belief in my abilities and to my Mother who continues to inspire me through her love and accomplishment.

CHAPTER ONE

Introduction

The Purpose of this study was to develop and test a fitness counselling program for use with individuals at higher risk of cardiovascular disease. The program was applied by a conditioning therapist following a baseline period where the only intervention was the exercise prescription of the personal physician. The success of the fitness counselling was to be compared to the baseline to see if the subjects would progressively increase the time spent exercising in target heart rate zone. Finally, longer term maintenance was examined after the counselling period was complete. The exercise behavior over six unsupervised weeks was examined to judge maintenance.

In reviewing the exercise adherence literature it is commonly reported that the health benefits of exercise are well documented and accepted (Dishman, 1982; Paffenbarger, Hyde, Hsieh and Wing, 1988). Regular exercise has been reported as having positive clinical application in the prevention and treatment of coronary artery disease, essential hypertension, chronic respiratory disorders, diabetes, dyslypoproteinemaias, obesity and peripheral vascular disease (Goldstein, 1989; Rippe, 1987). In addition benefits are suggested for treatment and prevention of osteoarthritis, osteoporosis, back pain, mental health

problems, infections and cancer (Bouchard, Shephard, Stephens, Sutton and McPherson, 1990). The previous statements suggest that although some of the benefits of exercise remain controversial the overall support for health benefits is strong.

Even with this abundance of information demonstrating the health benefits of regular activity, many individuals choose not to exercise, and if they do begin, are not able to establish exercise as a permanent lifestyle habit. It has been demonstrated that of the population beginning exercise 40 - 50% will typically drop out within six months (Wankle, 1985; Dishman, 1986; Carron, 1988). This is demonstrated in many sub-populations including individuals involved in cardiac rehabilitation. These high drop-out rates emphasize the importance of investigating specific techniques for improving the adherence to regular exercise for a variety of target populations.

In a survey of the general public, the most commonly mentioned factor that would encourage increased exercise participation was a physician`s recommendation to increase activity as a preventive health measure (Perrier, 1979). These survey results are supported by the prominence of the health belief model for adherence outlined by Oldridge (1979). In this model Oldridge (1979) suggests that a major factor influencing compliance is the belief that health is

impacted by not exercising or improved through regular exercise. Physicians felt they have been successful in helping individuals participate in regular exercise in only eight percent of cases (Wechsler, Levine, Idelson, 1983). These authors suggest that the physician working in combination with a health professional specializing in exercise is a possible solution. It is suggested that the specialists in exercise should have a scientifically based degree in physical education, or kinesiology with additional certification in the evaluation and prescription of exercise for individuals of high or undetermined risk (Painter, Blackburn, 1988; Simons-Morton, Pate, 1988; American College of Sportsmedicine (ACSM), 1988).

Achieving the levels of intensity and duration adequate to show positive health effects may take weeks (Smith, 1988). Compounding this problem, the first weeks show large rates of attrition. In a study conducted by Debusk, Haskell, Miller, Berra, Taylor, Bergen and Lew (1985) individuals recommended to exercise by their physician for prevention of coronary heart disease show a 15% drop-out in eight days and a 30% drop-out in 15 days. This large initial drop-out must be reduced if the long-term benefits of exercise are to have clinical effects upon a broad spectrum of patients. The process of moving from a sedentary lifestyle to levels of activity sufficient to

improve health requires guidance to progress slowly and steadily toward exercise therapy goals.

The prescription of individual home based exercise is more applicable for individuals with irregular hours of work and shift work. For example, in a study of police officers' adherence to a 20 week program, adherence was better for unsupervised compared with supervised programs. In the unsupervised program 35% drop-out was reported as compared to 45% for the supervised program (Gettman, Pollock and Ward, 1983). The early adherence of individuals in this form of high pressure job is an important target for intervention and study. Successful early intervention with this population may provide information for the prescription and programming of other target groups.

Questions

1- Does the intervention of a conditioning therapist meeting weekly with categorized, higher risk RCMP members improve the early adherence to physician prescribed exercise?

2- Does a short term educational program result in successful long term management of an exercise program by individuals at higher risk?

Operational Definitions

Adherence.

For the purpose of this research, adherence will be defined as the general maintenance of regular exercise. In this context adherence suggests a process of sticking to personal ideals, or being devoted to a course of action.

Compliance.

In this research compliance is defined as the tendency to acquiesce toward the wishes or commands of others.

Conditioning therapist.

The term conditioning therapist defines individuals with background in physical education who have additional training preparing them to work with populations of increased medical risk. In this research the definition of a conditioning therapist requires a Bachelor of Science in physical education or equivalent with additional certification as an American College of Sportsmedicine Exercise Test Technician, Specialist or Canadian Association or Sport Science Certified Fitness Appraiser.

Intervention.

The intervention in this research was defined as a weekly meeting with each subject by the conditioning therapist. The intervention provided individualized program support and review, including exercise prescription, educational information and practical adherence strategies. The intervention was designed to develop self-responsibility in each subject for continued exercise participation. A sample program outline is contained in Appendix A, with a complete agenda presented in Appendix B.

Short term adherence.

For this research short term adherence requires continued participation for a period of six weeks to an increasing criterion of exercise duration as established in interactive goal setting from therapist set ranges.

Physician prescribed exercise.

Physician prescribed exercise is defined as exercise that is recommended for the higher risk individuals by their physician as a suggested treatment of health risk factors

Long term management.

Long term management is defined as maintenance or improvement of the final exercise duration criteria as measured by a one week probe following six weeks of unsupervised program.

Individuals at higher risk.

For the purpose of this research, individuals at higher risk are those who have symptoms suggestive of possible metabolic disease and/or at least one major coronary risk factor as outlined by the American College of Sports Medicine (1986). The ACSM classifications are presented in appendix C.

Strength of criterion.

In the context of this research, strength of criterion refers to the magnitude of change in intensity established following the weekly intervention meeting. In this study target heart rate zones were selected by the subject from a suggested range established by the researcher.

Length of criterion.

In the context of this research length of criterion refers to the time or number of sessions required before a criterion is changed. In this study sub-phases were one week with the exception of the two week sub-phase covering weeks three and four. Minimally three sessions were required in each week.

Delimitations of the Study

The research was confined to individuals working within the R.C.M.P. Victoria subdivision. The study was further limited to those individuals working at the Airport, Colwood, Sidney, Sooke or Victoria detachments.

The research was confined to married volunteers whose spouses agreed to participate in the research by completing spousal report forms as a means of social verification.

To participate in the study subjects were required to complete two levels of screening. Initially subjects completed screening of both medical and activity history, were required to show low levels of physical activity, and higher risk of cardiovascular disease (ACSM, 1986). Physician participation was required to demonstrate the validity of subject reported medical history.

Limitations of the Study

This study was not designed to provide statistical generalizations which would be relevant to other specific or general populations. The investigation of four individual cases was designed to provide a model of intervention for this higher risk population. This model may in turn should be tested in other high risk populations.

This study was limited by the validity and reliability of the instruments used to collect the adherence data. Pen and paper instruments included the self and spousal report protocols. Reliability and validity of the Vantage XL microprocessor was also considered a limitation.

The study was limited by the reliability and validity of fitness testing procedures. The skill of the research team provided a limitation. The primary researcher, personal physicians and the independent laboratory were all part of the research team responsible for the collection of fitness test results.

The staff and equipment of Western Cardiology Laboratory were to a great extent independent of research control. Therefore staff training and equipment maintenance were limitations of the study.

CHAPTER TWO

Review of Literature

Introduction

The investigation of adherence and compliance to regular exercise is a complex process. The number of variables involved are so numerous that it complicates study of the area. Current thought will be reviewed in an attempt to discover many of the basic concepts relating to the initiation and continuance of regular exercise. Both the outcomes and influences of regular exercise will be investigated to gain an understanding of this complex topic.

There have been several theoretical models developed in an attempt to explain the incidence of adherence or compliance to regular exercise. These models will be used to demonstrate methods and strategies for changing behavior concerning exercise.

On a more tenable note, practical adherence strategies will be outlined in terms of general participation. During the investigating of this topic attention is directed to various special populations in relation to adherence and compliance. Some time will be spent scanning some of the special populations mentioned in the research. Special populations of concern will include; cardiac rehabilitation

programs, youth, the overweight population, unsupervised/home exercisers, and the corporate fitness community.

To complete this investigation it is important to look to the future. To that end, future directions and research concerns will be set out to conclude this review.

Differentiating Adherence and Compliance

In much of the literature pertaining to the initiation, and continuation of habitual exercise, the terms adherence and compliance are used interchangeably. This overlooks the major theoretical distinction between the two terms (Dishman, 1988A). Compliance implies that exercise is prescribed by others and that to be successful one must yield to another's wish or command to become a habitual exerciser. On the other hand adherence suggests a process of sticking with or holding to personal ideals, or being devoted to a course of action. The term adherence allows for the establishment of personal goals and objectives after considering all influences. This view of exercise behavior is more consistent than compliance.

With the current thought concerning the establishment of habitual exercise, there seems to be a common problem in the literature. Adherence and compliance are not well

defined and therefore the critical theoretical differences inherent in the two terms have not been established before studies begin. In many cases the term compliance is used incorrectly by authors who do not mean to investigate such a prescriptive area. In the context of this review the term adherence will be used to refer to the general maintenance of regular exercise, while compliance will refer to the tendency to acquiesce toward the wishes or commands of others. In the most current literature such as the works of Dishman (1988A) this suggested use of terms is prevalent.

Theoretical Directions

In this area of research it is common to approach the topic of adherence from two distinct theoretical directions. One view attempts to discover what factors influence the success of habitual exercisers. This view is exemplified by Sallis, Haskell, Fortmann, Vranizan, Taylor, and Solomon (1986). Their view investigates the predictors of adoption and maintenance of physical activity. The second view investigates the factors that influence the tendency to drop out from regular exercise. This second view is held by investigators such as Gettman, Pollock, and Ward (1983) who have concentrated on drop-out rates. Each of these directions can consider positive and negative influences. Examples of negative factors may be the barriers, while more

positive factors may be considered the rewards of an active lifestyle.

The Benefits of Regular Exercise

Many of the studies reviewed in the process of developing this review begin by emphasizing the benefits to be gained from regular exercise. According to Dishman (1982) the relationship between habitual exercise and health benefits are well documented. It is now commonly accepted by health professionals and the public that regular exercise produces many health benefits. Review of the literature concerning the benefits of exercise has beem summarized by Rippe (1987). In a round table discussion published in The Physician and Sportsmedicine and moderated by Rippe (1987), it was agreed upon by the panel of experts that even though the positive aspects of exercise are well established and publicized, 40% of adults in the United States remain sedentary. The panel of experts confirmed benefits affecting many components of health including; reduced cardiovascular risk, improved lipoprotein profile, weight control, and reduction of psychological problems.

The epidemiological effects of exercise are numerous. In a paper relating to the public health benefits of exercise Powel (1988) demonstrated the personal and societal benefits of habitual exercise. This author reports that the

inverse relationship between cardiovascular disease and regular exercise is well established. Powel also reported studies suggesting that regular exercise plays a major role in the reduction, or alleviation, of many problems, including; hypertension, osteoporosis, diabetes, acute respiratory disease, and low back pain. Aside from these direct effects he also emphasized the indirect influences on weight control, smoking and alcohol or substance abuse. Many of the claims reported by Powel (1988) are supported by Paffenbarger, and Hyde (1988).

The benefits of regular exercise extend further than to cover only physical health. According to Blair (1988) the influences of regular activity extend to exhibit effects on work, and healthy aging. In addition psychological well-being is influenced. These psychological effects are reported by Morgan and O'Connor (1988) who state that long term vigorous physical activity improves the mood of patients with psychopathology of varying degree, and the healthy population. The above authors suggest that the psychological effects admittedly need further systematic testing to determine the reasons for the altered mood, and how to maximize such benefits (Morgan and O'Connor, 1988). The difficulty with this area of improved mood is that even though 80-90% of individuals report feeling better after 8-10 weeks of participation in a program, 50% still drop out after a few months (Morgan and O'Connor, 1988).

Models Relating To Exercise Behavior

It has been suggested that many of the same theories can be applied to changing exercise behavior as to a variety of lifestyle behaviors (Mulder, 1981). Much as with the prescription of other health improving regimes a multitude of factors interact to produce an influence. Psychological, environmental, and physiological factors combine with the prescription regimen and physician-patient interactions to determine the degree of adherence. What Mulder (1981) refers to as the physician-patient interactions could be interpreted as interactions between the individual and any significant individuals that suggest exercise as a critical component of a healthy lifestyle.

Several psychological models exist that appear to be applicable to the study of exercise participation. These are outlined by Sonstroem (1988). These models provide the foundation for the use of further research investigating the multitude of factors suspected to affect adherence to exercise.

The psychobiological model proposed by Dishman (1981) and supported by Ward and Morgan (1984) is one method of screening for predictive adherence. Factors such as percent body fat, body weight, and self motivation have been stated

to successfully predict 88% of adherers, but at the same time failed to accurately predict dropouts.

The health belief model outlined by Sonstroem (1988) states that each individual is personally concerned about the susceptibility, and severity of negative health (Becker, & Maiman, 1975; Rosenstock, 1974). In other words, they question the likelihood of negative health effects, and how serious will the effects be. In addition each individual perceives benefits, and barriers toward taking specific health action. Sonstroem (1988) states that this model has some success in predicting specific situational behavior but because behavior is dependent to a great extent on a great number of situational variables the model does not make general predictions well (Fishbein & Ajzen, 1975).

The theory of reasoned action as stated by Sonstroem (1988) is an additive model. It states that behavior can be predicted by looking at the behavioral intention, and how it is effected by personal attitudes and what the individual considers important to significant others. This model involves study of the interaction between personal and environmental factors. Its weakness is the simplicity exhibited. The model does not take into account the multitude of factors involved in developing attitudes.

A paradigm labeled the locus of control model divides people into two categories; those that believe they can control their own lives (internal controllers, locus of control), and those that feel their life is controlled by powerful others, or chance (external controllers, locus of control) (Sonstroem, 1988; Rotter, 1966). Individuals who feel they have control of their exercise behavior according to this model are more likely to adhere to exercise. This model serves as only one of many factors involved in influencing adherence.

Several personal variables combine into a model Sonstroem (1988) calls the "self in exercise" model, also called the psychological model for physical activity participation. Self-esteem is one of the variables that is included in this model. Self perceptions are a contributing factor to adherence behavior. Self-efficacy, or the perception of mastery over particular areas is involved in adherence behavior as well. General estimation of competence is important to adherence to exercise. The third important variable is similar to self-efficacy but more specific in nature. Successful mastery of specific skills has its effects on adherence behavior. Mastery of skills leads to enhanced intrinsic motivation and therefore improves the adherence to activity involving the acquired skills.

The above models are all supported by positive research findings, but none to a degree that the others can be disregarded (Sonstroem, 1988). Further study is necessary to discover which model is appropriate for specific situations, or circumstances. The decision to initiate activity and then maintain that behavior depends to some extent on the theories outlined above.

Health and Adherence

According to Knapp (1988) exercise must begin, then behavior must become a habit, and the habit must be maintained. Some possible paradigms relating to the initiation of exercise behavior are outlined by this author. For some the decision to begin exercise may be initiated secondary to concerns about health. Consideration of health risk or a perceived illness may by a starting point. An understanding of the nature, treatment, or causes of health problems may initiate exercise behavior. In relation to these two health paradigms it is important to consider the implications. Individuals who are concerned about health according to Knapp (1988) are most likely to follow recommended exercises if they feel vulnerable to a condition that would be bad. In turn they must believe that the negative effects do not outweigh the benefits, and that it is within their capacities to follow the recommendations (Knapp, 1988).

Cost Benefit Balance

When ill health is not a concern a decision making paradigm becomes more prevalent (Knapp, 1988). According to this author in this case it is important to emphasize a variety of benefits rather than health benefits alone. Individuals develop a list of positive and negative factors and balance them against each other. Gains to self, gains to significant others, approval from others, and self approval all are measures against their negative counterparts in the formulation of a decision.

According to the views of Knapp (1988) cues preceding decisions may increase the behavior change or increase the possibility of competing behaviors. Therefore it is important to increase exercise cues and decrease cues for competing behaviors. An example of this would be finding a time and place for exercise that is free from detracting cues. The provision of cues from self and significant others aids in the establishment of habitual exercise (Knapp, 1988).

The consequences following a specific behavior can serve as punishment or reinforcement. The establishment of habitual exercise is improved if the punishing consequence of exercise are eliminated (Knapp, 1988). To habitualize

exercise it helps to reduce the discomforts associated with exercise, and avoid boredom. All factors that punish individuals for participating in activity should be reduced or eliminated (Knapp, 1988).

Positive reinforcement is critical to the establishment of habitual exercise (Knapp, 1988). Reinforcement may be self initiated, or come from significant others. It can even be materialistic or social interaction (Knapp, 1988).

Knapp`s Four Critical areas for Exercise Maintenance

In her paper on behavior management Knapp (1988) outlines four important general areas useful in maintaining regular physical activity.

Prevention of extinction

The first of the areas is the prevention of extinction (Knapp, 1988). This author suggests that withdrawal of reinforcement or the addition of punishment can result in extinction of desired behaviors. Therefore it is important to ensure reinforcement on some form of variable ratio schedule. By gradually reducing the reinforcement over time while maintaining exercise cues extinction possibilities are reduced.

Attribution of cause

The second area mentioned by Knapp (1988) refers to attribution of cause and self control. Maintenance of habitual exercise is hampered if positive changes are attributed to things outside of ones self and then the external factors are removed. This demonstrates the importance of self-control strategies. Self-cueing and self-reinforcement are two such strategies.

Self-Motivation

The third area is self-motivation. When cueing and reinforcement are not enough to maintain regular exercise self-motivation is important. Knapp (1988) defines self-motivation as "a learned set of skills and habitual responses that function to assist individuals to adhere to activities that are not adequately cued and reinforced by the environment or that may even be punished." (p.220)

Relapse prevention

The final area Knapp (1988) outlines as important to exercise maintenance is the prevention of relapse. A number of strategies are useful in this prevention. The identification of high risk situation can be accomplished through the use of self-monitoring, and individual record

keeping. Coping responses can be improved by planning in advance of high risk situations. A plan of action should be developed for small relapses. Another way to prevent relapses is to allow flexible criteria for goals and guidelines. In that way small deviations from planned exercise will not be viewed as failures. Alternative forms of exercise that are pleasurable or special should be established to allow for occasional feelings of deprivation. Finally one should think about possible rationalization that would allow skipping of exercise behavior (Knapp, 1988).

Factors Effecting Drop-Out

It is common in the literature to see dropout rates of close to 50% within the first six months of beginning an exercise program. (Dishman, 1986; Ward,and Morgan, 1984; King, and Martin, 1988) This information makes it clear that adherence to a program of regular exercise is a problem of great magnitude. The common denominator seems to relate to motivation. (Shephard, 1985) Underlying this general covering statement are a multitude of practical factors and strategies to improve adherence.

The place to start is by looking to the past. Kruse and Calden (1986) point out that the most important factor that relates to current individual exercise habits is the presence or absence of regular exercise in the past. This

obviously directs us to the early stages of life, and the educational system, but should not exclude the other life stages. As an example, the middle years activity will likely play a prominent role in establishing the pattern followed during the retirement years and into old age.

As mentioned previously, another method of identifying high risk dropouts is by looking at their biological makeup. (Dishman, 1981; Ward and Morgan, 1984; Sallis et al., 1986) This method seems to have some application in determining individuals that need special attention to change and maintain new behaviors. The use of body composition as a biological determinant is circular in that those who need exercise the most also are the most likely to dropout. This may indicate the importance of special programming to eliminate many of the factors that influence the behavior of overweight individuals.

The importance of enjoyment in exercise is a factor deserving special attention. Wankel (1985) emphasizes the importance of enjoyment to involvement in exercise. It was common amongst the individuals in his study to stress the importance of health concerns. The critical difference between dropouts and adherers was that the adherers stressed not only the health issue but also accented the importance of non-health related issues such as recreation, friendships, and competition. This research would support

the encouragement of participation for a variety of personal reasons outside the health concern. King and Martin (1988) support these findings stressing the importance of minimizing discomfort and maximizing positive factors in an attempt to enhance enjoyment.

The inclusion of structured social interaction may be another strategy for improving adherence. When suggestions are made aiding individuals in establishing a successful exercise program, social activity should be discussed in addition to the physiological effects of exercise. Some studies suggest that activity may be as beneficial for achievement of happiness and health as vigorous exercise (Monahan, 1987). It is suggested that adherence to lower levels of enjoyable activity is more likely than adherence to vigorous exercise, and may have many of the same end results. In other words fitness may not be as critical to good health as once believed. It may be the activity associated with gaining fitness that is the critical factor (Monahan, 1987).

The Exerciser

The emphasis of studies directed at adherence behavior should investigate both the exerciser, and the exercise setting. When investigating the individual psychological

level it is suggested by Dishman (1982) that three areas are important.

Firstly exercise attitudes, self-perceptions, and health beliefs are important. Positive influences on these personal philosophies improve adherence.

Exercise goals and objectives are the second important area of concern expressed by Dishman (1982). Of course the level of adherence will affect the achievement level, but it is also true that the expected attainment of goals effects adherence. Therefore the establishment of achievable, realistic, and acceptable goals, and objectives is vital to successful adherence (Dishman, 1982).

A self-motivating personality can be strengthened through the use of techniques that allow individuals to persist in long term behaviors without the external motivations that are present sporadically. King and Martin (1988) support the findings of Dishman (1982) by emphasizing personal factors such as past experience, health perception, personal responsibility, perceived physical demands, personal benefits, and self motivation. The important addition from their writing is the fact that many of these personal factors are able to be learned.

The Exercise Setting

The exercise setting influences exercise adherence behavior. The exercise situation, mode, and dosage have profound effects on adherence (Dishman, 1982). Interventions by trained personnel in the exercise environment also have an influencing effect (Dishman, 1982; King and Martin, 1988). The personal/environmental interaction has significant effects on the level of adherence to regular exercise (Wankel, 1985).

Special Populations

Before developing a list of practical suggestions to improve exercise adherence it is useful to expand on some of the special populations in which adherence to exercise is of concern. Populations such as cardiac rehabilitation patients, youth, the overweight, unsupervised/home exercisers, and the corporate fitness community have distinct properties in relation to exercise adherence (Dishman, 1988A).

Cardiac rehabilitation.

One would suspect that adherence to prescribed exercise would be very high amongst individuals whose physicians have suggested a regimen of diet and lifestyle change. The

adherence of cardiac rehabilitation patients although not as poor as the average population, shows a steady decline until it falls to a 50% dropout after 36-48 months (Oldridge, 1979). The importance of Sonstroem`s (1988) health belief model grows when working in cardiac rehabilitation. The perception of susceptibility and severity of the problem need be understood by the individual. The patient must be confident in the diagnosis, and in the beneficial effects expected through the use of exercise as a mode of rehabilitation. To eliminate a loss of motivation it is critical to ensure that the patient perceives more benefits than costs to the adherent behavior (Oldridge, 1979).

To encourage long-term adherence the individual must develop a sense of self-responsibility. This encourages adherence rather than short term compliance. Self-responsibility is aided by helping the patient establish personal, realistic goals (Somestrom, 1988; Knapp, 1988). The program should be designed to generate social support, and rapid feedback. These along with a host of other motivational techniques aid in long-term adherence in cardiac rehabilitation.

The influence of youth on later life stages.

The factors that motivate youth to become habitual in exercise are very important in light of earlier discussion

of the tendency to continue established habits throughout the life stages (Kruse & Calden, 1986). In a study of the factors that are most motivational to youth Rowland (1986) outlined the factors discovered to hold the most weight. Enthusiastic leadership and parental support topped the list, followed by development of feelings of accomplishment, and self-worth. Although these are also important to the adherence behavior of adults, the major difference is the lack of health concerns amongst the top motivators for youth. The importance of leadership through school physical education is re-emphasized by Dishman, and Dunn (1988). They support the theory of continuing activity patterns throughout the life stages that are established early in life.

Overweight individuals.

Earlier discussions have pointed out the inverse relationship between percent body fat, and adherence to exercise (Dishman, 1981). This highlights the importance of paying special attention to those who can gain the most from exercise. In a study reported by Gillett (1988) the participation of overweight individuals in a moderate intensity program showed a dramatically increased rate of adherence as compared to other studies of this population. The authors attributed high adherence to a program tailored to the age and fitness level which provided a non-

threatening environment exclusive of non-overweight persons. Although factors such as individual and group reinforcement were expected to improve adherence, they were not supported by the data. These factors deserve further investigation.

Unsupervised exercise.

A great number of exercisers participate in physical activity at home or in other unsupervised situations. A study by Gettman et al. (1983) reported that adherence to unsupervised exercise is better than to supervised programs. It was hypothesized that the increase in adherence is related to the flexibility and convenience of exercising at the time of preference, and at a location that is near home. The use of home exercise should be encouraged. To further improve adherence individuals should be educated on the basics of developing and starting an exercise program (Gettman, 1983). It may be helpful to initially start under a supervised condition, and on establishing an independent program, it may be motivating to report on participation every two weeks (Gettman, 1983).

The impact in some situations of cohesive group programs should not be overlooked. It has been reported from psychological, and sociological studies that group cohesion and size have powerful positive effects on the adherence behavior of group members (Carron, Brawley and

Widmeyer, 1990). The contrasting findings regarding home exercise and group programming emphasize the situational appropriateness of specific strategies.

Corporate fitness.

Another special population to be examined in relation to exercise adherence are those who have access to corporate fitness programs. Findings reported by Shephard (1988) indicate that only 20% of individuals who have access to programs through work take part in them. Out of the 20% who initially participate only half of those become long-term program adherers. These statistics place severe limitations on the benefits to employees or corporations. Shephard (1988) suggests that education and an establishment of a supportive corporate setting are the two key factors in improving initial involvement and long-term adherence. In addition to these two factors, Baun, and Bernacki (1988) emphasize the importance of establishing a well designed program, and maintaining interest in the program with periodical assessments and marketing strategies.

High risk occupations.

Specific occupational groups have special needs as demanded by situational and personal factors (Gettman, 1988). Law enforcement and other high risk occupations have

specific fitness requirements. It is difficult to link law enforcement job requirements with fitness standards (Gettman, 1988). Although law enforcement is to a great extent a sedentary occupation, officers must be physically and mentally ready to perform during an emergency. In this context fitness may be critical to both public and personal safety.

According to Gettman (1988) the sedentary nature of law enforcement and other high risk occupations minimizes physical readiness and increases health risk. Such occupations are exposed to two levels of risk. Firstly they are expected to perform sporadic physically demanding tasks as a job requirement. Secondly, the sedentary nature of the job may be a precursor to cardiovascular disease.

The recognition of fitness as a job requirement for high risk occupations has led to the development of physical ability tests. Such testing is carried out with the military, and with both local and national law enforcement agencies (Farenholtz, Rhodes and Bonheau, 1989, Jette, Kimick and Sidney, 1989). Research has been directed at validating these tests, but minimal attention has been aimed at programming with subjects after the test results are complete (Pealo, 1991).

Practical Strategies

Developing a list of practical strategies that improve adherence in all situations and with all personalities is not practical. Investigation of the literature emphasizes the importance of recognizing personal and situational features (Dishman, 1990). Positive influences can be generally categorized into two areas. In his review of current knowledge Dishman (1990) states that personality influences generally affect individual attitude, while environmental influences affect the surroundings, and therefore indirectly the personal attitude. There is no clear cut line between these categories. They have profound effects on each other and are complexly intertwined. The following lists summarize the personal and environmental categories of influences discovered during this review:

Personal influences

- Health and fitness education.
- Periodical assessment of attitudes.
- Support of significant others.
- Recognition of exercise significance.
- Knowledge of activity value.
- Improved self-confidence.
- Selection of group or individual program.
- Avoidance of excessive goal orientation.
- Developing realistic goals and objectives.
- Elimination of punishing consequences.
- Emphasizing benefits other than fitness.
- Appropriate timing.
- Develop exercise patterns early in life.
- Balance costs and benefits.
- Accept personal responsibility.
- Establish activity related goals.

- Avoid boredom.
- Examine personal characteristics.
- Promotion of health and personal benefits.
- Remove personal barriers.
- Promote psychological well-being.
- Develop internal controlling personality.
- Increase self-esteem, efficacy, and motivation.
- Mentally prepare for relapse and extinction.

Environmental influences.

- Provide a motivational environment.
- Begin with moderate intensity to reduce injuries.
- Variety in program.
- Qualified enthusiastic leadership.
- Fitness testing and counselling.
- Carefully consider the effects on adherence of intensity, duration, and frequency.
- Program proximity.
- Early supervision.
- Home programming.
- External incentives.
- Pre-screen for high risk dropouts.
- Keep exercise records.
- Substitute activity for strenuous exercise.
- Flexibility of program.
- Rapid feedback.
- Establish routine.
- Start slow and easy.
- Remove environmental barriers.
- Provide immediate consequences.
- Cohesive group situation.
- Well documented program and improvements.
- Increase environmental exercise cues and reduce competing cues.
- Provide recreation, competition, or socialization.

With the multitude of positive influences to exercise adherence presented above it is critical that the individuality of the person and situation be recognized. Further investigation is indicated to determine which of these influences are applicable to certain individuals and in what situations. This is especially critical when

considering opposing influences such as group or individual programming (Dishman, 1988B).

Methodological Considerations

This review of literature would not be complete without investigation of methodological considerations for future research. The methodology of research into exercise adherence is an important concern. Authors such as Perkins, and Epstein (1988) suggest some critical methodological considerations. The goal of exercise adherence need be clearly defined to determine valid, reliable, and generalizable ways to assess adherence. Increased attention must be devoted to investigation of factors such as intensity, duration, and frequency to establish their role in improved health and any adverse relationships they have to adherence (Perkins & Epstein, 1988). Research must be carefully designed to establish control and experimental groups that are equivalent outside of the factors being investigated.

The accuracy of subjective measures of exercise adherence may be questioned. Lack of objective measurement of exercise duration and intensity presents a problem in the assessment of exercise adherence. Varied findings have been reported regarding the accuracy of self-report and recall of

palpated heart rate. Several authors have concluded that palpation is not an accurate estimation of heart rate during or after exercise (Kalkwarf, Haas, Belko, Roach and Roe, 1989; McArdle, Zwiren and Magel, 1969; Parker, Hurley, Hanlon and Vaccaro, 1989). Pollock, Broida and Kendrick (1972) suggest that the palpation technique is an adequate measure of exercise heart rate.

Questions about the validity of palpation technique suggest the utilization of portable heart rate monitors as measures of exercise intensity and duration. Several authors have supported the validity and reliability of microprocessors, computers and heart rate monitors as exercise behavior measurement tools (Karvonen, Chwalbinska-Moneta and Saynajakangas, 1984; Leger and Thivierge, 1988: Mueller, Gossard, Adams, Taylor, Haskell, Kraemer, Ahn, Burnett and DeBusk, 1986; Treiber, Musante, Hartdagan, Davis, Levy and Strong, 1989). The finding of these researchers points toward the continuation of research using objective measures of exercise behavior as it relates to adherence. Portable microprocessors and motion sensors may provide objective measures of physical activity (Washburn, Cook and LaPorte, 1989).

Single-Case Research Designs

The recognition of the influence of personal and individual factors on individual adherence to exercise indicates the use of research designs examining the single subject (Kazdin, 1982. pp. 124). Wankel (1990) suggests that the study of exercise behavior has come to a point where individual variability must be addressed. Single case research designs can be used to address the influence of individual variability. These research designs may provide the appropriate control over extraneous variables while allowing effective counselling for the specific situation (Kazdin, 1982 pp. 14).

Examples are present in the literature of the application of single case research designs to the study of fitness motivation. Continuous monitoring of exercise behavior over long terms by several authors has provided insight to the individual nature of poor exercise adherence (Bryan, 1987; Fitterling, Martin, Gramling, Cole and Milan, 1988; Hegel, Ayllon, VanderPlate and Spiro-Hawkins, 1986; Taggart, Taggart and Siedentop, 1986).

Individual Short-Term Counselling

Individual short term counselling has been demonstrated to improve adherence rates to lifestyle programs (Janis, 1983; Wankel, 1990). The situational and personal influences of adherence are best effected by short term individualized counselling. As Wankel (1990) suggests such programs allow more client-counsellor contact and greater program flexibility within a scientific design. Short term counselling programs allow the development of individual strategies for adoption and maintenance of physical activity (Wankel, 1990).

The design of counselling programs has been suggested in the research. According to Wankel (1990) programs should include investigation of physical activity history, goal setting, decision balance sheet construction, contracting, provision for social support, self-reinforcement and relapse prevention. Gettman, Pollock and Ward (1983) support the initiation of unsupervised home exercise programs that provide education on the basics of beginning exercise. These authors suggest that home programs should be supervised in the early stages with establishment of self-reporting which continues on a regular schedule. Reviewing the literature can provide counsellors with the theoretical basis to improve exercise adherence. The challenge remains

to provide the information to the public using practical and effective methods.

Conclusion

This review has explored many of the writings pertaining to the current thought on adherence to regular exercise. The magnitude of variables influencing this area makes it very difficult to cover such an expanse of material in a comprehensive way. The study of exercise adherence may be compared to the study of medicine. It is important to understand the generalities, but to gain deeper comprehension it is necessary to examine parts of the whole in relation to the entire field. With deeper understanding of the component areas, the knowledge gained aids general understanding. In turn the gain of general understanding adds to the knowledge of specific components. The central thread tying the mass of available information together is the recognition of individual personal and situational differences.

CHAPTER THREE

RESEARCH METHODS

Subjects

Subjects were volunteers from the University of Victoria/RCMP wellness study who were excluded from the wellness program as a result of medical screening. The RCMP project is an ongoing employee wellness program with the intention of improving the well-being of RCMP members in the Victoria subdivision (Pealo, 1991). The subjects volunteered by answering a letter explaining the research questions and outlining the risk categories (see Appendix I). Seven males and one female subject responded to the initial letter. Two males and one female were eliminated from the research because of their classification as "apparently healthy" in respect to the American College of Sports Medicine Classifications (ACSM, 1986). An additional male subject was rejected by his physician as being medically inappropriate for the study at the time.

The screening process eliminated four volunteers. These subjects were excluded from further investigation. The remaining volunteers were assigned the numbers 1, 2, 3 and 4. These four remaining subjects were followed through the remainder of the study.

The two levels of screening resulted in the selection of four married male subjects (see appendixes F and H). Two of the subjects were diagnosed with hypercholesteroemia, one with hypertension and a final subject with both problems. The diagnoses were determined by examination of individual subjects by their physicians. The examination and consultation processes were controlled by the discretion of the family physicians. Each subject is described individually in the results and discussion chapter which follows.

Instruments and Apparatus

Subjects and their personal physicians were contacted by mail and asked to consider participation in the study (see appendixes I and G).

Informed consent was obtained from participants to outline possible risks, as well as expected benefits, of the program (see appendix D). The process and purpose of the study was outlined to all involved during a preliminary meeting. Intensity, duration, and number of aerobic exercise sessions were monitored by self-report, recall spousal report, and microprocessor. Log books for the recording of self-report (see appendix K) and spousal report (ss appendix L) were constructed after a review of the

literature. The multiple measurement technique as suggested by Blair, Haskell, Ho, Paffenbarger, Vranizan, Farquhar and Wood (1985) provides a viable tool for reporting adherence to exercise.

Microprocessor use provided an objective measure of both exercise and daily activity levels. The Vantage XL is an advanced heart rate monitor capable of recording 33 hours of training information in up to eight sessions (see appendixes R and S). Stored information can be down loaded onto a personal computer for interpretation and storage. A similar type of microprocessor has been utilized successfully in three day recording periods in combination with self-report and recall (Taylor, Coffey, Berra, Iaffaldano, Casey and Haskell, 1984). In a study by Leger and Thivierge (1988) it is reported that monitors utilizing conventional chest electrodes were both stable and valid as measures of time in target heart rate zone.

The fitness evaluation consisted of a body composition analysis followed by a physician supervised, graded exercise test conducted on motorized treadmill. The procedures outlined in the Canadian Standardized Test of Fitness were utilized to determine body weight, adiposity and fat distribution (Fitness Canada, 1987) (see appendix N). A modified Balke (ACSM, 1986) protocol was utilized under the guidelines suggested for graded exercise testing by the ACSM

(see appendix O). During the graded exercise test the Borg 10 point scale (Borg, G.V., 1970; ACSM, 1988) was utilized to rate perceived exertion.

Procedures

Subjects were recruited by means of a letter sent directly to them through their detachment (see appendix I). The mailing was restricted to the detachments in the local area so as to allow for ease of scheduling. Individuals that responded to the letter were contacted by telephone and were sent out a medical screening form through departmental mail with the request that it be immediately returned to the researcher (see appendixes E and F). The medical screening form included a request for the name and telephone number of a family physician. The initial screening determined which individuals were appropriate for referral to a physician for medical history. Before referral the physicians were contacted to ensure their understanding of the research and to request their cooperation (see appendix G). The physicians received written instructions as to their role in the procedures prior to conducting the physical. The instructions requested the physician to advise their patient as they normally would to begin an exercise program. The physicians were surveyed as to their actions concerning each patient.

Prior to physician involvement a meeting was scheduled with the prospective subjects and their spouses to explain and complete the informed consent (see appendix D). The research was explained and in particular self and spousal report forms were clarified. The subjects were asked to make an appointment for completion of a medical history form after which they began exercise as prescribed by their physician. The self and spousal report forms were utilized to record baseline exercise behavior (see appendixes J, K, L and M). The baseline period for each subject was approximately six weeks in length with some variation allowing for scheduling of individual meetings.

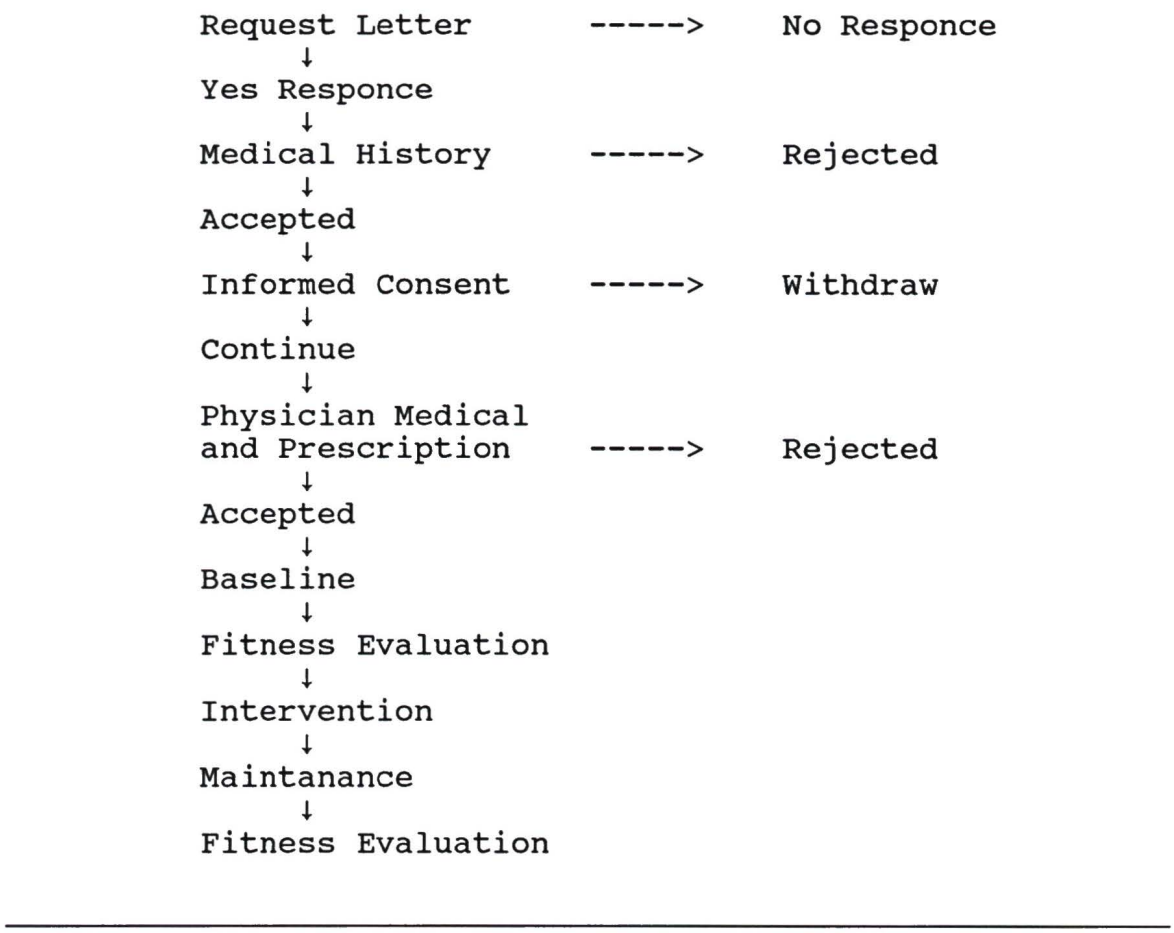
Immediately following the baseline period the researcher contacted individual subjects to schedule the week one counselling session, which included a physician supervised graded exercise test and body composition. The date of this meeting was the beginning of the intervention period lasting six weeks. The experimental procedures are outlined in Figure 1.

Research Design

A changing criterion single case research design was used as this provided a practical approach to the research questions. The questions were: 1. Does the intervention of a conditioning therapist meeting weekly with American

Figure 1

Procedures Flow Chart



College of Sportsmedicine categorized, higher risk RCMP members improve the early adherence to physician prescribed exercise? 2. Does a short term educational program result in successful long term management of an exercise program by individuals at higher risk?

The logic of group experimentation is extended to investigate the single case. Rather than a few observations of a large group of subjects this experiment studied a large number of measurements on a few individuals (Elmes, Kantowitz and Roediger, 1985). According to Kazdin (1982) the single-case design is an appropriate methodology for use in experimental and applied situations. These designs allow for individualized treatment to be administered meeting the client`s needs, and can be applied in the real setting rather than the academic or research setting.

This design was utilized to study the individual response of each participant. The attempt is not to generalize the results to a larger population, but rather it is the purpose of this work to provide an example of a program that may help individuals categorized by ACSM as at higher risk of health problems. It is an attempt to initiate exercise and work toward adherence to a regular program.

The behavior of four subjects was examined using a changing criterion design (Kazdin, 1982). Weekly counselling sessions with the conditioning therapist were arranged with each subject after the completion of the six week baseline period. The counselling sessions were documented and provided weekly goal setting, progress reports, feedback, social support, reduction of barriers and relapse prevention (see appendix B). Exercise duration and intensity were assessed by microprocessor, self and spousal report for a period of six weeks. Changes measured when intervention was added could then be attributed to the intervention rather than extraneous effects.

The changing-criterion design allowed the demonstration of the intervention effect by showing that behavior change follows an increasing set of criteria over the course of the intervention phase (Taggart, Taggart and Siedentop, 1986). The subjects followed their specific baseline phase with several sub-phases. Each sub-phase had a criterion set for duration of exercise. Each criterion was selected from a suggested range as a short term goal by the subject. This design fits with the progressive nature of beginning exercise. The intervention lasted six weeks. During the intervention phase duration and intensity of exercise were measured continuously with the three multiple measurements.

The duration of exercise was prescribed to the subjects using the schedule of duration ranges outlined in Table 1. The starting intensity and subsequent intensities were set by the participant in accordance to the intensity schedule. The intensity schedule was designed to vary the strength and length of criteria therefore strengthening the design. It was recommended that individuals with baselines above 20 minutes begin in the 16 to 20 minute duration while those below 10 minutes in the baseline phase start the intervention with exercise duration between 10 and 15 minutes. Failure to complete all sessions at the goal intensity resulted in addition of a week to that phase. The subjects were allowed to increase intensity in this manner to the end of the six week intervention. From this point they were advised to progress at their own speed.

The intensity of exercise was established using the ACSM (1986) guidelines for heart rate, following the graded exercise test. Intensity remained constant throughout the research. Intensity was recorded by the subjects according to heart rate and the revised Borge 10 point scale of perceived exertion (ACSM, 1986).

The suggested number of weekly exercise sessions was three. This corresponded to three weekly data points. Failure to complete any of the weekly sessions was recorded as a data point of zero.

Table 1

Intervention Criteria Schedule

Week #	1	2	3&4	5	6
Minimum *	10	21	30	36	41
Maximum *	20	25	35	40	45

* Duration of time in minutes

CHAPTER FOUR

Results and Discussion

This chapter begins by presenting the individual results of the four subjects who passed through both the activity level and medical history screening. The target behavior examined throughout the study is the number of minutes each subject spent in his prescribed target heart rate zone on a minimum of three weekly sessions. This adherence behavior was measured by two subjective measures, self and spousal report. Heart-rate monitoring utilizing microprocessors provided an objective measure of time in the target heart rate zone. Heart rate monitoring was collected utilizing the Vantage XL as described previously.

The subjects were treated as separate studies with no attempt to make cross subject comparison. The results are presented independently for each subject following a similar format for each subject. Only four subjects have reported results. Other volunteers were eliminated by preliminary screening.

Adherence Results

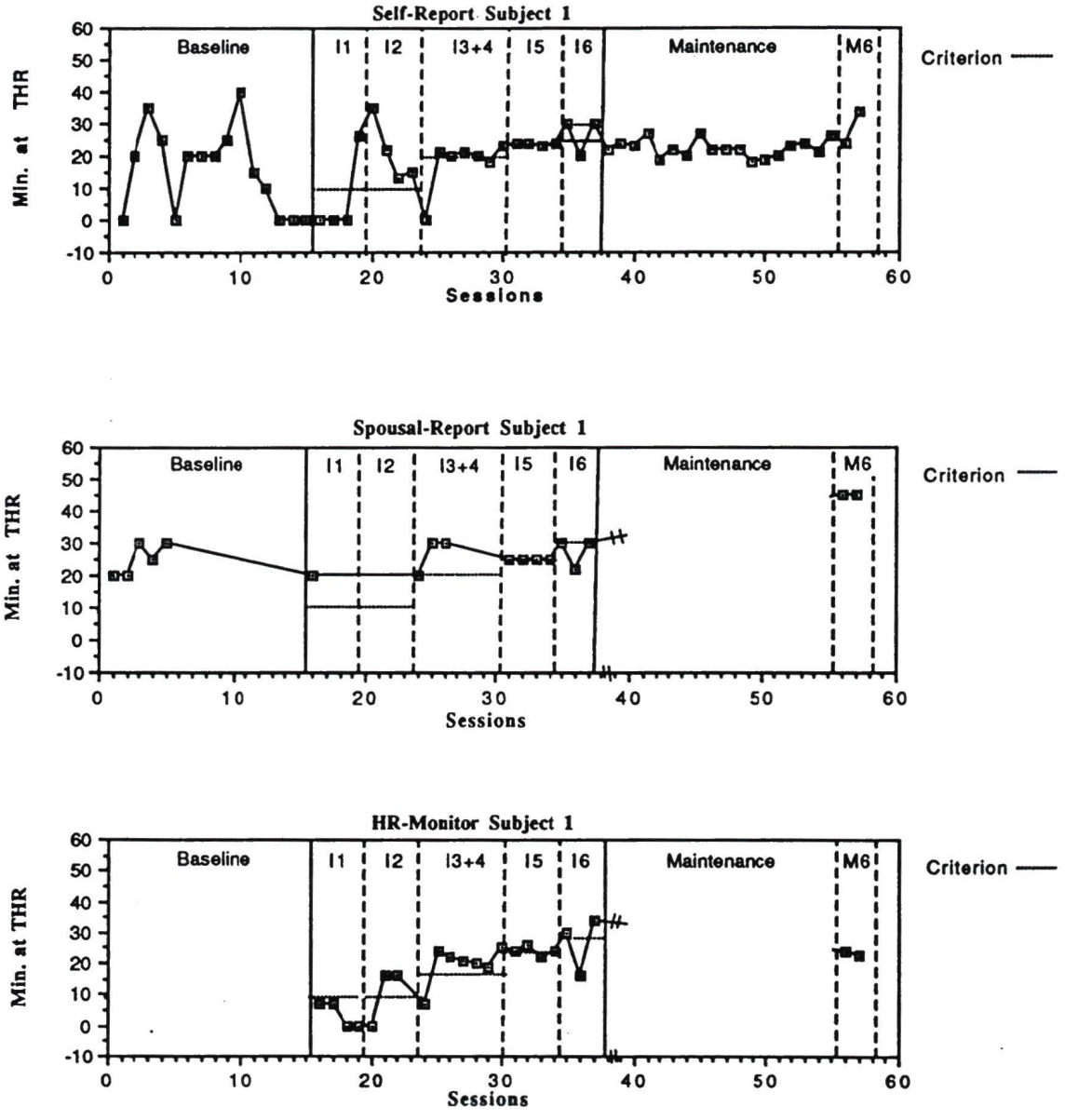
Subject #1

This 46 year old male reported no participation in regular exercise in the weeks prior to the study. During screening this subject indicated a history of electrocardiographic abnormalities, hypertension and dieting. The physician completed medical confirmed the history of hypertension and past diagnosis of an incomplete right bundle branch block.

The subject`s physician suggested utilization of the gym equipment at the place of work as a general exercise prescription for the subject. This subject`s self-reported baseline measurements of minutes at target heart rate showed great variability with a stabilization at zero in week six.

Prior to the intervention phase, graded exercise testing produced a maximum heart rate of 175 beats/min. and a maximum metabolic equivalent unit (met) level of 12.12. Based on the exercise test target heart rate was suggested at 154-169 beats/minute for the duration of 10-15 min. A summary of this subject`s adherence results is presented in Figure 2.

Figure 2, Subject #1 Multiple Adherence Measures



Self-Report

The first week of the intervention was unsuccessful. Based on this fact and the concerns of the subject the target heart rate zone was re-evaluated for the second session in week two. Target heart rate was reduced to 135-155 beats/minute at this point. The self-report duration criteria was achieved in weeks three and five. Variability in week six did not allow demonstration of success although two successful sessions were completed.

During the maintenance phase exercise behavior remained stable at the highest level achieved during the intervention phase. Self-reported adherence rose from the baseline mean of 15.3 minutes at target heart rate to 22.3 minutes.

Spousal-Report

Spousal-report was irregular throughout the study. Improvement in reporting was shown in the final two weeks of the study. The inconsistent spousal-report did not provide verification of self-report.

The baseline mean level of 8.3 minutes increased over the intervention period to a final level of 26.7 minutes. An exercise behavior probe in week six of maintenance reported a mean of 30 minutes in the prescribed zone.

Heart rate monitor

Monitoring indicated successful achievement of the target heart rate durations in weeks three, four and five. Monitoring began to approximate self-report as the study progressed. The highest duration achieved by this subject was 25-30 min. at target heart rate.

Examination of the maintenance phase was provided by a probe in the sixth week. The probe revealed a mean of 15.7 minutes in the target heart rate zone.

Individual adherence discussion

The self-reported baseline of exercise behavior for subject #1 showed great variability in the first weeks. Only in the final week did the baseline stabilize with no reported exercise in the target heart rate. Poor compliance to the spousal report task did not allow replication of the baseline period. With only the single measure of baseline exercise behavior it is difficult to draw conclusions on changes from baseline. This subject had difficulty palpating heart rate throughout the study due to poor feeling and circulation in the hands. Because of this difficulty the reliability of the baseline is questionable. The use of heart rate monitors provided this subject with

valuable feedback in the establishment and monitoring of exercise intensity and duration.

Subject #1 was unable to reach the prescribed target heart rate in the early weeks of the intervention. This subject had a history of problems working in a comfortable target heart rate zone. Exercise had always been a painful experience. The individual counselling situation allowed for re-assessment of the target heart rate zone. The counsellor was able to assess intensity by exercising with the subject to verify the heart rate and effort of the subject. Following the reevaluation a more acceptable target heart rate zone was established. From this point self-reported exercise met the criteria for the next four weeks . The subject reported feeling good after exercise for the first time he could remember. During week six self-reported exercise met the exercise duration criteria on only two of the three required sessions.

During the early weeks of intervention spousal report remained unreliable. In weeks five and six of the intervention spousal report was reliably reported. It is interesting that spousal-report became more consistent as the subject had increased success reaching the criteria.

Heart rate monitoring verified self-reported durations of exercise in the second, third, fourth, fifth and sixth

weeks of the study. Successful attainment in all but the first and sixth week of intervention would suggest improved short term adherence to exercise for subject #1.

During the maintenance phase self-report suggests that exercise was sustained at the highest level achieved during the intervention period. This is not verified by heart rate monitoring. Heart rate monitoring demonstrates that exercise was well above the early stages of the intervention but fell from the highest achieved levels. This demonstrates limited support for the maintenance of exercise following the intervention.

Subject #2

This 54 year old male subject reported no regular exercise in the weeks prior to the study. On initial medical screening the subject indicated a history of abnormally high blood cholesterol. The physician supported this finding in secondary screening.

The subject`s physician suggested that because the subject was self-motivated he should take advantage of exercise facilities present in his apartment complex. Following the physician`s recommendation this subject reported a stable baseline of 30 minutes of exercise in the target heart rate zone.

Prior to the intervention phase graded exercise testing indicated a maximal heart rate of 138 beats/minute. The heart rate was limited by a hypertensive response which ended the test. Results included a maximal met level of 15.74 and a suggested target heart rate of 122-135 beats/minute for a duration of 16-20 min. The summary of adherence results for subject #2 is presented in Figure 3.

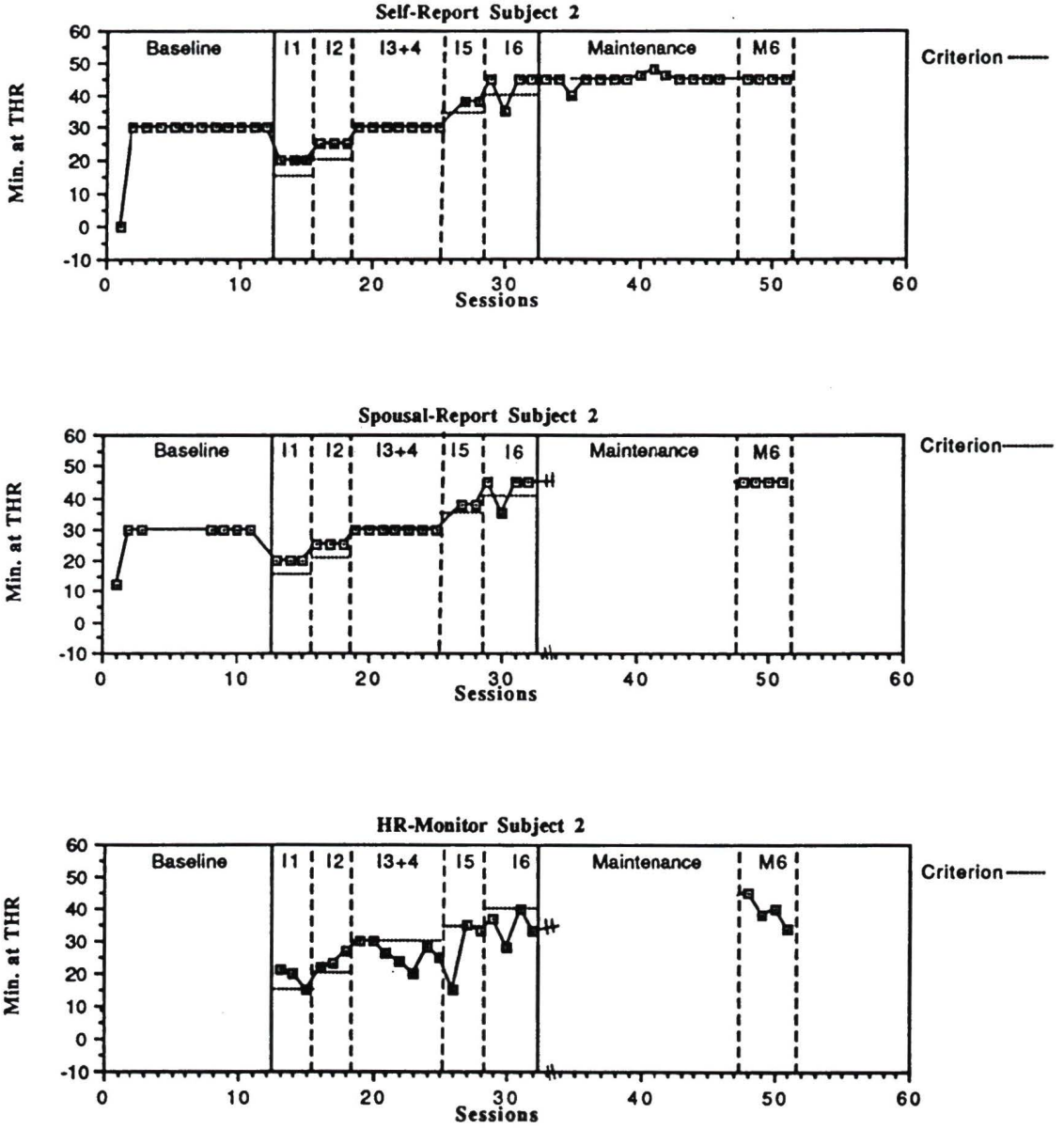
Self-Report

Self-report showed successful achievement of the criteria in all but the fifth week of the study. The mean baseline level of 27.5 minutes at target heart-rate rose throughout the intervention to the a final mean of 42.5 minutes. Maintenance showed a mean of 42 minutes supported by the sixth week probe of 45 minutes.

Spousal-Report

Spousal-report showed duplication of self-report. Missing sessions during the baseline period resulted in a mean of 16 minutes at target heart-rate. The spouse was unable to report during part of the baseline period due to hospitalization. Again the mean rose to 42.5 by the final stage of the intervention. The sixth week probe of maintenance showed a mean level of 45 minutes.

Figure 3, Subject #2 Multiple Adherence Measures



Heart rate monitor

Monitoring recorded an overshoot of the criteria in the first two weeks. The criteria were not achieved in weeks three, four and five. Variability was demonstrated in the sixth week. Self-report and monitoring showed initial verification with increasing variability over time. The greatest duration criterion reached by this subject was 21-25 min. at target heart rate.

Subject #2 was able to exceed the achieved level of activity reached during the maintenance period. During the week six probe the mean level of target heart rate activity was 39.3 minutes.

Individual adherence discussion

Self-reported time in target heart rate zone was very stable for subject #2. The spousal-report suggests verification of the baseline, but the exact matching may indicate duplication rather than verification. Rather than independently measuring exercise time the spouse may just be repeating the report of the subject. The extreme stability of baseline reports implies that total exercise may have been reported rather than time in target heart rate zone. Heart rate monitoring of baseline would verify this

implication but was not carried out. The problem remains how to objectively verify self-report without providing motivation not present in a realistic situation.

Self-report indicated the successful achievement of all but the fifth week's criteria. Spousal-report duplicates these results. Although the weekly mean continued to rise, heart rate monitoring did not support achievement of criteria past week two. The results gathered during the baseline and intervention suggest that this subject benefitted from the decision to participate in the research but was on his own schedule of increasing duration. As with subject #1 subjective assessment of baseline exercise behavior would allow better assessment of changes to behavior.

Self-reported exercise behavior shows durations above the week six criteria during the maintenance phase. Spousal-report duplicates these findings reporting a mean level of 45 minutes in target heart rate zone during the week six probe. Heart rate monitoring during the maintenance phase probe reported a mean of 39.3 minutes in target heart rate zone. Although this does not match the criteria set for week six of the intervention it exceeds the week five criteria. This suggests limited support for the long term maintenance of exercise following the baseline and

intervention, but cannot be directly connected to the intervention alone.

Subject #3

This 42 year old subject reported no regular exercise in the weeks prior to the study. The initial screening process indicated that the subject had electrocardiographic abnormalities, high blood cholesterol and that he was a smoker. The medical screening carried out by the personal physician supported the smoking and hyperlipidemia problems but did not suggest electrocardiographic abnormalities.

This subject`s physician suggested a minimum of a three mile workout daily in under one hour. Following the physician prescription this subject reported a slowly decreasing baseline of exercise duration from approximately 40 to 30 min. Exercise was missed in week four of the baseline period due to an out of town work assignment. The baseline was duplicated by the spouse with failure to continue in the fifth week.

Prior to the intervention this subject achieved a maximal heart rate of 175 on the treadmill. The final blood pressure reading limited this evaluation of maximal heart rate. Prior to starting and in the early stages of the graded exercise test a sinus arrythmia was noted with

premature atrial contractions. This was not reported in the previous medical evaluation but was consistent with the subject's reported medical history. Results of the graded exercise test indicated a maximal met level of 15.75. Target heart rate was prescribed at 154-171 beats/minute for the duration of 21-25 min. Adherence results for subject #3 are presented in Figure 4.

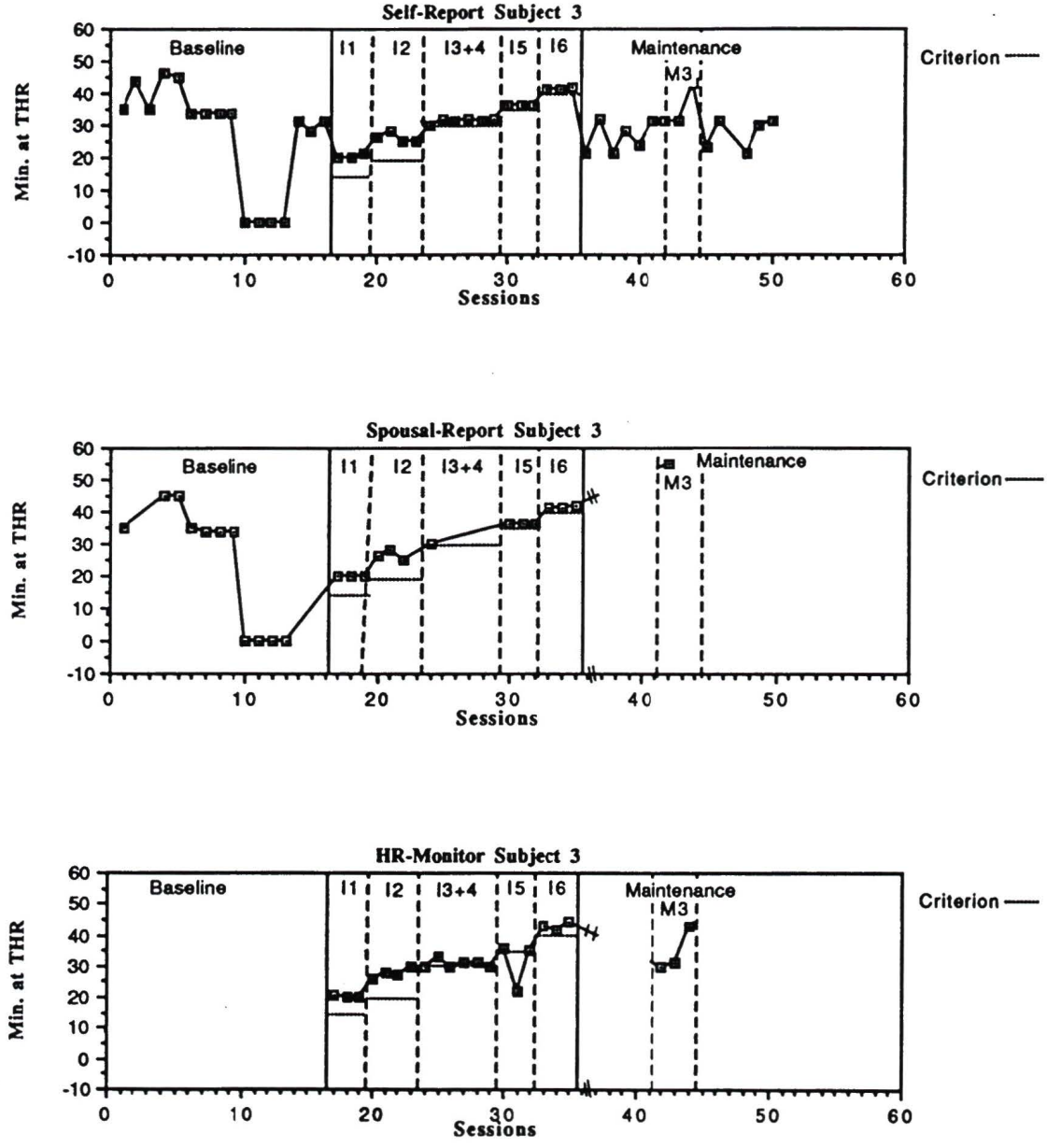
Self-Report

Self-report indicated achievement of target duration criteria in all six weeks of the intervention period. During the baseline phase the mean time in target heart rate zone was 26.9 minutes. The mean target heart rate rose consistently during the intervention phase to a level of 41.3 minutes in week six. The maintenance period produced a mean of 25 minutes with the probe week showing a mean of 35 minutes in target heart rate zone.

Spousal-Report

Spousal-report showed duplication with failure to report in weeks three and four of the intervention period, while the subject was away on assignment. The baseline measure for subject #3 shows a mean of 16.4 minutes in target heart rate zone. The final intervention phase demonstrated a mean of 41.3. Poor compliance with spousal-

Figure 4, Subject #3 Multiple Adherence Measures



report showed a mean of only 18.3 during the maintenance probe.

Heart rate monitor

Monitoring showed matching of all heart rate duration criteria with a single failure in week five. During the fifth week the subject was injured and switched exercise type from jogging to stationary cycling. Monitoring provided objective verification of self-report in all but the single fifth week session. The highest achieved duration criteria was 41-45 min. at target heart rate. The mean for week six of the intervention was 43 minutes at target heart rate. The probe of maintenance reported a mean of 34.7 minutes at target heart rate zone.

Individual adherence discussion

Self-reported time in target heart rate zone during the baseline showed weekly variability. The subject failed to exercise during the fourth week of baseline phase due to assignment out of town. Although this subject reported good levels of activity during the baseline the relapse in week four suggested that work schedule may interfere with adherence. Spousal-report was consistent with self-reported levels but demonstrated a duplication rather than a verification.

Self-reported durations in target heart rate zone met the criteria in all six weeks of the intervention. Spousal-report duplicated the results with an absence of reporting in weeks three and four of the intervention while the subject was on a second out of town assignment. Heart rate monitoring verified the results of self and spousal-report. There was a single lapse in duration during week five. The lapse corresponded to the date of an injury which required the subject to switch from jogging to stationary cycling as the type of exercise. The results of the three measures of adherence indicates that the intervention had positive effects on the adherence of subject #3. Support would be stronger with the addition of an objective measure of baseline exercise behavior. The positive influences of the intervention were demonstrated by the subject's ability to work through out of town assignment and injury.

During the maintenance phase self-reported duration in target heart rate zone showed a drop from the highest achieved criteria. Subject #3 was able to maintain at the level achieved during weeks three and four of the intervention. Spousal-report data were insufficient to verify maintenance. Heart rate monitoring probed during the maintenance phase demonstrated a mean time in the target heart rate zone above the criteria for week five of the intervention.

As with all subjects this subject was instructed to exercise as he felt was appropriate. Drops in duration may be limited by the fact that this subject was attending physiotherapy for rehabilitation of his foot injury. The subject moved back to jogging during the maintenance phase as rehabilitation allowed him to do so. Subject #3 completed only five weeks of maintenance due to annual holiday leave. The results of multiple measurement of adherence do not support the hypothesis of long term maintenance. This subject maintained increased levels of activity but not at the highest achieved level during the intervention period.

Subject #4

This 44 year old subject indicated no regular exercise in the weeks prior to the study. The subject reported history of abnormally high blood pressure, being overweight and dieting. The medical completed by a personal physician indicated the presence of a history of high blood pressure and cholesterol. Visken was prescribed for blood pressure control.

The subject`s physician advised walking beginning with 15-30 min. per day with increases up to one hour over a period of several weeks. Following the physician`s

prescription the subject reported one walk of 30 min. followed by a stable baseline of zero. The spouse did not record during baseline. The adherence results for subject #4 are presented in Figure 5.

Self-Report

The subject reported an overshoot of exercise duration criterion in weeks one through three with dropout in week four. Interpretation of mean values was not useful for subject #4.

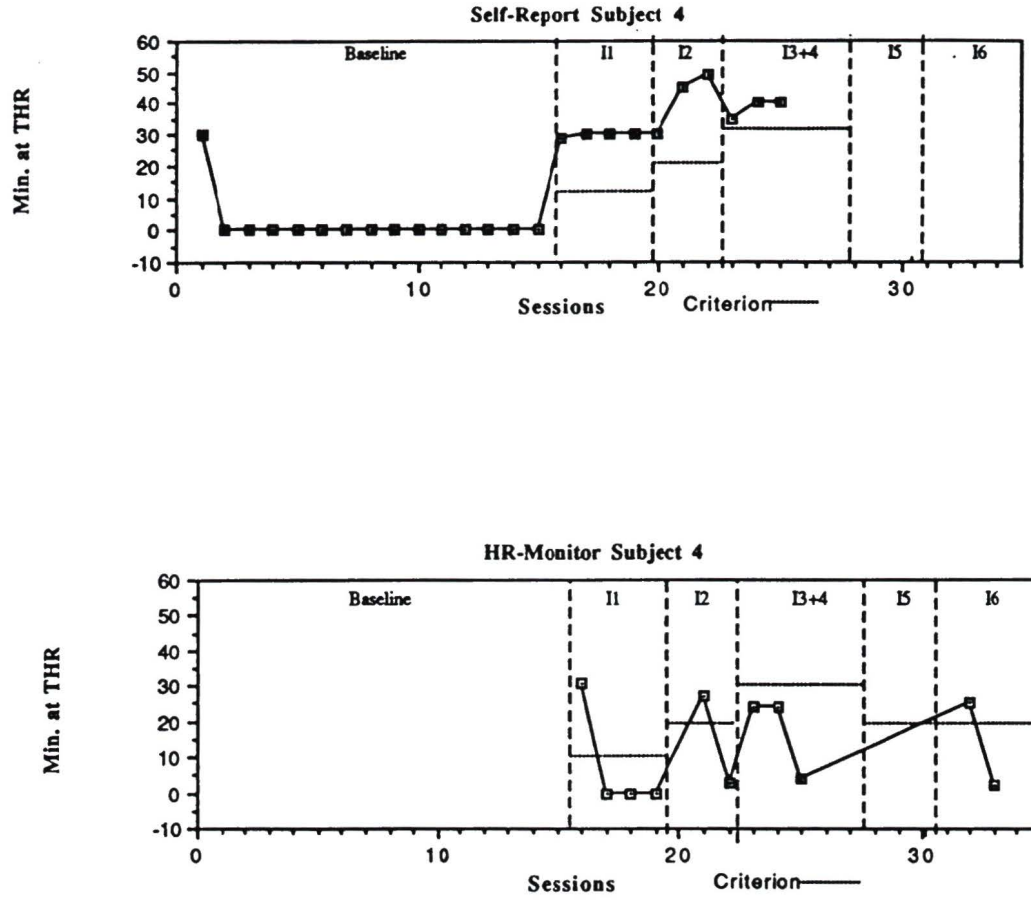
Spousal-Report

Data were insufficient with only a single recording during the study.

Heart rate monitor

Monitoring reported highly variable data in the first three weeks of intervention. No criteria were met but single successes were achieved in weeks one and two. No exercise was recorded in the fourth and fifth weeks. Two sessions were recorded in week six with a single success. Self-report and monitoring showed no relationship. Interpretation of mean values was not useful for subject #4.

Figure 5, Subject #4 Multiple Adherence Measures



Individual adherence discussion

The self-reported baseline for subject #4 was stable at zero. No verification was produced due to insufficient spousal-report data. The lack of spousal-report again indicates the importance of objective measurement of all stages of the study.

Self-reported adherence during the intervention was unstable. Weeks one, two and three showed an overshoot of the criterion followed by dropout in the fourth week. Spousal-report did not take place during the intervention period. Heart rate monitoring contradicted self-reported values with no useful relationship demonstrated between the measures. Heart rate monitoring showed sporadic exercise after the self-reported activity ceased.

Subject #4 did not continue self-report or heart rate monitoring during the maintenance phase. The subject did not keep an appointment for fitness testing where data were to be collected.

Poor time management may be suggested as a reason for the failure of the intervention to influence the exercise behavior of subject #4. The subject did not keep any of the six meetings scheduled during the intervention phase. Re-scheduling of each appointment allowed the counselling

sessions to continue. In a realistic situation this subject would have been lost to the counselling program before the completion of a six week intervention. The use of objective monitoring may have had value with this subject if criteria were based upon the objective measures rather than self-report. Criteria may have been past the subject's capabilities for adoption of exercise.

Fitness Results

Subject #1.

Several variables showed positive change from initial to final fitness evaluation. The results of fitness evaluation are summarized in Table 2. Resting heart rate dropped from 100 beats per minute to 75 beats/minute. Positive results from the graded exercise test included an increased maximum exercise time from 16 to 19 minutes, an increased max met level from 12.12 to 15.74 mets and an increased MVO2 from 42.43 to 55.09 ml/kg/min. Following the graded exercise test, after five minutes seated, the post rest heart rate dropped from 120 to 104 beats/minute.

Body mass index showed a negative change from 31.89 (10%ile) to 34.5 (5%ile). All other measures showed no change.

Table 2

Fitness Assessment Summary Subject #1

Date	04/11/91	07/11/91
Height (cm)	178.5	179
Weight (kg)	101.5	101.7
Rest HR (min)	100	75
Rest BP	130/100	130/100
Max HR (min)	175	178
Max BP	180/110	210/120
Max Exercise Time (min)	16	19
Max Mets	12.12	15.74
MVO2 (ml/kg/min)	42.43	55.09
Recovery HR (bpm)	140	138
Recovery BP	200/140	200/120
Post Rest HR (bpm)	120	104
Post Rest BP	120/94	146/104
Body Mass Index	31.89 (10 %ile)	34.5 (5 %ile)
Waist/HIp Ratio	0.98 (15 %ile)	0.98 (15 %ile)
Sum of Skinfolds	75.0 (20 %ile)	73.9 (20 %ile)
Trunk Skinfolds	46.0 (15 %ile)	47.9 (15 %ile)

Subject #2.

Prior to graded exercise testing this subject showed a drop in resting heart rate from 72 to 66 beats/minute. Resting blood pressure dropped from 130/94 to 120/90 mm. Hg. Fitness results for subject #2 are reported in Table 3.

Results of the graded exercise test showed an increase in total exercise time from 22 to 25 minutes. The increased exercise time resulted in an increased max met level from 15.74 to 17.30 mets and an increased MVO2 from 55.09 to 60.45 ml/kg/min.

Both recovery and resting heart rates after five minutes seated, showed increases following the graded exercise test. These increases may be the result of the higher maximal exercise heart rate achieved. The maximal heart rate rose from 138 to 154 beats/minute as the subject was allowed to continue exercise longer on the re-test without the contraindicated blood pressure response present on the initial exercise test.

The anthropometric measures showed improvement between the initial and final testing sessions. Body mass index, body weight, sum of skin-fold and sum of trunk skin-folds

Table 3

Fitness Assessment Summary Subject #2

Date	04/11/91	07/11/91
Height (cm)	180.5	180.5
Weight (kg)	77.7	74.5
Rest HR (min)	72	66
Rest BP	130/94	120/90
Max HR (min)	138	154
Max BP	230/120	230/110
Max Exercise Time (min)	22	25
Max Mets	15.74	17.30
MVO2 (ml/kg/min)	55.09	60.45
Recovery HR (bpm)	110	120
Recovery BP	180/90	200/90
Post Rest HR (bpm)	86	92
Post Rest BP	110/80	120/84
Body Mass Index	24.30 (70 %ile)	22.9 (85 %ile)
Waist/HIp Ratio	0.86 (85 %ile)	0.90 (70 %ile)
Sum of Skinfolds	78.7. (15 %ile)	65.2 (35 %ile)
Trunk Skinfolds	47.4 (20 %ile)	39.7 (30 %ile)

all dropped. The waist/hip ratio increased in subject #2 from 0.86 (85%ile) to 0.90 (70%ile). Other measures from the fitness evaluation showed no change.

Subject #3.

The presence of a sinus arrhythmia with occasional premature atrial contractions interfered with the measurement of resting heart rate. The sinus arrhytmia was present in both the initial and final fitness evaluation. Fitness results for subject #3 are reported in Table 4.

Although maximal exercise time increased from 22 to 24 minutes, the other measures of aerobic fitness showed no change. Maximal met level and MVO2 measures may have been effected by the change from walking to running resultant from the increased exercise time. Recovery and post rest heart rates showed increases which may be secondary to the effort demonstrated by a higher maximal heart rate.

Anthropometric measures showed positive changes with a drop in body weight from 76.2 to 74.3 kg., body mass index from 24.90 to 24.28 and sum of skin-folds from 56.1 to 54.3 mm. Waist/hip ratio showed a negative change from 0.89 (65%ile) to 54.3 (55%ile).

Table 4

Fitness Assessment Summary Subject #3

Date	04/11/91	06/25/91
Height (cm)	174.8	175.0
Weight (kg)	76.2	74.3
Rest HR (min)	48-88	76
Rest BP	110/70	94/70
Max HR (min)	175	180
Max BP	230/90	180/120
Max Exercise Time (min)	22	24
Max Mets	15.74	15.65
MVO2 (ml/kg/min)	55.09	54.76
Recovery HR (bpm)	118	130
Recovery BP	150/90	180/86
Post Rest HR (bpm)	100	110
Post Rest BP	110/70	120/70
Body Mass Index	24.90 (70 %ile)	24.28 (75 %ile)
Waist/HIp Ratio	0.89 (65 %ile)	0.91 (55 %ile)
Sum of Skinfolds	56.1 (55 %ile)	54.3 (60 %ile)
Trunk Skinfolds	33.5 (50 %ile)	34.3 (50 %ile)

Subject #4.

The usefulness of fitness testing in this subject was limited because of dropout before final testing was completed. The fitness assessment for Subject #4 is reported in Table 5.

Fitness Testing Discussion

Several problems resulted due to inadequate control over the fitness testing procedures. Initial plans were to have graded exercise testing conducted at the University of Victoria. Electrocardiographic and emergency equipment was not available for this plan to continue.

A private cardiology lab became involved in the study. This allowed for testing to be supervised by a cardiologist and directed by a cardiac nurse. This staff provided a great deal of safety to the testing but approached the testing from a functional diagnostic view rather than a fitness testing perspective. The subjects were allowed to grasp the bar directly in front of them and were not pushed to the extent common in fitness testing situations. Testing staff at the lab were well trained and experienced but lacked fitness testing experience.

Table 5

Fitness Assessment Summary Subject #4

Date	04/11/91	06/25/91
Height (cm)	182.9	?
Weight (kg)	96.8	?
Rest HR (min)	70	?
Rest BP	112/80	?
Max HR (min)	134	?
Max BP	180/110	?
Max Exercise Time (min)	18	?
Max Mets	13.33	?
MVO2 (ml/kg/min)	46.65	?
Recovery HR (bpm)	111	?
Recovery BP	150/80	?
Post Rest HR (bpm)	108	?
Post Rest BP	110/70	?
Body Mass Index	28.98 (30 %ile)	?
Waist/HIp Ratio	0.97 (20 %ile)	?
Sum of Skinfolds	78.5 (20 %ile)	?
Trunk Skinfolds	43.4 (20 %ile)	?

Facilities and equipment were inadequate for fitness testing. The testing rooms were small and crowded making observation difficult and did not provide room for emergency situations. Changing rooms were not provided for patients to prepare for or to return from exercise.

Electrocardiographic monitoring was inadequate for diagnosis or detection of ischemic changes. Studies show that sensitivity is increased as the number of leads is increased (ACSM, 1991). It is deemed essential that one lead be directed at each of three areas. The anterior and inferior walls and the lateral precardial area minimally should be monitored in higher risk or diseased populations (ACSM, 1986). The lab procedures utilized in this study monitored only V5 and AVF.

Treadmill speed and grade were not calibrated by the researcher. The testing situation did not allow for pilot study or pre-testing calibration of equipment. Post-testing calibration of the treadmill discovered large discrepancies in the equipment. In this research fitness test results are not used for inter-subject comparison or evaluation to group norms. Graded exercise results should not be compared to population norms. Anthropometric measures follow the STFA (1986) protocol and therefore can be compared to population norms. In continued research 12 lead ECG should be used if practically possible. By increasing the number of leads

false negative results can be reduced (ACSM, 1991). The use of gas analysis and preliminary calibration of equipment will improve the reliability and validity of graded exercise testing used for scientific inquiries.

It should be emphasized that the cardiorespiratory fitness levels are suspect. ACSM (1991) has established standards of aerobic capacity for 40 year old males. An MVO2 of 25.0 to 38.9 is categorized as average fitness, while a high fitness level reports 49.0 to 56.0 ml/kg/min. Lack of laboratory control over calibration and testing protocol may be responsible for the high levels of cardiorespiratory fitness reported. The MVO2 scores reported should be used for within subject comparison only. The MVO2 scores have been marked with an asterisk to avoid possible between subject comparison or comparison to population norms. The presence of these problems with the laboratory conditions suggests the need for control over laboratory procedures for both clinical and experimental application.

General Discussion

The research design.

The utilization of a changing criterion design suited the goals of short term fitness counselling. As Kazdin (1982) suggests this design allows the demonstration of behaviors that occur over the length of an intervention. The design does not require withdrawal of treatment and allows for individual variation in the intervention to meet the specific needs of the subject. To be beneficial exercise should be progressive in nature. According to the American College of Sports Medicine Guidelines (1991), the rate of progression is dependent on numerous factors. Both the starting point and the rate of progression depend on individual functional capacity, health status, age, preferences, needs and goals. The changing criterion design used for this research allowed for individual counselling within a design framework. Individual rates of progression and self-selection of criteria from set ranges allowed for subject input.

With multiple measurements of exercise adherence a choice must be made as to which measurement techniques is utilized in the establishment of criterion. The use of subjective measurements can produce uncertainty The use of objective measures may be more applicable when the validity

of self or spousal-report is in question. Both subject #1 and #4 had large discrepancies between measurement techniques in the early stages of the intervention. This suggests the utilization of an objective evaluation of duration. Further research into the strength and length of exercise duration criterion may improve the application of this design to fitness counselling.

Multiple measurement techniques

Three techniques were used for the evaluation of time spent exercising in the target heart rate zone. Each of the techniques manifested weaknesses and strengths during the research.

Spousal-report proved to be the least useful of the measurement techniques. Spouses did not have the opportunity to independently assess the target heart rates of the subjects. If spouses were exercising together the technique would be useful, but as utilized in this study spousal-report provided more a duplication than a verification of the self-reported scores. The measurement of exercise behavior using spousal-report was not useful in this study. Further study of spousal support may provide more information than the continued use of spousal-report as a verification of other measurement techniques. Social

support provided by significant others does impact adherence to regular exercise (Wankle, 1984).

The lack of verification of self-reported durations during the baseline phase presents a question. Were self-reported durations recorded as time in target heart rate zone or an assessment of total time spent exercising? This question cannot be answered by the data collected in this study.

The application of objective heart rate monitoring provided useful results to this study of adherence. Clinically the microprocessors provided reliable information. The subjects were able to set the monitors and work in the prescribed target heart rate zone. The transfer of information to micro-computer was reliable. Data were not lost due to complications with the microprocessor or in the transfer process. As Leger and Thivierge (1988) suggest, heart rate monitors can provide a valid stable and functional assessment of intensity and duration of exercise.

Heart rate monitoring provided feedback to both the subjects and the researcher. In each counselling session the subjects viewed the results of monitoring on the micro-computer. The objective feedback was appreciated by the subjects. When asked in a follow-up questionnaire about parts of the intervention that provided the greatest

assistance the three remaining subjects mentioned a number of positive factors in relation to the monitors (see appendix R). Heart rate monitors aided subject #1 in developing confidence. He was able to see what was happening which provided a feeling of security. Subject #2 added that the monitors provided both encouragement and challenge. Subject #3 responded that the monitors allowed him to pace his exercise sessions. The three subjects independently pursued the purchase of personal monitors on completion of the intervention phase.

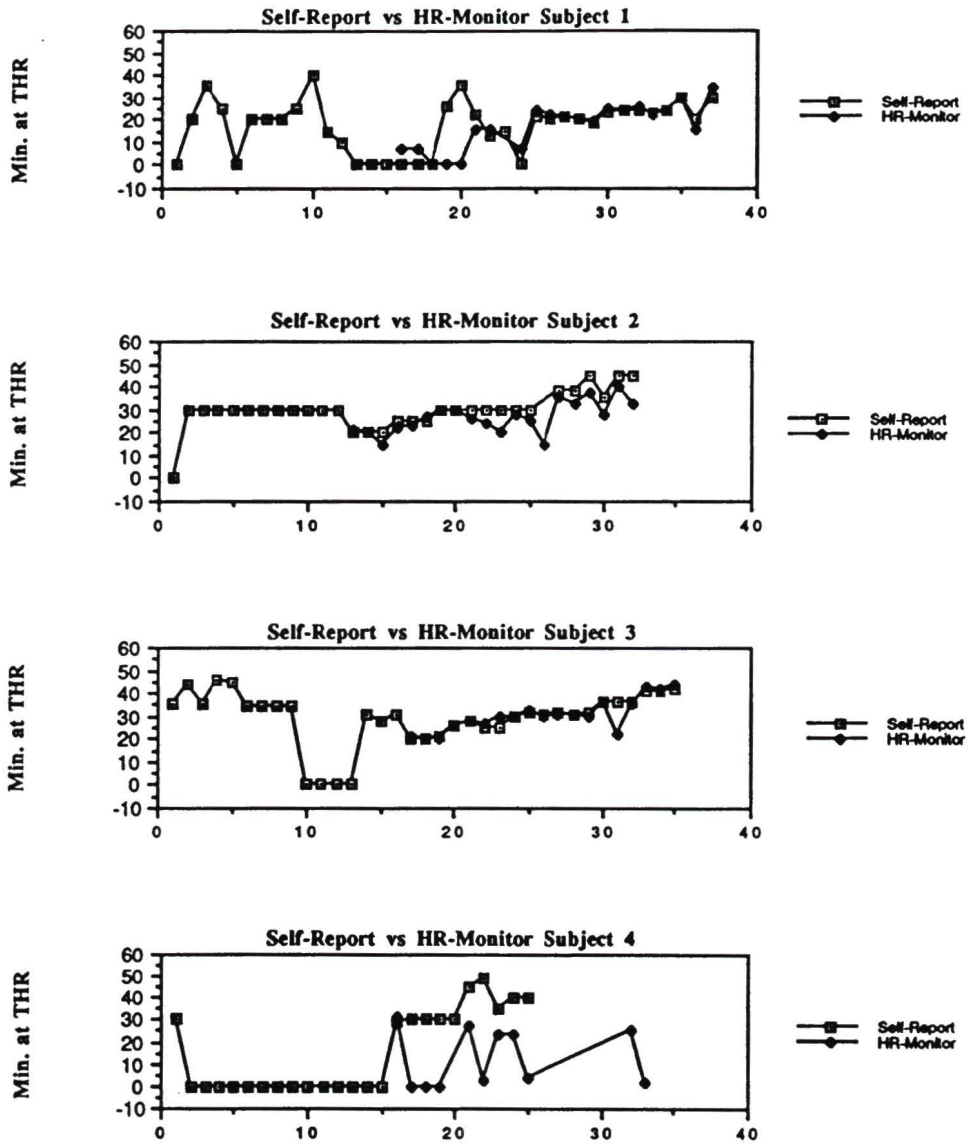
Self-reported duration of exercise is a useful measurement of exercise adherence. The subject`s perception of intensity and duration are reflected by self-reported measures.

Self-Report vs.heart rate monitoring.

The comparison of self-reported with monitored data provide some interesting perspectives (see Figure 6). Future studies may gain information on adherence to activity through the investigation of perceived levels of activity in comparison to objectively measured durations.

During the first two weeks of the intervention period subject #1 demonstrated no relationship between self-report and monitoring. Corresponding to the readjustment of target

Figure 6 Comparison of Self and Monitor Report



heart rate zone, the two measures showed similar trends as observed by visual inspection. The successful achievement of duration criteria corresponds to this matching of trends.

Visual inspection of the data for subject #2 shows a similarity in the trend with failure to match in the middle segment of the intervention. Variability of the heart rate monitoring does not support any further conclusions.

Subject #3 who achieved all but the fifth exercise duration criteria had strong similarity between the two measures of adherence as assessed by visual inspection. The obvious diversion during intervention week five corresponded to a change in exercise type following injury. This feedback was useful during counselling for aiding in the transition to a new exercise form.

There is no relationship demonstrated by visual inspection of the two measurements for subject #4. The variation in report presents questions for future research. It is deserving of further research to discover if wide variation between objective and subjective measures indicates problems with adherence. Answering this question may suggest the utilization of objective measurement to aid in training individuals to subjectively measure their adherence to personal fitness programs.

Personal physician involvement.

The personal physicians of each subject were utilized in the selection of subjects for this study. This began the baseline period of data collection. The client history questionnaire completed by physicians covered several areas of investigation (see appendix H). Beginning with a patient description and evaluation of risk factors, the history continued by asking about diagnosis of etiology, present physical activity, electrocardiographic information, medication and additional abnormalities. Besides providing for selection of subjects based on medical history the questionnaire provided for the comparison of pre-exercise to post-exercise cholesterol and blood pressure readings. Clinical changes were noted in the lipid profile of the three remaining subjects, but blood pressure changes were not demonstrated. The results of such comparison are presented in Table 6.

Blood lipids.

Blood lipid measures were reported by physicians on the Client History Questionnaire. Local laboratories were used for lipid testing, The laboratories utilized enzymatic methods for the measurement of lipids rather than reference

Table 6

Medical Results

#/Test	Blood Count (Hbg.)	Glucose (mmol/L)	Fast Trig. (mmol/L)	HDL (mmol/L)	Total Cho. (mmol/L)	BP s/d
#1/pre	141	8.6	3.72	0.84	4.8	130/80
#1/post	141	8.6	1.30	0.94	3.48	140/85 Medicated BP
#2/pre	157	5.4	4.18	0.87	6.99	130/90
#2/post	148	6.0	1.74	0.96	6.48	120/90
#3/pre	157	4.1	NA	0.90	6.97	120/70
#3/post	160	3.8	1.68	0.93	5.72	130/70
#4/pre	NA	5.3	3.94	.84	7.02	110/80
#4/post	NA	NA	NA	NA	NA	NA Medicated BP

methods. This is standard procedure for clinical measurement of blood lipids.

Subject #1 recorded an improved blood lipid profile following involvement in the research. Fasting triglyceride levels fell from the pre-test level of 3.72 mmol/L to 1.30 mmol/L on the post-test evaluation. The subject's total cholesterol/high density lipoprotein ratio fell from 5.71 to 3.70. The second reading fell below the ACSM (1986) risk level of a 5.0 ratio.

Subject #2 recorded a decreased fasting triglyceride level from 4.18 to 1.74 mmol/L. His Total/HDL ratio fell from 8.03 to 6.75 during the research period.

Subject #3 recorded a lowered Total/HDL ratio from 7.74 to 6.15. Total cholesterol in this subject fell from 6.97 to 5.72 which is below the ACSM (1991) risk level of 6.20 mmol/L. Only a final recording of fasting triglyceride was recorded for this subject.

Physician prescription of exercise.

Each personal physician received a letter with the client history questionnaire asking them to counsel their patient as they normally would regarding exercise. The physicians were asked to outline their general exercise

prescription and methods. In addition they were asked to expand on specific suggestions actions or goals discussed with the patient.

The personal physician for subject #1 emphasized weight control problems to convince the subject of the importance of regular exercise. It was suggested that the subject utilize gym equipment at the place of work. A weight loss of eight to ten pounds was established as a goal.

The physician for subject #2 felt that the subject was self-motivated *and did not need external motivation to begin* regular exercise. The physician suggested that it would not normally be part of his practice to advise on exercise.

Subject #3 received unspecified information to convince him of the importance of regular exercise. The exercise prescription suggested that the subject should participate in a daily walk of at least three miles in under one hour. The physician suggested that goals should be realistic.

Subject #4 was reminded of his risk factors by his personal physician. Increased blood pressure, high cholesterol and high body weight were emphasized. It was suggested that exercise would reduce cardiovascular risk and aid in meeting the physical demands required by RCMP work. The exercise prescription suggested continuous walking

starting with 10-30 minutes increasing to an hour per day in a period of a few weeks. It was suggested that low weight bearing activities would be most appropriate. Specific suggestions stated that the activity should be something that was enjoyable and that could be continued on the long term.

The amount of counselling provided to the subjects in this study was highly variable. This research suggests that the physician plays an important role in motivating patients with health problems to exercise. As Oldridge (1979) suggests both the severity and susceptibility of health risk need be explained to patients. Patients need to be confident in the diagnosis of their health problems and in the benefits to their health derived from regular exercise. The physician can have strong influence in these areas.

Fitness or lifestyle specialists have the expertise to aid individuals establish a program, set goals and work towards regular adherence. This research suggests that physicians should utilize other health professions to continue their initial motivation. Individuals with health problems benefit from the continued involvement with individuals trained to educate them on programming their own activity and developing adherence strategies.

Three of the four subjects participating in this study increased their level of exercise through physician and conditioning therapist contact. This study provides evidence that combination of both individuals influenced the exercise behavior of the three subjects. It would follow from the review of literature that the physician aids in the patient's decision to begin exercise. Health professionals trained to program exercise and continue motivation play a larger role in the establishment of activity habits and longer term program maintenance.

Individualized short term counseling.

The intervention period utilized individualized counselling for the six week period. The objective was to provide basic programming information and practical adherence strategies to the subjects. The short term nature was emphasized, while stressing self responsibility to the subjects. Structured counselling began by establishing a mutually acceptable program meeting the goal of both the counsellor and the subject (Janis, 1983). As the program progressed the emphasis shifted to place total responsibility in the hands of the subject. The intervention was well received by the three continuing subjects. In a follow-up questionnaire subjective comments on the intervention program were collected.

Subject #1 reported a general feeling of well-being, more endurance and better circulation to his hands. He plans to continue exercise and has purchased a monitor to aid in recording duration and intensity. This subject suggested that a longer program would have be appreciated. Interest was shown in both a six month and one year follow-up evaluation.

Subject #2 reported loss of weight, feeling fit, more energy and less fatigue. He considered the counselling sessions well spaced, informative and encouraging. Subject #2 plans to continue exercising and showed interest in a six month and one year follow-up.

Subject #3 felt that his increased exercise provided him with more energy. He reported feeling better both mentally and physically. This subject reported a better outlook on life, better appearance and better fitting clothes. Subject #3 plans to continue jogging with the substitution of stationary cycling if need be. Interest was expressed in both a six month and one year follow-up.

Although the rate of progression was not questioned by any of the subjects, it may have been related to the dropout of subject #4 and failures in adherence in subjects #1 and #2. If subjects adhered to each exercise duration criteria

they would have been exercising 45 minutes in target heart rate zone at the end of the six week intervention period. Further research should investigate the ideal length and strength of criteria to establish adherence to regular exercise.

CHAPTER FIVE

Conclusions and Recommendations

This research provides the basis for a sensitive intervention program for police officers, who find themselves isolated from a mainstream work-place fitness or wellness program. Three of the four subjects improved their participation in regular aerobic activity over the combination of the baseline and intervention period. Experimental control was demonstrated for only two of the four subjects. This lack of control limited the effects that could be attributed to the intervention directly.

It was proposed that physician contact is not enough to aid in the development of exercise habits in higher risk populations. It is difficult to support this viewpoint due to the highly variable nature of the baseline measures. The baseline measurement of self-reported exercise duration is not conclusive. Spousal-report of exercise behavior was not always carried out. The data suggest that spousal-report served more as a duplication rather than a verification of self-report.

The personal physicians involved in this study provided limited information concerning fitness to their patients. Each of the subjects reported that the information provided

was inadequate. Physicians need to take a larger role in establishing regular exercise in patients. Physicians should be educated in the basic applications of exercise to the clinical situation. Where physicians feel it is indicated the expertise of outside individuals or agencies should be employed. More than physician encouragement is required to habitualize physical activity. The conditioning therapist can support the early beginnings of exercise by providing fitness education, practical adherence strategies and motivational support. The physician, conditioning therapist and the patient all have roles to play in establishing regular exercise. It remains in the patient's hands to accept self-responsibility for positive life choices.

In visual inspection of the graphs only subject #1 showed a reversal in the trend developed in the baseline measurement of exercise duration. Subject #3 demonstrated a reduction of exercise duration variability during the intervention phase and an absence of lapses in performance. The data allow only the conclusion that subject #1 and #3 showed increased adherence specific to the intervention. Subject #2 may have shown equivalent improvement with only the involvement of the family physician. The data would therefore support the importance of the involvement of both the personal physician and a conditioning therapist.

The three subjects who continued exercising throughout the study showed improving trends in lipid profile and fitness. In personal description of the perceived benefits both physical and psychological benefits were noted by each of the subjects. Emphasis should not be concentrated solely on medical or fitness changes. Total concern for wellness should note improvements in subjective feelings and psychological factors.

The utilization of microprocessor for the objective monitoring of intensity and duration of exercise provided a major contribution to the study. With the failure of spousal-report to provide verification of self-report, monitoring was the only alternative. Microprocessors were not utilized during the baseline period to avoid the addition of motivators that would not realistically be provided by the family physician. The lack of objective baseline measurement could contribute to the failed demonstration of the research proposition. The addition of objective monitoring would provide a valuable addition to future research. The problem presented is how to use objective measurement tools without the accompanying motivational influence. Blind monitoring may be a possible solution.

In addition to the research value of the microprocessors, they provided valuable feedback immediately

to the subjects. Objective heart rate monitors allowed the subjects to develop their subjective measurement of target heart rate zone. One subject was unable to develop the skill to measure heart rate by palpation due to his medical condition. The microprocessors were strongly supported by the subjects as a motivational and teaching tool. The three successful subjects highlighted their belief in the monitors by expressing interest in purchasing them for continued use.

Self-reported adherence by subject #1 was verified by the objective measurement of heart rate up to the fifth week of intervention. Subject #1 reported maintenance of that duration for the six week maintenance phase. Only two objective measures of heart rate were completed during the sixth week maintenance. This provides limited support for maintenance of his exercise behavior.

Subject #1 demonstrated improved cardiovascular fitness and lipid profile. Anthropometric measures and blood pressure did not show improvement.

Subject #2 reported achievement of all established exercise duration criteria. Self-report was not verified by objective measures of target heart rate. Although criteria were not met, mean weekly duration did rise during the intervention phase. Subject #2 reported maintenance of the highest level of achieved exercise duration. This

maintenance report was verified by the sixth week objective probe. This subject did not follow the established duration criteria but did progressively increase duration.

Subject #2 showed improved cardiovascular fitness. During graded exercise testing his hypertensive response showed improvement. Antropometric measures showed improvement. Lipid profile demonstrated an improving trend. Resting blood pressure did not change.

Subject #3 reported achievement of all six exercise duration criteria during the intervention phase. Objective measurement of heart rate verifies this report in all but week five of the intervention. This subject reported maintenance at a mean level above the week three and four duration criteria. Objective measurement of heart rate showed actual achieved durations at the week five level of intervention.

During graded exercise testing subject #3 demonstrated positive cardiovascular changes including a reduced hypertensive response.

Subject #3 showed positive anthropometric changes and improvements in lipid profile. Resting blood pressure did not show improvement.

Subject #4 reported successful achievement of the exercise duration criteria in the first three weeks of intervention. Objective measurement of heart rate did not verify self-reported exercise behavior.

This subject did participate in all intervention counseling but effectively dropped out from exercise after the third week of intervention. No comment on fitness or medical changes is possible as the final evaluation was not completed.

It is important to emphasize the individual subject design of this research. Generalization of individual conclusions should not be applied to other populations without further testing. A program is outlined by this research to support the initiation of a individualized approach to fitness counselling in higher risk populations. This study suggests that the physician, conditioning therapist and especially the patient have roles to play in establishing lifestyle change. Care should be taken not to compare graded exercise test results to population norms. Poor control of the testing situation limits this comparison, but allows only comparison within subject tests.

Work-place wellness programs should provide more than screening for health problems or individuals at higher risk. Successful programs must provide all individuals with the

means to make necessary lifestyle change. Expertise should be drawn upon to provide education and motivation for the participant. Although the responsibility for change falls back on the individual, the employer, physicians, health professionals and significant others have a major influence.

Three of the four subjects involved in this study demonstrated increasing exercise adherence through their involvement in the study. The combination of advice from their family physician followed by a weekly meeting with a conditioning therapist provided a sensitive intervention for these higher risk individual police officers. Single subject changing criterion design allowed for the individualization and progression necessary for the subjects to develop self-responsibility for their exercise.

Recommendations

Several recommendations can be presented based on this adherence research. The recommendations relate both to future research and to the intervention program.

Heart rate monitoring provided a useful measurement of exercise adherence and should be utilized as an objective measure of exercise adherence. The Vantage XL monitors supplied consistent and reliable data. The review of

literature suggests that monitors can be utilized as a valid exercise behavior measurement tool. The monitors allowed objective measurement of duration and intensity of unsupervised exercise for periods up to two weeks. In addition monitors improved counselling sessions by providing rapid feedback and continued motivation. These factors support monitor use as a research, motivational and teaching tool.

Spousal report should be limited to a measure of social validation. In contrast to heart rate monitoring spousal-report did not provide effective validation of self-reported exercise adherence. Unless the spouses are exercising together, spousal-report tends to be a duplication rather than a validation.

Continued research should use objective measures of adherence, but utilize spousal support rather than spousal-report. This study did not address the influence of spousal-report on exercise adherence.

Continued research should utilize single-case research designs to investigate exercise behavior. Single-case research provides useful designs for continued exercise adherence inquiry. Changing criterion design allows for the progressive nature of exercise programs. The single subject design permits an individualized approach to short-term

counselling within a scientific inquiry. In the past adherence research has demonstrated numerous personal and situational factors influencing exercise behavior. Single case research allows for the investigation of both personal and situational influences.

Future research should place emphasis on establishment of valid stable baseline exercise behavior. Establishment of a valid baseline measurement is critical to continued use of single-case designs in the investigation of exercise behavior. In this study subjects may have reported either minutes exercising at target heart rate or total exercise time. Objective measurement of all phases of research would provide clear information.

In continued research fitness testing should be as scientifically valid as possible with control of the procedures controlled by the research team. Lack of control over laboratory equipment and procedures had negative influences in this study. In both research and clinical situations it is important to ensure calibration of equipment. Protocols must be strictly followed to ensure valid and reliable measurement of fitness. Graded exercise testing of higher risk subjects should follow ACSM (1991) guidelines.

Short-term counselling should be investigated to a greater extent. With higher risk populations the physician and other health professionals can influence exercise behavior. Sensitive intervention programs can provide individuals with increased risk of cardiovascular disease with motivation and practical strategies necessary for safe and effective physical activity programs.

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APPENDIX A

Sample Intervention Program Outline

Sample Intervention Program Outline

Week	Program	Time Hours
PRE	- Baseline establishment	
	- Physician supervised graded exercise test	
1	- Development of long term goals	1 1/2
	- Lifestyle review	
	- Week one duration intensity goals	
	- Basics of fitness	
	- Individualized fitness prescription	
2	- Practical adherence strategies	1
	- Action planning for week 2	
	- Question and answer period	
	- Principles of exercise	
	- Benefits of health related fitness	
3	- More practical adherence strategies	1
	- Action planning for week 3	
	- Question and answer period	
	- Assessing fitness barriers and rewards (Physical Activity Balance Sheet)	
4	- Developing a personal wellness program	
	- (self-responsibility)	1
	- Action planning for week 4	
	- Relapse prevention	
5	- Subject developed action planning for week 5 (reviewed by conditioning therapist)	1
	- Progress review	
	- Question and answer period	
	- Subject developed action plan for week 6	
6	(Reviewed by conditioning therapist)	1
	- Question and answer period	
	- Client developed short/long term goals	1
7	- Question and answer period	
Post	- Final fitness evaluation and debriefing	1 1/2

Developed from Fitness Canada, CASS CSTF Interpretation and Counselling Manual (1987)

Appendix B

Intervention Agenda and Handouts

INTERVENTION #1 AGENDA **Subject #** _____

Meet subject at the University of Victoria. Do a quick tour of the building and show them to room 166.

Review the purpose of the study and outline the time-lines and general plan of action. Ask the subject about how their meeting with the physician was and how they have progressed to this point. What activity have they chosen to participate in.

Explain the anthropomometry assessment, conduct it and review the findings.

Review the findings of the graded exercise test

Explain the use af the Vantage XL as well as continued self and spousal report.

Set the interactive exercise duration goals for week 1 of the intervention: Minimum 10 min. Maximum 20 min. at target heart rate. If above 20 min. in baseline then 16-20 min. If less than 20 min. start at 10-15 min.

Set up meeting time and place for one week.

Comments on the physician interaction and prescription

_____

_____

_____

Comments on the baseline period of exercise

_____

_____

_____

Now that we have established a baseline for your exercise after your physicians prescription it is time to systematically work on exercise adherence. It will be the goal over the next six weeks to progressively increase the time you spend exercising each week. We will be scheduling a weekly meeting for the next six weeks to review your progress, increase your knowledge about programing your own exercise and provide you with practical strategies to adhere to your regular exercise. Following the six week intervention you will be asked to continue your own self directed program for a period of six weeks followed by a re-evaluation of your fitness.

For week one we will develop exercise goals based on a set intensity and duration. Please follow these guidelines to the best of your ability three times per week until our next meeting.

Continue to complete the self-report forms as during the baseline period. Also ask your spouse to complete the spousal-report forms in the same manner as during the baseline period. The forms should be returned to the researcher for each meeting time.

In addition to the report forms we will be utilizing the Vantage XL Heart Rate Monitor. This will provide the research with an objective measurement tool.
I will ask you to use the monitor to record your exercise sessions. Fifteen minutes before you begin your exercise session follow these instructions:

1. Place the transmitter on the chest band right side up. Place the chest band around your chest just below the pectoral muscles. The black electrode will be toward your right side.

2. Put on the wrist monitor as you would a normal watch. At this time the monitor should show the time of day.

3. Press the SELECT ^ button 2 times. Int 60 should now be flashing alternately.

4. Press STORE/RECALL 1 time. Stop watch and heart rate will be showing. Watch for beating heart. Pressing the SIGNAL v button will silence the beeper.

5. Press the SET/START/STOP BUTTON approximately ten minutes before you begin each exercise session.

6. Press the SET/START/STOP ten minutes following the exercise session.

7. Complete the recording by pressing the SELECT ^ button two times.

8. Remove the transmitter from the chest strap, wipe with a clean dry cloth, store until next exercise session.

The Vantage XL is an expensive piece of technology, please ensure that it is stored as safely as possible in a dry location. The equipment is water resistant. Swimming or heavy perspiration will not damage it. Please remember that if it is wet, dry it with a clean cloth before storing in the provided container.

Please use the monitors only as requested by the researcher.

Remember to bring the entire monitor with you to each of the weekly meetings.

Activity preference _____

THR Range _____ to _____ 10/sec. or _____ to _____ min.

Duration Goal _____ to _____ min. at THR.

Meeting date, time and place for next week.

_____

Other Comments

_____

_____

_____

INTERVENTION #2 AGENDA SUBJECT # _____

Collect self and spousal report sheets from week one and provide sheets for week two.

Are there any questions and concerns from the first week of intervention?

_____

_____

_____

Outline the four components of fitness:

Flexibility

The range of motion for a joint or a series of joints. Flexibility is dependent on the joints, muscles and connective tissues. Good flexibility aids good posture with less risk of injury and chronic pain.

To develop flexibility stretch the major joints to the point of gentle tension holding in the stretched position for 15 to 20 seconds. Avoid over-stretching and bouncing while stretching as this initiates reflexes that interfere with the stretching process.

Muscular Strength and Endurance

Muscular strength is the ability of the muscles to develop a maximum tension for a single contraction. Muscular endurance is the ability of the muscles to produce repeated contractions or hold a contraction for an extended period

These muscular abilities are developed by progressive weight training. At this point of your program we will not focus on muscular ability allowing more concentration on body composition and aerobic fitness.

Body Composition

This component of fitness concentrates on the body weight adiposity and distribution of fat. Evidence shows that both high and low levels of body fat are associated with health risk. Also the distribution of fat in the trunk region is associated to increased risk of health problems.

The best method of fat loss combines reductions in fat and calorie intake with increased daily physical activity and regular exercise.

Aerobic Fitness

Aerobic fitness looks at the combined efficiency of the heart, lungs, blood vessels and muscles to supply energy for work and rid the body of waists.

Aerobic fitness allows for participation in work and leisure activities with less stress. Regular aerobic activity has been associated with improved cardiovascular health.

To develop aerobic fitness we should participate in continuous activity involving the major muscle groups regularly.

The FITT Principle

Frequency - Minimum of 3 times per week or alternate days.

Intensity - In target heart range 60-80% of maximum heart rate.

Time - Minimum of 15 min. working toward 1 hr. at THR.

Type - Continuous activity using the large muscle groups.

These principles should be followed as prescribed after your fitness evaluation. Progression can be developed by manipulating these factors gradually. For this research we will collectively set increasing goals for exercise duration.

An Exercise Session

Warm-Up (5 min.)

Begin with approximately five minutes of warm-up period which allows the heart rate to slowly rise into the target heart-rate zone. This period allows for gradual adaptation to exercise. The muscles and cardiovascular system are allowed to adapt slowly to higher levels of activity.

Training Period (15-60 min.)

Continuous period of elevated heart rate.

Cool-Down (5 min.)

Reduce intensity gradually keeping the legs moving. This allows gradual return toward resting levels of blood pressure and heart-rate. Keeping the legs moving allows for good return of the blood to the heart, brain and upper extremities.

Stretches

Stretching following aerobic activity provides a period for continued cool-down as well as providing for the development or maintenance of flexibility.

(See Flexibility Program)

Goal Setting

(See Goal Setting Guidelines)

(Action Plan Worksheet)

(Self-Contract)

Questions or Comments

_____

_____

_____

Activity Preference _____

THR Range _____ to _____ 10/sec. or _____ to _____ min.

Duration Goal _____ to _____ min. at THR

Meeting date, time and place for next week.

_____

Intervention Agenda #3 Subject # _____

Collect Self and Spousal Report form. Provide forms for week three and four. Stress that this will be a two week period until the next meeting. Remind the subjects of the importance of taking their own pulse in addition to the wrist monitor.

Were the subjects able to think about goal setting? what were the major points that their goal setting established?
Any other questions or concerns from week two of the program?

_____

_____

_____

The Health Benefits of Exercise

There is evidence that regular exercise reduces the risk of mortality and morbidity. Exercise has been shown to contribute to quality of life in these ways.

The main physical benefits to health have been shown in the prevention and treatment of hypertension, coronary heart disease, atherosclerosis and diabetes. Psychological health seems to be aided by the reduction of stress, anxiety, tension and depression due to regular aerobic exercise.

The risk of injury or sudden death is increased during exercise but exercise in the long term reduces these risks overall. What this means is that the jogger is at increased risk while actually jogging however joggers suffer less overall risk to health.

What type of activity is recommended to reduce the risk of health problems? Aerobic activity that takes place for 20-60 minutes three to four times a week at an intensity 60-70% of maximal exercise capacity.

The general short term benefits of exercise include an increased calorie use which is prolonged after exercise, decreased appetite and improved aerobic capacity. This can lead to reductions in body fat and improvements in cardiovascular function.

Exercise is reported to lower coronary heart disease by reducing high blood pressure, slowing the heart rate, improving the efficiency of the heart, providing more capillaries for the heart fibers and increasing the coronary vessels.

Exercise has been associated with improvements in the blood lipid profile reduction which in turn lead to reduced health risk.

Regular exercise has the secondary effect of producing changes in other risk factors. Exercising reduces the cigarette habit, leads to reductions in body mass index and minimizes family history of coronary heart disease.

Exercise and Hypertension

Hypertension is elevation of blood pressure above 140/90. It is the risk factor most strongly associated with coronary heart disease. Hypertension produces strain on the heart and increases the possibility of blockage of the bodies arteries.

Two studies have demonstrated that individuals who do not exercise regularly have higher risk of heart disease. In Paffenbarger's Harvard Alumni study it was shown that those not exercising had a 35% higher risk if developing high blood pressure. Blair supported this finding demonstrating that low fitness individuals had a 52% higher risk of hypertension than a high fitness group.

What about the reduction of hypertension in individuals who currently are affected. Exercise training is associated with a 3-15 mm Hg drop in diastolic pressure and 5-25 mm Hg drops in systolic pressure. A study by Duncan demonstrated that a group of 44 hypertensives were able to decrease their diastolic blood pressure by a mean of 7.1 mm Hg following a 16 week exercise program.

Exercise and Hypercholesterolemia

Cholesterol is produced naturally by the body and is consumed in the diet. It is a essential component of cell membranes found in large amounts in the brain and nerve tissue.

There are four major lipoproteins. They are:

High Density Lipoprotein, the most dense protein. They seem to have protective effects, taking up other fats to be excreted from the body. Exercise has been shown to produce increases in this good component of blood cholesterol.

Very Low Density Liopprotein, carries triglyceride to the body cells.

Low Density Lipoprotein, left over after the VLDL passes on the triglicerides.

Trigliceride should be maintained at levels below 110 mg/dl. They are lowered by losing weight, regular exercise and reductions in the intake of alcohol and simple carbohydrate.

How do you maintain good levels of lipoprotein? Appropriate levels of lipoprotein are maintained through a balance of dietary and exercise intervention. The following suggestions have been provided for the control of blood lipid problems:

Improve the TC/HDL ratio (below 5).

Maintain total cholesterol below 6.2 mmol/L (240mg/dl).

Decrease intake of saturated fats and total fat.

Maintain ideal weight or reduce overweight.

Increase fiber intake.

Increase aerobic exercise.

Stop smoking

Studies show that exercisers have lower levels of total cholesterol, VLDL, LDL and trigliceride. In addition HDL levels are elevated in those who exercise regularly. Additional studies show that those with elevated lipoproteins con lower the levels of total cholesterol and trigiceride and increase HDL in as little as 9weeks of regular aerobic exercise.

Summary of Exercise Prevention of Coronary Heart Disease

Three important studies have provided support:

London Bus Study

The active conductors had less incidence of heart disease than the less active drivers.

Sanfransisco LongShoremen

Those that expended 8500 Kcal or more during work had half the rate of fatal heart attacks.

Harvard Alumni

Those that expended 2000 Kcal or more a week in walking climbing or sports play had 49% less coronary heart disease. Also reductions were shown in the risk of respiratory disease, cancer, suicides and all other causes of death. Even ex-athletes who did not exercise regularly developed increased risk. Sedentary individuals who began exercising gain the protective benefits of exercise.

Again why does exercise help?

Lowers the impact of other risk factors

decreases smoking
reduces blood pressure
improves lipoprotein profile
controls obesity, diabetes and stress

Exercise Directly improves myocardial function and electrical stability and reduces oxygen demand.

Activity Preference _____

THR Range _____ to _____ 10 sec. or _____ to _____ min.

Duration Goal _____ to _____ min. at THR

Meeting date, time and place for next meeting

_____

Intervention Agenda #4 Subject # _____

Collect self and spousal reports for weeks 3 and 4. Provide report sheets for week 5 along with the intervention handout.

Do the subjects have any questions after the past two weeks? Record special problems, concerns or questions below.

_____

_____

_____

Adherence to Regular Exercise

Exercise adherence can be thought of as a series of steps relating to sticking with an exercise program you have chosen. You have completed the first step. Initially you made the decision to begin exercising for your own personal reasons. Although this is a major accomplishment the next step is establishing exercise as a habit and finally sticking to a program in the long term. We have talked about setting goals for the short and long term as one strategy aiding adherence.

Of the individuals who begin an exercise program 40-50% drop the program within six months. Within 8 days 15% will discontinue regular exercise and within 15 days 30% will have discontinued. The longer you stick with exercise the more likely you are to continue.

The Five Most Common Reasons People Drop Exercise

1- Program takes to much time.

2- Program interferes with job responsibility.

3- Family illness prevents participation.

4- Lack of interest (boredom).

5- Travel to exercise center expensive or time consuming.

Do you feel any of these reasons might effect you? Are there other possibilities? What can you do to reduce problems for yourself?

_____

_____

_____

The major reason people give for beginning exercise is to maintain, protect or improve their health. When setting goals it is important to consider occupational demands, recreational interests and any personal reasons for exercising.

We have gone over the health benefits of exercise. The following table summarizes the frequency of physical tasks in law enforcement.

Table 1 from Gettman (1988)

Can you think of other reasons beside health or occupational demands that inspire you to exercise?

_____

_____

_____

What Can be Done to Improve Adherence to Exercise?

1- Encourage a self-directed home program.

2- Teach individuals how to develop and monitor their own program.

3- Supervise the early stages of exercise.

4- Have individuals report the type and amount of activity.

5- Develop good communications and provide follow-up sessions.

Practical Strategies you can Use to Stick With Exercise

1- Don't try to do to much to soon.

People seem to adhere better to programs with less frequent workouts. Three workouts per week is the best balance for results and adherence.

People adhere best to programs of shorted but continuous duration. A minimum of 15 min. of continuous activity is required. This level should be increased in a slow progressive manner.

Intensity should not cause great discomfort. The best adherence has been demonstrated to walking, jogging and cycling programs.

2- Remember the inverse relationship between exercise and heart disease, but try to discover other personal benefits gained from adherence to regular exercise.

3- Increase the cues for exercise and reduce cues for competing behaviors.

Find a time and place for exercise that is uninterrupted by other influences. It may be helpful for significant others to provide cues for exercise. Keep a log or calendar to remind you of your last exercise session and when the next one should be.

Do you have such a place and time?

_____

_____

How can you provide cues for exercise?

_____

_____

4- Provide positive reinforcement for yourself or have others become involved in positive reinforcement.

5- Take control of your own situation. Learn the skills needed to program and monitor your own exercise. Call on others to aid in your motivation or to provide additional information, but remember that ultimately you are responsible for your own well-being.

What other information do you feel would be helpful to you in preparation for programing and monitoring your exercise program?

_____

_____

_____

6- Build some enjoyment into your activity.

Stress not only the health benefits of exercise but also the recreational or play components. Remember to minimize the discomfort and increase the positive factors.

7- Make exercise a social activity.

Some people prefer to exercise alone and commonly use the time for reflection ,peace and quiet. Others find exercise much more interesting as a social activity. Joining a club, social league, an exercise class or exercising with a friend are all forms of more social exercise.

Do you see yourself as a person who enjoys exercise alone or one who would find it more interesting with a group?

_____

_____

8- Continue to work on goals and objectives.

New goals should be developed, old goals should be reviewed and revised. This monitoring process aids planning for continued regular activity.

Do you have specific topics where more information would be helpful to you?

_____

_____

_____

Next session will provide more specific adherence strategies. Discussion will center of the prevention of relapse, the specifics of the individual or situation and balancing the rewards and barriers involved with regular exercise.

Activity Preference _____

THR Range _____ to _____ 10 sec. or _____ to _____ min.

Duration Goal _____ to _____ min. at THR

Meeting date, time and place for next week.

_____

INTERVENTION AGENDA #5 SUBJECT # _____

Collect logs from week five and provide logs and intervention for the final week. Are there any questions or concerns from the last week? Have you discovered any information that you feel if provided would help you program and adhere to exercise? In the last week did you think of the most likely barriers to your exercise adherence?

_____

_____

_____

Relapse Prevention

To this point you have succeeded in the first two steps of developing a regular exercise habit. The first step was to make the decision to take part in this research helping you to begin exercise. Over the past few weeks you have been provided with information on basic programing of exercise , the health benefits to be expected and practical adherence strategies. In every program there is the possibility to lapse. For a short time you may go off program due to interference or lack of motivation. These interruptions should not be an excuse to quite but rather a indication that you need to make changes or utilize some pre-planed actions.

There are a series of steps that can be utilized in the prevention of relapse. Relapse prevention begins long before problems arise and is a continuous process.

1- Examine Your Exercise or Lifestyle History.

Begin by looking back at other attempts to modify lifestyle. What were the bailers and rewards that influenced your lifestyle? Think of an example say a diet modification, exercise program or smoking cessation.

_____

_____

_____

2- Identify High-Risk Situations.

From your past history or the changes that you have undertaken in the weeks what situations do you feel may cause you problems. Think of past relapses and identify factors that you can imagine as possible distractions from your regular exercise.

_____

_____

_____

3- Improve Coping Responses

Once high risk situations are identified you can make plans to avoid problems. Planning is the key to success. If you come to a point where bad weather is interfering with your exercise what would you do to overcome the barrier. Rather than taking a few days off substitute a indoor activity or get a pass to the local fitness club or recreation center. Having the passes on hand may be enough inspiration to exercise.

Other Barriers to Regular Exercise

Shift-work, travel, injury, holidays or illness

Do any of these barriers have the opportunity to interfere with your exercise? Are their additional barriers that you can anticipate? What can you do to avoid the impact of barriers?

_____

_____

_____

4- Develop Strategies for Slips

Have a pre-planned set of actions to fall back on when you discontinue regular exercise. You have the skills to plan your exercise program, set goals and monitor them. Keep a reminder card that reviews the benefits you feel exercise provides. On the card write out a plan that gets you exercising again if you reach a point where it becomes difficult. Remember that most reasons not to exercise are only rationalizations. Do not accept rationalization, rather concentrate on the positive rewards from an active lifestyle.

On an index card summarize the major benefits of an active lifestyle. What will you do to initiate exercise again if you reach a point where you slip.

5- Avoid Excessively Ridged Rules

Build flexibility into your program. Flexible goals allow leeway so that failure is not as likely. If you break with a program remember that it is not the end of the world. All you need to do is start again. All or none thinking should be avoided. Remember that even a gentle walk has physical and mental benefits. On days that injury illness or fatigue slow you down any activity is better than none.

6- Maintain Positive Attitudes

Remember the positive health influences of exercise as well as the positive feelings it produces. Your mind set should be directed toward a lifetime of continued activity rather than to a point of slipping from regular exercise. An example might be that when your feeling bored or tired you should not skip exercise due to the feelings. Remember the energizing qualities of regular exercise. Skipping exercise will not solve the boredom or fatigue, rather it will lead to feelings of guilt and lowered self-esteem. Exercise on the other hand has the effect of increasing energy and producing an improved mood.

7- Personal and Situational Influences on Adherence

There are numerous influences that effect the adherence to regular exercise. They can be divided into personal and situational influences. Think about each of the following factors and how it might affect your situation.

<u>Personal Influences</u>

- Health and fitness education.
- Periodical assessment of attitudes.
- Support of significant others.
- Recognition of exercise significance.
- Knowledge of activity value.
- Improved self-confidence.
- Selection of group or individual program.
- Avoidance of excessive goal orientation.
- Developing realistic goals and objectives.
- Elimination of punishing consequences.
- Emphasizing benefits other than fitness.
- Appropriate timing.
- Develop exercise patterns early in life.
- Balance costs and benefits.
- Accept personal responsibility.
- Establish activity related goals.
- Avoid boredom.
- Examine personal characteristics.
- Promotion of health and personal benefits.
- Remove personal barriers.
- Promote psychological well-being.
- Develop internal controlling personality.
- Increase self-esteem, efficacy, and motivation.
- Mentally prepare for relapse and extinction.

Environmental Influences

- Provide a motivational environment.
- Begin with moderate intensity to reduce injuries.
- Variety in program.
- Qualified enthusiastic leadership.
- Fitness testing and counselling.
- Carefully consider the effects on adherence of intensity, duration, and frequency.
- Program proximity.
- Early supervision.
- Home programming.
- External incentives.
- Pre-screen for high risk dropouts.
- Keep exercise records.
- Substitute activity for strenuous exercise.
- Flexibility of program.
- Rapid feedback.
- Establish routine.
- Start slow and easy.
- Remove environmental barriers.
- Provide immediate consequences.
- Cohesive group situation.
- Well documented program and improvements.
- Increase environmental exercise cues and reduce competing cues.
- Provide recreation, competition, or socialization.

This is your last week of intervention before six weeks of unsupervised program. If you have any questions concerning the continuation of regular activity make a list of them here and bring them to the next meeting. Think about goals for the following six weeks and your plan of action.

When could you be available for the post fitness evaluation?

_____

_____

Activity Preference _____

THR Range _____ to _____ 10 sec. or _____ to _____ min.

Duration Goal _____ to _____ Min. at THR

Meeting date, time and place for next week.

_____

Appendix C

ACSM Medical Classification Categories and Risk Factors

ACSM Medical Classification Categories and Risk Factors

The American College of Sports Medicine has advised individuals wishing to enter an exercise program should be classified according to one of the following categories.:

1 - Apparently Healthy

Those who are apparently healthy and have no major coronary risk factors.

2 - Individuals at Higher Risk

Those who have symptoms suggestive of possible metabolic disease or coronary disease and/or at least one major coronary risk factor.

3 - Patients With Disease

Those with known cardiac, pulmonary or metabolic disease.

American College of Sports Medicine (1986)

The ACSM (1986) has established the major coronary risk factors. If an individual has one or more of the following they are classified at higher risk:

1 - History of blood pressure above 145/95

2 - Elevated total cholesterol/high density lipoprotein cholesterol ratio (above 5)

3 - Cigarette smoking

4 - Abnormal resting EKG including evidence of old myocardial infarction, left ventricular hypertrophy, ischemia, conduction defects and/or dysrhytmias

5 - Family history of coronary or other atherosclerotic disease prior to age 50

6 - Diabetes mellitus

Appendix D

Informed Consent

INFORMED CONSENT FOR PARTICIPATION IN RESEARCH

I have been advised of the purpose of the research conducted by John Craig Hudec under the direction of Dr. Martin Collis, University of Victoria. I understand that the intent of the study is to provide me with assistance in establishing regular exercise as one part of a healthy lifestyle. My participation in this research is intended to demonstrate one method of assisting others who can improve their health status by adhering to exercise.

My participation in this study is completely voluntary. I am free to withdraw from the study at any time. No coercion of any type has been used to gain my cooperation. My confidentiality will be maintained throughout the study and in future publication of the study. The information gained during this study may be released to my physician but only with my permission.

Participant's Signature_____Date_____

Witness Signature_____Date_____

INFORMED CONSENT FOR GRADED EXERCISE AND OTHER PHYSICAL FITNESS TESTS

Testing Objectives: I understand that the tests to be administered during this research are for the purpose of determining my physical fitness status, including heart, lung and blood vessel capacities for whole body activity, ratio of body fat to lean tissue, muscular endurance and strength, and joint flexibility.

Explanation of Procedures: I understand that the tests which I will undergo will be performed by only trained personnel. The cardiovascular test will be conducted either walking or running on a motorized treadmill, pedalling a stationary bicycle ergometer, or on an arm ergometer. After an orientation period the continuous graded exercise test will begin. The speed and/or grade of the apparatus will be increased progressively until fatigue, breathlessness, or other symptoms require discontinuation. The heart will be monitored throughout the test by electrocardiogram through the application of electrodes on the body surface. Blood pressure will be monitored throughout the test.

Body composition will be determined through the use of skinfolds. Muscular endurance will be measured through the use of calisthenics and/or equipment. Range of motion movements will be utilized to determine flexibility.

Description of Potential Risks: I understand that there exists the possibility that abnormal changes may occur during the testing procedures. These changes could include abnormal heart beats, abnormal blood pressure response, in rare cases, heart attack, and various muscle or joint injuries. Every effort is made to minimize these possibilities through preliminary screening, medical examination and close observation by trained professionals throughout the tests.

Benefits to be Expected: I understand that the results of this testing will aid in determining my present physical fitness status, and in determining potential health hazards. These results will be utilized to develop an individualized exercise prescription in conjunction with personal preferences.

Inquiries and Freedom of Consent: I have read the above information and understand it. Questions concerning the procedures have been answered to my satisfaction. I am free to deny answering any questions throughout the procedure and can discontinue participation in any procedures. I understand that the information derived from this testing is confidential, and will only be released to my physician or others in care of my prescription with my permission. I am in agreement that the information from these tests not identifiable to me can be used for research purposes.

Participant's Signature_____Date_____

Witness Signature_____Date_____

INFORMED CONSENT FOR PHYSICAL FITNESS INTERVENTION PROGRAM

Program Objectives and Procedures: I understand that this physical fitness program may include activities to build the heart and lungs, muscular and skeletal systems, develop strength and flexibility, and reduce excess body fat. Exercise may include aerobic activity, strength training and stretching as suggested by an individual exercise prescription.

I will be asked to schedule weekly meetings with a conditioning therapist. We will work together to improve my knowledge and understanding of fitness and establish self-responsibility for developing a more active lifestyle. In the interest of research I understand that my physical activity will be monitored by machine and by spousal-report, and that I will be asked to keep a log and recall weekly activity.

Description of Potential Risks: I understand that the reaction of the heart, lungs and blood vessels to exercise cannot always be predicted. I know that there is a risk of abnormal changes occurring during or after exercise, including abnormal heart function , blood pressure, and in rare instances heart attack or musculoskeletal injuries. The preliminary screening, exercise testing and a progressive program reduce the risk of these abnormalities. In addition the access to the expertise of a conditioning therapist weekly should allow discussion of any suspected problems. I understand that the program is unsupervised and that it is important to discuss any potential problems.

Description of Potential Benefits: I understand that a program of regular exercise for the heart, lungs and muscles has many associated benefits. These include a decrease in excess body fat, improvements in blood fats and pressure, improvements in psychological functions such as the reaction to stress, and decreased risk of heart disease.

I have read the above information and understand it. Any questions that I have had have been answered to my satisfaction. I understand that I am free to withdraw from the program without prejudice at any time. I am free to deny information to specific questions throughout the program. The information which is obtained will be treated as privileged and confidential and will not be released to any person other than my physician without my consent. The information obtained however may be used for scientific purposes with my right for privacy retained.

Participant's Signature_____Date_____

Witness Signature_____Date_____

Adapted from Schwann (no date), & Nieman (1986)

APPENDIX E

University of Victoria Fitness Adherence Program
Client Information Form

University of Victoria Fitness Adherence Program
Client Information Form

Please complete the following information and return as quickly as possible to the researcher. Quick response will ensure that you are screened promptly and that you will be able to begin on program without delay.

Name _____ Client Number _____

Address _____

City/Town_____Code_____

Telephone (Home)_____(Work)_____

Work Address _____

Detachment_____Code_____Fax#_____

Name of spouse or other individual that would be willing to aid in recording the amount of exercise you perform weekly.

_____ Phone_____

Family Physicians Name _____

Address _____

Phone _____

Please complete the two forms enclosed and return them to the following address Immediately:

John Craig Hudec
School of Physical Education
University of Victoria
P.O. Box 1700
Victoria, B.C.
V8W-2Y2

This is only the beginning of screening for this program. Before you are asked to participate in the program a meeting will be scheduled at your convenience to outline the details to both you and your spouse.

If you have any questions or concerns regarding these forms please feel free to contact me at:

(H) 592-8912 or (W) 721-8373

APPENDIX F

Client Medical Screening Questionnaire

CLIENT MEDICAL SCREENING QUESTIONNAIRE NUMBER _____

yes	no	
		Have you ever been told by a doctor that you have had any of the following?
___	___	Heart or valvular disease
___	___	Electrocardiographic abnormalities
___	___	Abnormally high blood pressure
___	___	Abnormally high blood cholesterol
___	___	Bone or joint problems aggravated by exercise
___	___	Epilepsy
___	___	Diabetes
___	___	Lung or pulmonary disorders (asthma, emphysema, etc.)
___	___	Do you have any other health related problems that may be aggravated by exercise. Please explain. _____
___	___	Do you smoke? # of cigarettes per day _____
___	___	Have you ever smoked? When did you quit? _____
___	___	Do you have a history of heart disease in your immediate family before age 50?
___	___	Have you recently been ill? Please indicate illness. _____
___	___	Are you currently on, or have you recently been on a diet?
___	___	Do you exercise on a regular basis? (3 times per week)
		While exercise do you experience any of the following?
___	___	Chest pains, arm or neck pains
___	___	Spells of fainting or dizziness

Physician _____ Telephone_____

Appendix G

Physician Instructions

February 21, 1991

Dear Dr.:

This letter will provide you with the additional information concerning your part in the research we talked about during our phone conversation.

Your first part in the process is to complete the enclosed client history questionnaire. Your thorough completion of the form will aid in the success of this research.

As mentioned in our telephone conversation the purpose of this research is to investigate the adherence to regular exercise as prescribed by physicians. Specifically patients who are considered by the American College of Sports Medicine criteria are of interest as they are one population which stands to gain greatly from an exercise prescription. The question posed by the research asks if fitness and adherence education provided by a conditioning therapist is a beneficial addition to the suggestion by the physician for a patient to begin exercise.

After completion of the client history questionnaire your next part in the research process is to prescribe exercise to your patient in the manner consistent with your normal practice. It will not aid the research for you to pay special attention to this task. Your prescription is designed to provide the patient with the incentive to begin exercise within the limitations of your practice. If you have handouts or suggestions that you normally give to patients under these conditions please do so. The closer to your normal routine for prescription the better.

Finally I would ask you to write a short description of your suggestions to the patient concerning exercise. I have enclosed some guidelines to direct your description of the exercise prescription process.

I thank you for your invaluable assistance in this research. I hope that this research will provide examples for the physician and fitness professionals in improving the adherence of individuals at higher risk of developing health problems. In appreciation of your assistance you will be provided with a summary of the findings and information gained in the process may be supplied to you with the consent of the patient involved. Please contact me with any questions or concerns.

Yours truly,

Physician Guidelines for Describing The Exercise Prescription

What methods did you use to convince the patient that it was important for them to begin regular exercise?

_____

_____

_____

Outline your general prescription for exercise.

_____

_____

_____

Describe specific suggestions, actions, or goals for exercising that you discussed with the patient. Please enclose handouts or the name of references you suggested.

_____

_____

_____

How would you rate the chances of this patient starting and adhering to regular exercise based on your intervention alone?

___ None
___ Very Poor
___ Poor
___ Neutral
___ Good
___ Very Good
___ Absolute

Additional Comments

_____

_____

_____

APPENDIX H

Client History Questionnaire

CLIENT HISTORY QUESTIONNAIRE
(TO BE COMPLETED BY A PHYSICIAN)

---

removable data sticker here

Client Number_____

Patient Description (please check)

I consider the above individual to be:

___ Apparently Healthy - those individuals who are apparently healthy and no major coronary risk factors.

___ At Higher Risk - those that have symptoms suggestive of possible coronary disease and/or at least one major coronary risk factor. (see risk factors below)

___ With Disease - those with known cardiac, pulmonary or metabolic disease.

Risk Factors Present (please check)

___ History of high blood pressure (above 145/95)

___ Elevated total cholesterol/high density lipoprotein cholesterol ratio (above 5)

___ Cigarette smoking

___ Abnormal resting ECG - including evidence of old myocardial infarction, left ventricular hypertrophy, ischemia, conduction defects, dysrhythmias

___ Family history of coronary or other atherosclerotic disease prior to age 50

___ Diabetes mellitus

Diagnostic Data Etiologic (please check)

___ No Heart Disease

___ Rheumatic Heart Disease

___ Congenital Heart Disease

___ Heart Murmurs or Gallops

___ Hypertension

___ Ischemic Heart Disease

___ Other (please explain)

_____

_____

Present Physical Activity (please check)

___ Very Active

___ Active

___ Moderately Active

___ Inactive

___ Sedentary

___ Restricted Activity (explain)

_____

_____

Electrocardiographic Information (please check)

___ Within Normal limits

___ Drug Effects (ie digitalis)

___ Abnormal:Non-specific

___ Abnormal:Previous Infarct

___ Other (explain)

_____

_____

Cardiac Rhythm (please check)

___ Sinus

__ Pacemaker (type)

___ Arrhythmia (type & treatment)

_____

_____

Additional Abnormalities and Date Diagnosed

Present Medications and/or Treatments

Previous Significant Medical History (please comment)

Accidents:

Allergies:

Diabetes:

Epilepsy:

Infections:

Lung Disease:

Mental Illness:

Neural Impairment:

Bone/Joint Problem:

Please Provide Following Information

Blood count: (Hbg.)_____ Glucose: (mmol/L)_____

HDL: (mmol/L)_____ Cholesterol: (mmol/L)_____

Fasting triglyceride: mmol/L_____

Blood pressure: Systolic_____ Diastolic_____

___ Medicated ___ Unmedicated

___ 12 lead ECG enclosed

___ Graded exercise test results enclosed

Comments: _____

_____

_____

Additional Comments

Date of Last Complete Physical Examination

The above listed person is capable of participating in a laboratory controlled physical fitness test, under the direct guidance of a:

___ ACSM Exercise Test Technician ___ Physician

___ Please indicate if you are interested in attending

Signature_____M.D. Date_____

Name: (print)_____ Telephone_____

Please return to patient or mail marked Confidential to:

John Craig Hudec
School of Physical Education
Room 153, McKinnon Building
University of Victoria
Victoria, British Columbia

Direct Questions to:

(306) 721 8373

APPENDIX I

Subject Request Letter

December 28, 1990

To All Interested R.C.M.P. Members:

At this time of the year it is common to reflect on our lives and consider resolutions for the New Year. One of the common resolutions is to lose weight or to begin exercising either for health or to feel better. This letter will outline the opportunity for some members to take advantage of my experience as a fitness consultant in helping you to adhere to such resolutions and at the same time make them part of your future lifestyle.

I would like to take a moment to introduce myself. I am a graduate of the University of Saskatchewan with a Bachelor of Science in Physical Education. I have continued my education to certify with the American College of Sports Medicine as an Exercise Test Technologist and am currently pursuing my Exercise Specialist certification. I have been working in the health and fitness field since 1984. My background experience includes three years as a fitness consultant at the University of Regina where I had the opportunity to work with both R.C.M.P. and civic police forces. I continued to work in the fitness leadership field as the individual responsible for the development of the Saskatchewan Fitness leadership program. Currently I am studying at the University of Victoria. My research interest is the study of adherence to exercise. Specifically how to practically improve higher risk individuals ability to manage their own activity program.

If you work in the Victoria, Sidney, Colwood, Sooke or Airport detachments and have ever been told by your physician or other health professionals that you should exercise more due to medical risk factors this is your opportunity to get guidance and support. Some of the specific factors that indicate that exercise is important to your health may be included in the following list of risk factors:

A history of high blood pressure
Elevated total cholesterol or cholesterol ratio
Cigarette smoking
Abnormal ECG
Family history of heart disease prior to age 50
Diabetes mellitus

If a physician has ever stated that reducing your body weight or reducing any risk factors for disease may be a wise step then you are welcome to participate in this program. If you are unsure of where you stand I would be glad to discuss it with you.

The program begins after consulting with a physician. You would be asked to begin an exercise program on his advice, while keeping track of your activity. Following an adaptation period we would meet to assess your fitness level and establish goals with the intent of establishing a safe and effective program that you are happy with. We would continue to meet weekly for six to eight weeks to improve your knowledge and skills in maintaining your own personal activity program. To accommodate the hectic schedule of a R.C.M.P. member I will be available to meet at the location and time of your convenience.

You have received a letter indicating the Victoria Subdivision support of this program. An opportunity is being provided for members to improve their wellness. The study is not a R.C.M.P. program but rather an off work time fitness program. Involvement in this program will be fully confidential. This will be ensured through coding of all files so that your name is never mentioned in any research. Your involvement will remain known to only your family, your physician, and myself. No records of your participation will be released to the R.C.M.P.

Fitness programing of this type is provided in many locations for costs ranging from $300 and upward. A fitness evaluation of this nature with an exercise prescription costs from $75 to $500. The weekly reviews and re-assessment would be additional costs. The individuals selected to participate will have no cost for any services. Not only will you stand to gain personally by your involvement, but research will be conducted. It is my design that this research will provide for the development of suggestions on how to help others in the population that wish to improve their health through guided exercise. This research will investigate the importance of fitness consultant contact in adherence to regular self maintained exercise.

While you consider this opportunity remember that the entire process is designed with you in control. Your reply to this letter does not commit you to anything, and in fact you are free to withdraw from the process at any point in time. There is no cost for your involvement. It may be the opportunity of a lifetime. The study is planned to begin in late January of the upcoming year. Interested individuals should make contact as soon as possible to ensure access to the program.

If you have any interest in this program, questions or concerns feel free to call me at any time.

Appendix J

Self and Spousal-Report Instructions

SELF-REPORT BINDER

Please continue to record your three weekly exercise sessions. If You exercise more than three times per week fill in the appropriate extra sheets.

Please bring both this self-report binder and your spouse's booklet to each intervention meeting

THIS BINDER CONTAINS IMPORTANT RESEARCH INFORMATION IF FOUND PLEASE RETURN TO THE UNIVERSITY OF VICTORIA, PROJECT # 23-91 OR CONTACT 592-8912

SELF-REPORT LOG INSTRUCTIONS

The first component of this research is to establish baseline exercise levels after you visit your Physician to complete the physical and receive his exercise prescription. When your physician gives you the ok to begin exercising please start to record your exercise sessions in this book immediately.

As soon as possible after each exercise session fill out the report form for that day. Make sure to include the exercise type (ie. walk, bike, swim, etc.) Also the intensity and duration at target heart rate.

Your target heart rate is approximately _____ to _____ beats in 10 sec. Your Physician may wish to modify this safety zone. If so follow his directions and make note of his suggestions in your additional comments.

Heart rate can be measured by feeling for the pulse on the lower wrist just above the base of the thumb. Note that you should take the pulse twice during each exercise session.

Please circle your most appropriate perception of how hard you felt that your work-out was and how the session felt to you personally.

Three forms are included each week. Follow your Physicians instructions regarding intensity, duration and number of exercise sessions per week. Extra forms are included in the back of your book.

Address any questions concerning this phase of your exercise program to your physician. If you need additional forms or information please feel free to call me at:

(H)592-8912
(W)721-8373

THIS BOOK CONTAINS VALUABLE RESEARCH INFORMATION IF FOUND PLEASE RETURN TO:

THE UNIVERSITY OF VICTORIA, P.O. BOX 1700, V8W 2Y2
PROJECT NUMBER 23-91

SPOUSAL-REPORT BOOKLET

Please continue to monitor your spouse's exercise adherence. Your input to this research project is important. Your support to this research will aid your spouse in the accomplishment of wellness.

This booklet should be sent with your spouse to all weekly intervention meetings.

THIS BINDER CONTAINS IMPORTANT RESEARCH INFORMATION IF FOUND PLEASE RETURN TO THE UNIVERSITY OF VICTORIA, PROJECT # 23-91 OR CONTACT 592-8912

SPOUSAL-REPORT LOG INSTRUCTIONS

The objective of this first phase of the research is to develop a baseline for exercise behavior after your spouse visits her/his physician. You role is to verify the exercise behavior of your spouse.

As soon as possible after each exercise session fill in the spousal-report to the best of your ability. Begin by listing the type of activity participated in (ie. walking, biking, swimming, etc.) As accurately as possible record the duration of aerobic activity. Aerobic activity should be continuous and rhythmic using the major muscle groups.

Describe your spouse's exercise intensity by checking the appropriate category from your own estimation. Additional comments may be included. If you are exercising with your spouse you may wish to check the pulse rate and include it under additional comments.

Feel free to exercise with your spouse if he/she agrees that it would be convenient. Do not feel obliged to exercise with your spouse this is a personal decision.

Your spouse will be directed to begin exercise by his/her personal physician. Your participation would be very much appreciated in verifying the research.

Three forms are included for each week. Your spouse under the directions of the physician may require more. Additional forms are included in the back of this log.

Address any questions concerning this phase of your spouse's exercise program to her/his physician. If additional forms or information are needed please feel free to call me at:

(H) 592-8912
(W) 721-8373

THIS BOOK CONTAINS VALUABLE RESEARCH INFORMATION. IF FOUND PLEASE RETURN IT TO:

THE UNIVERSITY OF VICTORIA, P.O. BOX 1700, V8W-2Y2
PROJECT NUMBER 23-91

APPENDIX K

Weekly Exercise Self-Report Form

Weekly Exercise Self-Report Form

Client Number _____ Week # _____

Day _____ Date _____

Exercise Type _____

Exercise Intensity

Pulse #1 _____/10 sec. Pulse #2 _____/10 sec.

Perceived Exertion(circle one)		Feeling Scale(circle one)	
0	Nothing at all	+5	Very good
0.5	Very, very weak	+4	
1	Very weak	+3	Good
2	Weak	+2	
3	Moderate	+1	Slightly good
4	Somewhat strong	0	Neutral
5	Strong	-1	Slightly bad
6		-2	
7	Very strong	-3	Bad
8		-4	
9		-5	Very bad
10	Very, very strong Maximal		

Exercise Duration _____ Minutes at target heart rate

Comments_____

Day _____ Date _____

Exercise Type _____

Exercise Intensity

Pulse #1 _____/10 sec. Pulse #2 _____/10 sec.

Perceived Exertion(circle one)		Feeling Scale(circle one)	
0	Nothing at all	+5	Very good
0.5	Very, very weak	+4	
1	Very weak	+3	Good
2	Weak	+2	
3	Moderate	+1	Slightly good
4	Somewhat strong	0	Neutral
5	Strong	-1	Slightly bad
6		-2	
7	Very strong	-3	Bad
8		-4	
9		-5	Very bad
10	Very, very strong Maximal		

Exercise Duration _____ Minutes at target heart rate

Comments_____

_____

Day _____ Date _____

Exercise Type _____

Exercise Intensity

Pulse #1 _____/10 sec. Pulse #2 _____/10 sec.

Perceived Exertion(circle one)		Feeling Scale(circle one)	
0	Nothing at all	+5	Very good
0.5	Very, very weak	+4	
1	Very weak	+3	Good
2	Weak	+2	
3	Moderate	+1	Slightly good
4	Somewhat strong	0	Neutral
5	Strong	-1	Slightly bad
06		-2	
7	Very strong	-3	Bad
8		-4	
9		-5	Very bad
10	Very, very strong Maximal		

Exercise Duration _____ Minutes at target heart rate

Comments_____

_____

Please outline reasons for missing your exercise on any day.

_____

_____

_____

_____

_____

Appendix L

Spousal-Report Form

Spousal-Report Form

Client Number _____ Week # _____

Day _____ Date _____

Type of Activity _____

Duration of Exercise _____ Minutes

Intensity

How would you describe your spouses exercise intensity

___ Very, very light ___ Very light
___ Fairly Light ___ Somewhat hard
___ Hard ___ Very hard
___ Very, very hard

Was the activity continuous and rhythmic using the major muscle groups of the body? Yes ___ No___

Comments _____

Day _____ Date _____

Type of Activity _____

Duration of Exercise _____ Minutes

Intensity

How would you describe your spouses exercise intensity

___ Very, very light ___ Very light
___ Fairly Light ___ Somewhat hard
___ Hard ___ Very hard
___ Very, very hard

Was the activity continuous and rhythmic using the major muscle groups of the body? Yes ___ No___

Comments _____

_____

_____

_____

Day _____ Date _____

Type of Activity _____

Duration of Exercise _____ Minutes

Intensity

How would you describe your spouses exercise intensity

___ Very, very light ___ Very light
___ Fairly Light ___ Somewhat hard
___ Hard ___ Very hard
___ Very, very hard

Was the activity continuous and rhythmic using the major muscle groups of the body? Yes ___ No___

Comments _____

_____

_____

_____

Why did your spouse miss one or more exercise sessions this

week?_____

_____

_____

_____

Appendix M

Self-Reported Maintenance Log

WEEKLY EXCERCISE REPORT SUBJECT # ______ WEEK # ______

GOAL FOR THE WEEK ____

____

DAY __________ DATE __________ TIME __________

TOTAL EXERCISE TIME ______ MIN. AT THR ______MIN.

HR BEFORE ______ DURING ______ AFTER ______ 10 SEC./MIN.

COMMENTS ____

____

____

DAY __________ DATE __________ TIME __________

TOTAL EXERCISE TIME ______ MIN. AT THR ______MIN.

HR BEFORE ______ DURING ______ AFTER ______ 10 SEC./MIN.

COMMENTS ____

____

____

DAY __________ DATE __________ TIME __________

TOTAL EXERCISE TIME ______ MIN. AT THR ______MIN.

HR BEFORE ______ DURING ______ AFTER ______ 10 SEC./MIN.

COMMENTS ____

____

____

DAY ___________ DATE ___________ TIME ___________

TOTAL EXERCISE TIME _______ MIN. AT THR _______MIN.

HR BEFORE _______ DURING _______ AFTER _______ 10 SEC./MIN.

COMMENTS ____

____

____

DAY ___________ DATE ___________ TIME ___________

TOTAL EXERCISE TIME _______ MIN. AT THR _______MIN.

HR BEFORE _______ DURING _______ AFTER _______ 10 SEC./MIN.

COMMENTS ____

____

____

DAY ___________ DATE ___________ TIME ___________

TOTAL EXERCISE TIME _______ MIN. AT THR _______MIN.

HR BEFORE _______ DURING _______ AFTER _______ 10 SEC./MIN.

COMMENTS ____

____

____

DAY ___________ DATE ___________ TIME ___________

TOTAL EXERCISE TIME _______ MIN. AT THR _______MIN.

HR BEFORE _______ DURING _______ AFTER _______ 10 SEC./MIN.

COMMENTS ____

____

____

APPENDIX N

Anthropometric Measurement Data Sheet

ANTHROPOMETRIC MEASUREMENT DATA SHEET

Subject # _____ Date _____ Time _____

Weight _____(kg) Height _____(cm)

BMI _____(kg/m2) %ile _____ Zone _____

Girths

Chest _____.___

Waist _____.___

Hip _____.___

R. Thigh _____.___

WHR(waist/hip) ___._____

%ile _____

Above 1.0 Y ___ N ___

Skinfolds(mm)

Triceps 1st _____.___

2nd _____.___ Mean _____.___

3rd _____.___

Biceps 1st _____.___

2nd _____.___ Mean _____.___ Sum of Skinfolds

3rd _____.___ _____.___

Subscap 1st _____.___ %ile _____

2nd _____.___ Mean _____.___ Sum of Trunk SF

3rd _____.___ _____.___

Iliac 1st _____.___ %ile _____

2nd _____.___ Mean _____.___

3rd _____.___

M. Calf 1st _____.___

2nd _____.___ Mean _____.___

3rd _____.___

Comments _____

APPENDIX O

Graded Exercise Evaluation

MAXIMAL GRADED EXERCISE ASSESSMENT SUMMARY **Client #** _____

Date _____ **Rest H.R** _____ **Rest B.P.** _____

Ht. _____ **Wt.** _____ **Age** _____ **Gender** _____

Medications _____

Diagnosis _____

Symptoms _____

Cardiac Rhythm _____

Physical Findings _____

Reason Exercise Stopped _____

Max. Exercise Time _____ **Max. Mets** _____

MVO2 _____ **Max. H.R.** _____

P.M.H.R. _____ **%P.M.H.R.** _____ **Max. B.P.** _____

Comments

_____

_____

Technician _____

Physician _____

Researcher _____

SUMMARY					
STAGE .P.	MPH	GRADE	METS	MIN.	H.R.	B
W-up	3.5	0%				
comments						
#1	3.5	2.5				
comments						
#2	3.5	5				
comments						
#3	3.5	7.5				
comments						
#4	3.5	10				
comments						
#5	3.5	12.5				
comments						
#6	3.5	15				
comments						
#7	3.5	17.5				
comments						
#8	3.5	20				
comments						
#9	3.5	22.5				
comments						
#10	3.5	25				
comments						
#11	4.0	25				
comments						

#12	4.5	25			
comments					
#13	5.0	25			
comments					
Rec.	2.0	0%		2	
comments					
Rec.	2.0	0%		5	
comments					
Rest	0	0%		2	
comments					
Rest	0	0%		5	
comments					

Appendix P

Client Review Questionnaire

CLIENT REVIEW QUESTIONNAIRE
(TO BE COMPLETED BY A PHYSICIAN)

---

removable data sticker here

Client Number _____

Patient Description (please check)

I consider the above individual to be:

___ Apparently Healthy - those individuals who are apparently healthy and no major coronary risk factors.

___ At Higher Risk - those that have symptoms suggestive of possible coronary disease and/or at least one major coronary risk factor. (see risk factors below)

___ With Disease - those with known cardiac, pulmonary or metabolic disease.

Risk Factors Present (please check)

___ History of high blood pressure (above 145/95)

___ Elevated total cholesterol/high density lipoprotein cholesterol ratio (above 5)

___ Cigarette smoking

___ Abnormal resting ECG - including evidence of old myocardial infarction, left ventricular hypertrophy, ischemia, conduction defects, dysrhythmias

___ Family history of coronary or other atherosclerotic disease prior to age 50

___ Diabetes mellitus

Please Provide Following Information

Blood count: (Hbg.)_____ Glucose: (mmol/L)_____

HDL: (mmol/L)_____ Cholesterol: (mmol/L)_____

Fasting triglyceride: mmol/L_____

Blood pressure: Systolic_____ Diastolic_____

___ Medicated ___ Unmedicated

Date of Last Complete Physical Examination

Signature_____M.D. Date_____

Name: (print)_____ Telephone_____

Please return to patient or mail marked Confidential to:

John Craig Hudec
School of Physical Education
Room 153, McKinnon Building
University of Victoria
Victoria, British Columbia
V8W 2Y2

Direct Questions to:

(306) 721 8373

June 20, 1991

School of Physical Education
Room 153 McKinnon Building
University of Victoria
Victoria, British Columbia
V8W 2Y2

Dear Doctor:

Your patient has been involved in a research project at the University of Victoria. It has been twelve weeks since their last meeting with you. In that period they have attempted to begin a regular exercise program.

Enclosed with this letter you will find a client review questionnaire. Your completion of this form will provide motivation toward further lifestyle change in the patient as well as assessing the medical effects of there participation in the past twelve weeks of exercise.

Please complete the form return it as directed. Your prompt assistance is appreciated.

Upon tabulation of the results, with permission of your patient a summary of the exercise prescription and response will be forwarded to your office. Thank you for your attention to this matter.

Yours truly,

APPENDIX Q
Follow-Up Questionnaire

FOLLOW-UP QUESTIONNAIRE SUBJECT# _____

1- How does your current level of exercise compared to the two weeks prior to this research?

2- On average how much time would you now estimate you spent in your target heart rate zone during the six week baseline period of the study?

_____ sessions/week _____ min. at THR

3- What benefits have you gained from your participation in this research? (mental, physical, other)

4- How could the process of fitness consulting be improved for your case?

5- Are there particular parts of the research program that seemed to be of great assistance to you?

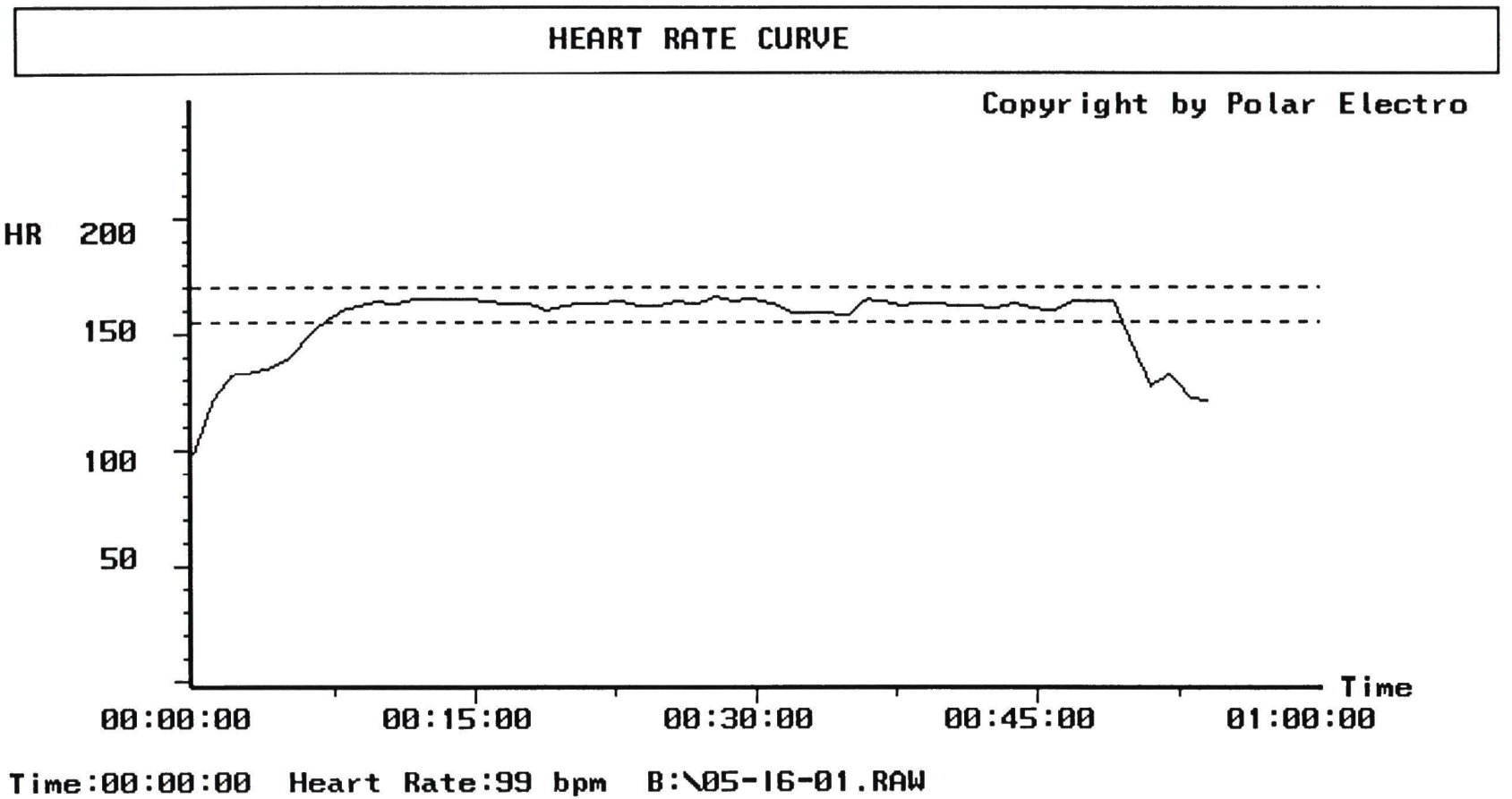
6- Do you plan to continue regular exercise? Is there additional information that would help you in directing or monitoring your program?

7- Would you be interested in a six month or one year follow up evaluation?

8- Comments?

APPENDIX R

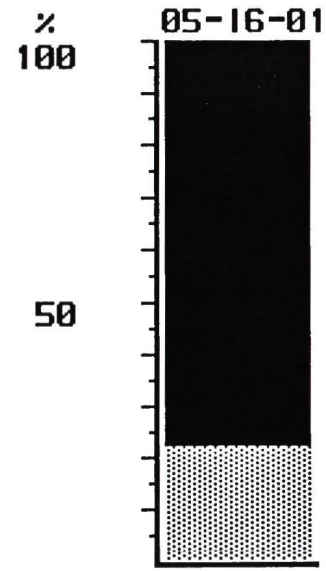
Vantage XL Monitor Report Samples



Time:00:00:00 Heart Rate:99 bpm B:\05-16-01.RAW

FILE SUMMARY

Copyright by Polar Electro



FILE SUMMARY

B:\05-16-01.RAW

TOTAL TIME : 00:55:00 (hh:mm:ss)

Above Target Zone	: 00:00:00	0 %
In Target Zone	: 00:43:00	78 %
Below Target Zone	: 00:12:00	22 %

Target Zone limits: Low : 155
High : 170

HEART RATE LISTING

Copyright by POLAR ELECTRO SOURCE FILE: B:\05-I6-01.RAW

Time	Heart Rate Values											
00:00	99	121	132	133	135	139	148	155	160	162	164	16
00:12	165	165	165	165	164	163	163	160	162	163	163	16
00:24	162	162	164	163	166	164	165	163	159	159	159	15
00:36	165	164	162	163	163	162	162	161	163	161	160	16
00:48	164	164	145	127	132	123	121					

Final Time: 00:54:02.6, HR 120

-Intermediate Times:----------

POLAR
USA, INC.

FOR A STRONGER HEART

470 West Ave. Stamford, CT 06902
203-359-1966 FAX 203-327-4948

January 20, 1992

John Craig Hudec
7308-B 79th Avenue
Edmonton, Alberta
Canada T6V 0C5

Dear John:

Regrading our conversation on Friday, Jan. 17, 1992, POLAR is happy to grant you the permission to use your POLAR heart rate curves in the appendices of your thesis. As long as they remain with the copyright statement on the information, they are in no violation to us or POLAR Electro OY.

If it is possible to have more information about your study and where you plan to publish this information, I would greatly appreciate the information. Also, if you are planning any more seminars in the governmental fields, I would really appreciate the information on them. Currently, I was just promoted into the New Market Development area of the company. One of the markets is governmental sales and I could use all the additional information available.

Looking forward to hearing from you in the near future. Good luck with your research.

Sincerely,

[redacted]

Amy James
New Market Development

APPENDIX S

Adherence Data Report

02.data Thu, Jul 25, 1991 1:50 PM

	Days	Self-Report	Spousal-Report	HR-Monitor
1	1.000	0.000	20.000	
2	2.000	20.000	20.000	
3	3.000	35.000	30.000	
4	4.000	25.000	25.000	
5	5.000	0.000	30.000	
6	6.000	20.000		
7	7.000	20.000		
8	8.000	20.000		
9	9.000	25.000		
10	10.000	40.000		
11	11.000	15.000		
12	12.000	10.000		
13	13.000	0.000		
14	14.000	0.000		
15	15.000	0.000		
16	16.000	0.000	20.000	7.000
17	17.000	0.000		7.000
18	18.000	0.000		0.000
19	19.000	26.000		0.000
20	20.000	35.000		0.000
21	21.000	22.000		16.000
22	22.000	13.000		16.000
23	23.000	15.000		
24	24.000	0.000	20.000	7.000
25	25.000	21.000	30.000	24.000
26	26.000	20.000	30.000	22.000
27	27.000	21.000		21.000
28	28.000	20.000		20.000
29	29.000	18.000		19.000
30	30.000	23.000		25.000
31	31.000	24.000	25.000	24.000
32	32.000	24.000	25.000	26.000
33	33.000	23.000	25.000	22.000
34	34.000	24.000	25.000	24.000
35	35.000	30.000	30.000	30.000
36	36.000	20.000	22.000	16.000
37	37.000	30.000	30.000	34.000
38	38.000	22.000		
39	39.000	24.000		
40	40.000	23.000		
41	41.000	27.000		
42	42.000	19.000		
43	43.000	22.000		
44	44.000	20.000		
45	45.000	27.000		
46	46.000	22.000		
47	47.000	22.000		
48	48.000	22.000		
49	49.000	18.000		
50	50.000	19.000		
51	51.000	20.000		
52	52.000	23.000		
53	53.000	24.000		
54	54.000	21.000		
55	55.000	26.000		
56	56.000	24.000	45.000	24.000

	Day	Self-Report	Spousal-Report	HR-Monitor
1	1.000	0.000	12.000	
2	2.000	30.000	30.000	
3	3.000	30.000	30.000	
4	4.000	30.000		
5	5.000	30.000		
6	6.000	30.000		
7	7.000	30.000		
8	8.000	30.000	30.000	
9	9.000	30.000	30.000	
10	10.000	30.000	30.000	
11	11.000	30.000	30.000	
12	12.000	30.000		
13	13.000	20.000	20.000	21.000
14	14.000	20.000	20.000	20.000
15	15.000	20.000	20.000	15.000
16	16.000	25.000	25.000	22.000
17	17.000	25.000	25.000	23.000
18	18.000	25.000	25.000	27.000
19	19.000	30.000	30.000	30.000
20	20.000	30.000	30.000	30.000
21	21.000	30.000	30.000	26.000
22	22.000	30.000	30.000	24.000
23	23.000	30.000	30.000	20.000
24	24.000	30.000	30.000	28.000
25	25.000	30.000	30.000	25.000
26	26.000			15.000
27	27.000	38.000	38.000	35.000
28	28.000	38.000	38.000	33.000
29	29.000	45.000	45.000	37.000
30	30.000	35.000	35.000	28.000
31	31.000	45.000	45.000	40.000
32	32.000	45.000	45.000	33.000
33	33.000	45.000		
34	34.000	45.000		
35	35.000	40.000		
36	36.000	45.000		
37	37.000	45.000		
38	38.000	45.000		
39	39.000	45.000		
40	40.000	46.000		
41	41.000	48.000		
42	42.000	46.000		
43	43.000	45.000		
44	44.000	45.000		
45	45.000	45.000		
46	46.000	45.000		
47	47.000			
48	48.000	45.000	45.000	45.000
49	49.000	45.000	45.000	38.000
50	50.000	45.000	45.000	40.000
51	51.000	45.000	45.000	34.000

05.data Thu, Jul 25, 1991 1:52 P

	Day	Self-Report	Spousal-Report	HR-Monitor
1	1.000	35.000	35.000	
2	2.000	44.000		
3	3.000	35.000		
4	4.000	46.000	45.000	
5	5.000	45.000	45.000	
6	6.000	34.000	35.000	
7	7.000	34.000	34.000	
8	8.000	34.000	34.000	
9	9.000	34.000	34.000	
10	10.000	0.000	0.000	
11	11.000	0.000	0.000	
12	12.000	0.000	0.000	
13	13.000	0.000	0.000	
14	14.000	31.000		
15	15.000	28.000		
16	16.000	31.000		
17	17.000	20.000	20.000	21.000
18	18.000	20.000	20.000	20.000
19	19.000	21.000	20.000	20.000
20	20.000	26.000	26.000	26.000
21	21.000	28.000	28.000	28.000
22	22.000	25.000	25.000	27.000
23	23.000	25.000		30.000
24	24.000	30.000	30.000	30.000
25	25.000	32.000		33.000
26	26.000	31.000		30.000
27	27.000	32.000		31.000
28	28.000	31.000		31.000
29	29.000	32.000		30.000
30	30.000	36.000	36.000	36.000
31	31.000	36.000	36.000	22.000
32	32.000	36.000	36.000	35.000
33	33.000	41.000	41.000	43.000
34	34.000	41.000	41.000	42.000
35	35.000	42.000	42.000	44.000
36	36.000	21.000		
37	37.000	32.000		
38	38.000	21.000		
39	39.000	28.000		
40	40.000	24.000		
41	41.000	31.000		
42	42.000	31.000	55.000	30.000
43	43.000	31.000		31.000
44	44.000	43.000		43.000
45	45.000	23.000		
46	46.000	31.000		
47	47.000			
48	48.000	21.000		
49	49.000	30.000		
50	50.000	31.000		
51	51.000			
52	52.000			
53	53.000			

08.data Thu, Jul 25, 1991 1:53 P

	Day	Self-Report	Spousal-Report	HR-Monitor
1	1.000	30.000		
2	2.000	0.000		
3	3.000	0.000		
4	4.000	0.000		
5	5.000	0.000		
6	6.000	0.000		
7	7.000	0.000		
8	8.000	0.000		
9	9.000	0.000		
10	10.000	0.000		
11	11.000	0.000		
12	12.000	0.000		
13	13.000	0.000		
14	14.000	0.000		
15	15.000	0.000		
16	16.000	29.000	39.000	31.000
17	17.000	30.000		0.000
18	18.000	30.000		0.000
19	19.000	30.000		0.000
20	20.000	30.000		
21	21.000	45.000		27.000
22	22.000	49.000		3.000
23	23.000	35.000		24.000
24	24.000	40.000		24.000
25	25.000	40.000		4.000
26	26.000			
27	27.000			
28	28.000			
29	29.000			
30	30.000			
31	31.000			
32	32.000			25.000
33	33.000			2.000
34	34.000			

VITA

Surname: Hudec Given Names: John, Craig

Place of Birth: Regina, Sask. Date of Birth: 07/13/56

Educational Institutions Attended:

University of Saskatchewan	1979 to 1983
Kelsey Institute Applied Arts and Science	1977 to 1979

Degrees Awarded:

Bachelor of Science	University of Saskatchewan	1983
Diploma of Recreation	Kelsey Institute	1979

Honours or Awards:

University of Victoria, School of Physical Education Graduate Scholarship	1990
University of Victoria, Faculty of Graduate Studies Teaching Award	1990

Publications:

Hudec, J.C., & Collis, M.L. (1991). Structured rehabilitation by a conditioning therapist of RCMP members denoted medically unfit for strenuous work by a specific performance test. Abstracts from the Symposium on Physical Fitness, Active Living, and Occupational Performance - NATO Research Meeting for Biomedical Aspects of Military Training. (pp. 10). Edmonton: University of Alberta

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Title of Thesis: EARLY ADHERENCE TO PHYSICIAN PRESCRIBED EXERCISE BY HIGHER RISK RCMP MEMBERS: The Effect of Fitness and Adherence Counselling Provided by a Conditioning Therapist.

Author [redacted]
(Signature)

John Craig Hudec

Jan 31/92
(Date)