THE INFLUENCE OF A PHYSICAL FITNESS APPRAISAL
AND EXERCISE COUNSELLING ON SELECTED MEASURES OF FITNESS

by

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ABSTRACT

This study was undertaken to investigate changes in physical activity patterns and physical fitness characteristics of subjects after they had received a physical fitness test and exercise prescription.

Thirty-two male police officers between the ages of 20 and 49 years were tested and individual training programmes were prescribed. Twelve months later, 17 of the officers were retested. At that time an additional 16 officers were tested to provide control data (C_{79}).

No differences ($p < .05$) were observed on the variables of age, height, weight, skinfold thickness, trunk flexion, or treadmill time between the data sets of those subjects who ultimately returned for the second test (Experimental Group) and those who did not (C_{78}).

Following the twelve months of training, improvements were noted between the 1978 and 1979 data sets for the Experimental Group on the following variables:

1. treadmill time ($p < .001$) for the group with ages pooled (20-49 years);
2. treadmill time ($p < .003$) for the younger age category (20-34 years); and
3. trunk flexion ($p < .03$) for the older age category (35-49 years).

No differences in physical and performance characteristics were observed between the data sets of subjects who had received the treatment (Experimental Group) and subjects who had not (C_{79}).

The results of the study suggest that while the Experimental Group demonstrated increased levels of physical fitness following the treatment, their physical and performance characteristics did not differ from the Control Group (C_{79}) who had not received the treatment. It appeared that factors other than the treatment may have caused a similar increase in physical performance capability.

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CHAPTER I

THE PROBLEM

Introduction

In recent years there has been an increased interest among North Americans in health and physical fitness. As a result of this interest a great deal of time, energy, and human and material resources have been devoted to what is commonly referred to as the "fitness boom". The concern over physical fitness has sparked a proliferation of fitness testing programmes among various agencies.

Fitness testing may take many forms and may be employed for various purposes. The four commonly acknowledged objectives of fitness testing are (American Heart Association, 1972; Collis, 1977a):

1. diagnostic,
2. informational,
3. assessment of functional capacity, and
4. motivational.

A legitimate physical fitness appraisal may be a useful diagnostic tool for physicians. Testing may supply accurate data for researchers. Test results may provide an objective basis for exercise prescription and may be a motivational device to promote physical activity, when combined with other elements of a successful fitness programme.

This study was concerned with the motivational effects of physical fitness appraisals and subsequent exercise counselling. It has long

been taken for granted that fitness testing is a helpful device to motivate inactive people to exercise (Cumming, 1976). Hospitals, YMCA's, universities, health, fitness and recreation organizations, and commercial testing laboratories are testing more and more people each year in the hope of encouraging them to adopt healthier and more active lifestyles. However, the effectiveness of such treatments has not been adequately demonstrated.

The Problem

The study was designed to examine the influence of a physical fitness appraisal and subsequent exercise counselling on the exercise behaviour patterns of the subjects.

Null Hypotheses

The following null hypotheses were tested:

1. There would be no differences between the Experimental Group and the Control Group in:
   a. current exercise habits,
   b. current attitudes towards exercise, and
   c. increase in exercise habits between July 1978 and July 1979.
2. There would be no significant differences in the values of selected variables measured in the physical fitness appraisal conducted on the Experimental Group in June 1978 and the values measured in the follow-up appraisal, conducted between May and August 1979.
3. There would be no significant differences between the results

of the follow-up physical fitness appraisal of the Experimental Group and the appraisal of the Control Group between May and August 1979.

Delimitations

1. The study was confined to male police officers who were between the ages of 20 and 49 years as of July 1, 1979.
2. The Experimental Group was selected from those police officers who received a fitness appraisal and subsequent exercise counselling at the University of Victoria during the months of June and July 1978.
3. The Control Group was selected from local police officers who did not participate in the fitness appraisal and exercise counselling programme offered by the University of Victoria during the summer of 1978.
4. The Physical Activity Readiness Questionnaire (PAR-Q) medical screening device was employed to eliminate those subjects for whom vigorous exercise, or an unsupervised exercise test, was contraindicated (see Appendix A).
5. The study identified some of the consequences of the physical fitness appraisal and exercise counselling service which was offered to various groups in the Greater Victoria area during the summer of 1978. The focus of attention was on any changes in the exercise behaviour patterns of the subjects which could be attributed to the influence of the fitness appraisal and exercise counselling.

Limitations

1. Data were gathered by:
    a. personal interview-questionnaire which was administered by the investigator during the months of May through August 1979, and
    b. physical fitness tests which were administered by the investigator during the months of May through August 1979.
2. The study was limited by:
    a. the interviewing skill of the investigator and the response reliability of the subjects, and
    b. the skill of the investigator in administering the physical fitness tests and the ability of the subjects to perceive and perform the required tasks.
3. As two of the physical fitness tests required an effort from the subject, subject motivation may have been a limiting factor in both pretest and posttest results. Differences in subject motivation to perform the tasks on the two separate occasions may have confounded the test results.
4. The accuracy of the physical fitness test results may have been limited by the calibration of the testing instrumentation. The following instruments were employed to measure the physical performance of the subjects:
    a. Cambridge VS4 Electrocardiograph,
    b. Hewlett-Packard Model 7803A ECG Monitor,
    c. Quinton Model 24-72 Motor-Driven Treadmill,
    d. GraLab Universal Timer, Model 171,

e. Harpenden Skinfold Calipers,

f. Heathometer Scale and Stadiometer, and

g. Wells and Dillon Sit and Reach Test Apparatus.

Prior to each testing session each instrument was checked for correct calibration according to the specifications of the manufacturer.

5. The study may have been limited by the validity of the physical fitness tests which were employed. Detailed test procedures and validation references are included in Appendices B, C, and D.
6. The accuracy of the physical fitness test results may have been limited by the condition of the subjects prior to testing. Behaviours of the subjects prior to testing were controlled as much as possible. The subjects received the same instructions which were issued prior to the testing sessions in June 1978. At that time the subjects were advised not to eat or smoke for at least two hours prior to the test. The study may have been limited by the willingness of the subjects to abide by these instructions and by any unperceived stress or injury condition in the subjects.

Definitions of Terms

Physical Fitness

Physical fitness was defined (functionally) as "the ability to carry out daily tasks with vigour and alertness, without undue fatigue, and with ample energy to enjoy leisure-time pursuits and to meet unforeseen emergencies" (Clarke, 1971). The concept of physical fitness includes

the physiological variables of aerobic capacity, muscular strength, joint and muscle flexibility, and body composition.

Aerobic Capacity. Aerobic capacity is defined as the physiological response of the cardiovascular system to locomotor activity of gradually increasing intensity (Stoedefalke, 1974a:447). The adaptation of the body to the stresses of muscular effort is expressed numerically in the amount of oxygen supplied to the tissues. This may be calculated from the results of cardiovascular function tests. The point at which no further adaptation of the cardiovascular system occurs in response to an increased workload is called maximum aerobic capacity or maximum oxygen uptake ($\dot{V}O_2$ MAX). This is usually expressed in milliliters of oxygen per kilogram of body weight per minute (ml/kg/min).

Muscular Strength. Muscular strength may be defined as the maximal muscular force which can be exerted once. Isometric (static) strength is the maximum amount of force that can be exerted against a fixed resistance. Isotonic (dynamic) strength is defined as the amount of resistance that can be overcome during one application of force through the full range of motion of the particular joint or series of joints involved. Strength is specific to a given muscle or muscle group and depends upon the nature of the resistance.

Flexibility. Flexibility is defined as the fundamental capacity of a joint to move through a normal range of motion. It is specific to given joints and is more dependent on the musculature and connective tissue surrounding a joint than on the bony structure of the joint itself, except in cases of disease or disorder of the skeletal system.

Body Composition. Body composition is defined as the percentage of

body weight which is adipose or fat tissue. This percentage may be estimated by measuring skinfold thicknesses at selected anatomical sites with skinfold calipers.

Physical Fitness Appraisal

For the purposes of this study a physical fitness appraisal (or physical fitness test or fitness test) was defined as a laboratory investigation by qualified personnel into the physical fitness of a subject. The investigation included measurement of the following variables, using valid testing techniques:

a. aerobic capacity,

b. muscular strength,

c. flexibility, and

d. body composition.

The primary objective of the appraisal was to provide information on the subject about his physical fitness.

Fitness Variables Selected

For the purposes of this study the fitness variables selected for consideration were:

a. aerobic capacity,

b. trunk flexibility, and

c. body composition.

Exercise Counselling

Exercise counselling was defined as the discussion between the fitness appraisal subject and the test administrator about the meaning of the test results and the suggestions by the test administrator for improving the fitness of the subject.

Exercise Behaviour

Exercise behaviour referred to the frequency, type, intensity, and duration of physical activity that the study subjects may have engaged in for purposes of enjoyment, recreation, sports competition, or physical fitness development.

Attitude Towards Physical Activity

Attitude towards physical activity referred to the way(s) in which a subject perceived the role of physical activity in his life.

CHAPTER II

REVIEW OF THE LITERATURE

Nations have passed away and left no traces
And history gives the naked cause of it —
One single, simple reason in all cases,
They fell because their people were not fit.
Rudyard Kipling

Introduction

Much of the recent interest in physical fitness in North America can be attributed to the apparent prophylactic effect which exercise may provide against premature death from degenerative diseases. Since modern conveniences have eliminated most of the physical demands of work in business, industry, the home and transportation, North American society has become essentially a sedentary society.

For the first time in mankind's history the majority of people do not have to work physically for their living. Better working conditions and shorter working hours have provided these sedentary workers with a comparative abundance of leisure hours. Many of the participants in the fitness explosion of the past few years are participants because they have the time and the motivation to use that time to do some sort of physical activity.

Physical fitness represents many things to many different people. Wenger (1978) noted that "for some, it is focussed on the cosmetic benefits of exercise; for others it is the enhanced resistance to fatigue

and the improvement in the quality of life; while for others it involves increased capability to perform in athletic activities."

Many fitness-related agencies use fitness testing as a tool to motivate people to participate in physical activity. The basic assumption being that if people can be faced with objective data describing their lack of fitness they may not be able to rationalize an inactive lifestyle (Poole, 1977). Collis (1977a:52) noted that testing is a useful tool to motivate people to continue an exercise programme because they receive objective feedback on the programme from test results. Test results are an effective method of evaluating an exercise programme and redirecting programme emphasis if required.

Quantitative assessment of the motivational aspects of fitness testing is a neglected area in physical education research. It is, therefore, relevant at this time, when so much emphasis is placed on testing and much lip service is paid to the motivational benefits of testing, to evaluate the motivational effects of such a programme. A thorough review of the related literature has failed to indicate quantitatively just how "motivational" fitness testing is to inactive people.

The pertinent literature on physical fitness, physical fitness testing, and their relationships with lifestyle may be divided into the following categories:

a. physical fitness,

b. physical fitness testing,

c. North American lifestyle and related disease risk factors,

d. relationship of exercise to risk factor reduction,

e. relationship of exercise to improvements in the quality of life,

f. application of behaviour modification techniques to risk factor reduction, and

g. fitness testing and lifestyle modification.

The literature from each of the above categories is discussed in the sections that follow.

Physical Fitness

The literature offers many definitions of physical fitness (Bannister, 1972; Clarke, 1971; Cooper, 1970; Shephard, 1977). According to Sinning (1974a), physical fitness is a concept, not a quantitative entity which has a numerical value. Typically the concept of physical fitness may include a broad range of physical and mental variables which describe the individual's state of well-being. Clarke (1971) described, rather than defined, the state of physical fitness as "the ability to carry out daily tasks with vigor and alertness, without undue fatigue, and with ample energy to enjoy leisure time pursuits and to meet unforeseen emergencies." This is a functional definition of fitness rather than a scientific one.

The scientific approach to defining physical fitness is to select the most important parameters of fitness and define them in a systematic, physiological manner. While the physical attributes selected are dependent on a certain amount of personal bias, the four most commonly acknowledged components of fitness are: (1) cardiovascular endurance, (2) muscular strength and endurance, (3) joint flexibility, and (4) body composition.

Cardiovascular endurance (or cardiorespiratory endurance or aerobic

capacity) is probably the best single indicator of physical fitness if only one variable is measured. From a health-related standpoint, it is the most critical because it reflects the efficiency of the heart and lungs, and circulatory system. This variable is usually weighted the highest in discussions of physical fitness (Cooper, 1970; Saltin, 1968; Shephard, 1977).

The role of muscular strength and endurance in physical fitness is not clearly defined. In the past strength was frequently equated with fitness. The Rogers Physical Fitness Index was determined on the basis of strength scores, and the tests were given in many schools and YMCA's (Sinning, 1975a). In modern North American society very little strength is required to accomplish the majority of daily tasks. However, the maintenance of some as-yet-unidentified level of minimal strength is necessary for the prevention of low back pain (Kraus and Raab, 1960), for the ability to carry out moderate physical work, and for the prevention of the decline in strength that may accompany aging.

The exact role of flexibility is also difficult to define. There are no true standards available to assess accurately what a "normal" or "adequate" level of joint and muscle flexibility is. Further, it appears that flexibility is specific to individual joints and muscle groups. Research has shown that a high degree of flexibility in one joint does not imply that a high degree of flexibility exists in other joints as well (Hupprich and Sigerseth, 1949).

Studies have been conducted to investigate the role of flexibility in relation to posture development (Flint, 1963; Kraus, 1970), tension reduction (deVries, 1966), injury prevention (Davis, 1965), and counter-

action effects of specific exercises such as jogging and weight training (Leighton, 1957; Massey, 1956). In summary, it appears that few specific conclusions can be drawn about the benefits of flexibility except that an undefined "normal" range of motion is desirable. It is probably safe to assume that it is better to be flexible than inflexible and, hence, flexibility exercises should be included in any fitness programme.

Body composition is an important factor in determining a person's physical fitness. This is especially true since many coronary heart disease risk factors are directly associated with diet. Exercise can help burn up excess calories (Konishi, 1965) and can be a contributing factor in appetite control (Mayer, 1968). From both a cosmetic and a health-related viewpoint an awareness of the factors of body composition is important in fitness programming.

A definition of each component of fitness as it applies to this study has been presented in the first chapter. It should be emphasized again that the state of physical fitness is very difficult to define. It is difficult to specify what a "minimum" fitness level is or what an "optimal" fitness level is. It depends greatly on the individual's occupational and recreational activities, his genetic potential, and his overall state of health. When fitness goals are being set, diagnostic tests may provide information on areas of adequacy and deficiency.

Physical Fitness Testing

The recent increase in the number and types of adult exercise programmes caused the American Heart Association (1972) to advocate the use of proper preliminary fitness testing and individual exercise prescription

to eliminate the dangers of unregulated exercise for sedentary people. The American College of Sports Medicine (1976) responded with a series of exercise testing and prescription guidelines. The use of testing and exercise counselling programmes may not completely remove the dangers from sudden adoption of vigorous exercise patterns, but this type of scientific approach may help to do so.

Exercise stress testing has been shown to be a reasonably reliable tool for use in clinical diagnosis of cardiovascular disease (Aronow, 1973; Beard, 1973; Bruce, 1974a, 1975; Ellestad, 1975; Epstein, 1978; Kassen, 1969; Morris, 1978). Much of the knowledge gained from clinical diagnostic testing can be applied to fitness testing for other motives. Assessment of functional capacity is the basis of individual exercise prescription (Hellerstein, 1973; Howard, 1975; Stoedefalke, 1974a; Wilmore, 1974). Test results provide a performance baseline from which change can be measured. Repeated tests can be used to monitor programme effectiveness. This type of objective feedback may provide reinforcement for continued participation in a programme and may also motivate the subject to achieve higher fitness goals (Cooper, 1970; Wilmore, 1975).

Cardiovascular function tests can take many forms and can be undertaken to fulfill several different objectives. They may be categorized by:

1. the degree of stress, either maximal or submaximal;
2. continuously or discontinuously applied workloads;
3. the type of ergometric equipment used;
4. the type and number of physiological variables which are monitored;

5. the monitoring techniques employed;
6. the number and type of personnel required to administer the test;
7. the designated endpoints of the test; and
8. the reasoning or objectives behind the decision to administer the test.

Regardless of the type of test or mode of testing employed, certain principles need to be observed in order that both consistent results are obtained and an adequate degree of safety is provided:

1. Every subject should undergo an appropriate medical screening. Apparently healthy adults should complete a Physical Activity Readiness Questionnaire (PAR-Q) (Appendix A) which is designed to identify those subjects for whom vigorous exercise is contra-indicated (Chisholm, et al., 1978). Those subjects with positive PAR-Q responses or a history of diagnosed cardiovascular disease should receive medical clearance before testing.
2. The test should include an adequate warm-up and recovery period.
3. An exercise test must have specific endpoints. These may include subjective as well as objective endpoints, such as:
   a. exhaustion;
   b. attainment of a predetermined heart rate;
   c. the attainment of $\dot{V}O_2$ MAX; and
   d. symptoms such as chest pain, abnormal ECG responses, pallor, dyspnea, or ataxia.

   Some subjects may attain more than one endpoint simultaneously.
4. As far as possible the test should be of aerobic design. It should be adequate to define the point at which the subject attains his $\dot{V}O_2$ MAX, or physical working capacity, or develops some manifestations of impairment (Naughton and Haider, 1973:80).

5. Tests administered outside the laboratory should meet the following criteria (Bonen, 1975:288):

   a. must be safe;
   b. must be accurate and objective;
   c. must be easy to administer (mobile, relatively inexpensive equipment and minimal personnel requirements);
   d. must be adjustable to age and/or fitness levels.

6. In every case, regardless of the type of test and the testing location, a full safety and emergency procedure should be established and followed. All testing personnel should be fully competent in emergency procedures, and professional rescue assistance should be within easy access.

There are some negative aspects of cardiovascular fitness testing which should be mentioned. These generally result from the use of an inappropriate test, inappropriate interpretation of the test results, or poorly qualified test administrators. Concern over changes in ECG waves during or after exercise may lead to unnecessary restrictions for subjects capable of exercising. It can also cause unncesssary anxiety and medical expense. An overly conservative approach may act as a deterrent to those who might normally enter an exercise programme and may create a "worried well" (Collis, 1977a) or a cardiac neurotic patient. In other cases tests have been used to "lend a scientific veneer to unscientific programs" (Collis, 1977a; Morris, 1978). Monitored cardiovascular testing is time consuming and expensive. Careful consideration should be given before using it as a routine screening or motivational device.

Erroneous results from exercise testing may be the product of the test itself, the test administrator, the subject, or any combination thereof. In utilizing the results of exercise tests to formulate an exercise prescription, it must be ascertained that the tests were per-

formed under standardized conditions of test procedure, environment, and subject preparation.

The maximum oxygen consumption ($\dot{V}O_2$ MAX) is probably the best single indicator of the functional efficiency of the cardiovascular system (Shephard, 1977; Wenger,1975). There are a variety of laboratory techniques and procedures for measuring $\dot{V}O_2$ MAX. However, direct measurement of $\dot{V}O_2$ MAX is not always possible or desirable. Hence, a wide variety of tests have been designed to predict $\dot{V}O_2$ MAX from other more readily measurable variables, such as heart rate or duration of exercise at a given power output. The Bruce Treadmill Test (Appendix D) used in this study was designed to enable the user to infer the level of cardiovascular fitness of a subject from the duration of exercise at incremental workloads. Pollock (1976) and Bruce (1973) reported high correlations (.88 and .92, respectively) between duration of exercise and the observed $\dot{V}O_2$ MAX under the Bruce protocol.

Various measurement techniques are available for assessing the range of motion around a joint or series of joints. A simple goniometer may be used on some joints (Clarke, 1975), or a more sophisticated flexometer (Leighton, 1955) can provide an indication of range of motion of virtually any body segment.

The floor-touch test, which is part of the Kraus-Weber Test of Minimum Muscular Fitness (1954), is very similar to the Sit and Reach Test developed by Wells and Dillon (1952). Both tests are designed to evaluate overall trunk-hip flexibility. A slightly modified version of the Sit and Reach Test was used in this study. The original test description required the subject to bob forward which is a form of ballistic stretch-

ing. The modified procedure calls for a more gentle static stretching action.

The first commonly used method of assessing body composition involved the use of height-weight tables. Most of these tables relate only the skeletal dimension of height with body composition and do not provide for variances in body type. Therefore, an endomorph and an ectomorph are evaluated on the same scale (Sinning, 1975c:42).

Another obvious shortcoming of this type of table is that it may allow for an increase in weight as an individual ages. Newer tables are designed to evaluate all adults on the same scale regardless of age. They become slightly more effective by omitting the age factor and including the frame size (Sinning, 1975c:43).

The most serious drawback in using tables currently available is that they cannot distinguish between fat and lean tissue. Lean tissue represents all the body tissue with the exception of stored fats. This includes muscle, bone, nerve fiber coverings, and essential fats. Lean body weight is equal to total body weight minus the weight of stored fat. Obesity represents more of a "fat" problem than a "weight" problem, hence it is desirable to be able to distinguish between the two types of tissue.

There are various methods available for measuring lean body weight and percentage of body fat. The two most common are body densiometry and anthropometric measures. Body densiometry is normally restricted to laboratory use while anthropometric measurement techniques may be employed nearly anywhere (Sinning, 1975c).

Differences in body density usually indicate differences in fat

content. Equations are available for converting body density to fat content values (Goldman, 1961). Density is defined as the mass or weight per unit of volume. Body weight is relatively easy to assess accurately. Body volume may be calculated either by (1) volume displacement method or (2) underwater weighing method. The volume displacement method measures the amount of water displaced when a subject is lowered into a tank of water. The underwater weighing technique is based on Archimedes' principle that an object is buoyed up by a force equal to the weight of the water displaced. It is known that an object (in this case, a body) displaces its own volume in water. Therefore, if the force buoying up the body is known, the weight of the displaced water is known. By knowing the density of water, the volume of displaced water can be calculated. The volume of displaced water is equal to the volume of the body. The residual air in the lungs and the temperature of the water must also be accounted for when calculating body density (Sinning, 1975c).

These techniques are not always appropriate for use with classes or groups. Simplified techniques involving use of a few anthropometric measurements can be used to predict body density. In many cases the tester need only compare the results of his measurements to a chart which will provide an estimate of percent body fat (Kuntzleman, 1975). For body composition purposes the most common anthropometric measurements are skinfolds. These are usually taken in the areas of relatively high superficial fat deposits.

These measures have some shortcomings in that they are only estimates and may be inaccurate for some individuals. However, they generally provide meaningful information on body composition and are very

useful, provided the tester is aware of their limitations (Sinning, 1975c).

North American Lifestyle and Related Disease Risk Factors

Marc Lalonde has emphasized the importance of lifestyle to health. Lifestyle is interpreted as "the aggregation of decisions by individuals which affects their health and over which they have more or less control" (Lalonde, 1975). Personal decisions about bad health habits create self-imposed risks. When these risks result in either morbidity or mortality, then the person's lifestyle has contributed to that morbidity or mortality.

A brief review of recent North American mortality figures indicated that degenerative diseases such as coronary heart disease, cerebrovascular disease, lung cancer, and cirrhosis of the liver rank highly among the leading causes of death (Dever, 1975; Lalonde, 1975). The majority of the contributing factors to these diseases are lifestyle related (Dever, 1975).

The examination of mortality data helps to identify the most serious potential health problems for each stage of life. Health problems can then be seen more clearly as problems of how people live (Colburn, 1974). This knowledge can be used to offer guidance in determining the means of improving an individual's chances of good health and perhaps even longevity. The importance of human behaviour and the potential for its alteration should not be overlooked. If disease risk factors are related to lifestyle, then lifestyle modification in the right direction should result in reduced risks.

In the past North American health care systems have been "crisis"

oriented rather than "prevention" oriented (Lalonde, 1974). Bannister (1978) reported that total health care costs in Canada in 1977 were about 12 billion dollars; and Lalonde (1974) noted that health care costs were escalating at a rate of between 12 and 16 percent per year, which was far in excess of the economic growth rate of the nation. If unchecked, health care costs could increase beyond the capacity of society to finance them. Clearly, the role of preventive medicine cannot be underestimated.

Coronary heart disease is the greatest health hazard (Lalonde, 1974), and over 50 percent of heart disease mortality can be attributed to lifestyle influences (Dever, 1975). Numerous studies (Dawber, 1961; Doyle, 1966; Rosenman, 1964) have led to the identification of many factors which may lead to premature coronary disease: cigarette smoking, hypertension, blood lipid abnormalities, carbohydrate intolerance, heredity, physical inactivity, nutrition habits, obesity, personality and behavioural factors, and abnormalities in heart function. These factors are not listed in rank order as it is virtually impossible to assess the relative importance of a single factor (Montoye, 1976). Therein lies the largest problem facing researchers in the field. It is extremely difficult to isolate one factor in an experimental setting and assess its effect on heart disease when other factors are at work as well. The one thing that researchers are certain of, is that the risk that a person will suffer from coronary heart disease increases dramatically with the increase in the number of risk factors to which the person is exposed (Belloc and Breslow, 1972; Kannel, 1967).

Exercise and Risk Factor Reduction

Lifestyle-related risk factors are controllable. A great deal of research has been done to attempt to assess the value of regular aerobic exercise in controlling coronary risk factors. As well as inducing some beneficial cardiovascular changes, there is evidence that habitual physical activity may reduce disease risk factors (Bonanno, 1974; Cooper, 1970; Cureton, 1976; Koerner, 1973; Saltin, 1968).

Considerable research has been done which relates the incidence of coronary heart disease to occupational activity (Morris, 1953; Paffenbarger, 1970; Taylor, 1962). The evidence from these occupational studies indicated that heart disease is more frequent and fatal among sedentary workers. However, it cannot be concluded that sedentary work is in itself the cause of the higher incidence of heart disease. It is virtually impossible to account for the natural selection factors which occur, that is, a worker with poor health may naturally select a less strenuous occupation.

Other researchers have investigated leisure time activity and its effect on morbidity (Boileau,1967; Bonanno, 1974; Costill, 1970; Epstein, 1976; Kannel, 1967; Koerner, 1973; Wilmore, 1970). The results of these studies indicate a strong relationship between habitual physical activity and reduced numbers of coronary heart disease risk factors present in subjects investigated.

Several prominent writers have summarized the findings of various research studies (Astrand, 1971; Bannister, 1972; Fox, 1974; Froelicher, 1977; Montoye, 1976); and their collective opinions indicate that, even though there is no absolute scientific proof, apparently regular physical

activity may help reduce the presence of coronary risk factors. It is probably safe to assume that, as well as providing healthy cardiovascular system adaptations, chronic exercise patterns will reduce the risk of premature coronary heart disease (Kannel, 1979).

It has been noted that people who are involved in regular physical activity are more receptive to information on nutrition, smoking, alcohol abuse, and other factors. If people find that certain lifestyle habits are inhibiting their fullest enjoyment of physical activities, this may stimulate them to modify those habits (Collis, 1976).

Generally Canadians have failed to exhibit acceptable levels of cardiorespiratory fitness. Bailey et al. (1974) pointed out that the majority of Canadians tested for cardiorespiratory fitness failed to meet the acceptable standards set by Swedish and American researchers. Collis (1976) described three recent surveys which indicated that the majority of Canadians tested were below the acceptable standards for cardiovascular fitness. Cumming (1969) and Bailey (1973) have both reported on the low levels of cardiorespiratory fitness among Canadian school children and that current school physical education programmes may do very little to improve physical fitness. Cureton (1976) reported on the high levels of coronary risk factors among Chicago school children and emphasized the role of exercise in promotion of health and fitness. An assessment of school children in British Columbia (Carre et al., 1979:1) indicated a high incidence of obesity and rated many of the students "weak" in the area of physical fitness.

On the basis of his experience in the Saskatchewan growth study and a review of other research on growth factors, Bailey (1973) noted that

physical activity is important for children for the support of normal growth. The amount of physical activity in youth may also be important in determining the adult functional capacity and may influence health in adulthood. This theory is supported by the writings of Boyer (1974) who reported that coronary risk factors are present in a high percentage of American children and that primary prevention of heart disease should begin at the pediatric level. He advocated emphasis on regular endurance fitness activity and rational dieting habits as early in life as possible.

Exercise and Improvements in the Quality of Life

As well as promoting desirable cardiovascular system changes and probable health-related benefits, regular exercise has been shown to contribute to the "quality of life". The employee fitness programme for the National Aeronautics and Space Administration employees in Washington, D.C., resulted in more positive attitudes towards work, health habits, and leisure-time activities (Durbeck, 1972). Other researchers (Bonanno, 1974; Cureton, 1976; Hammer, 1973; Morris, 1978; Sidney, 1976) have reported positive attitude changes towards perceived health, body image, anxiety, and life satisfaction after endurance conditioning programmes. Various professional journals have published articles which expound both the physiological and the psychological benefits of regular exercise. An example was found in the American Journal of Nursing (Friedman, 1978) where the writers reported improvements in life quality, occupational performance, and satisfaction after becoming habitual exercisers. This feeling was summarized well by Astrand (1971) who noted that fitness can

add "life to years, not just years to life."

Behaviour Modification Techniques and Risk Factor Reduction

Lifestyle is the most important modifiable behaviour influencing health and fitness. Behaviour modification techniques have been shown by many researchers to be the most effective method of modifying lifestyle (Boyer, 1974; McAlister, 1975; Mahoney, 1975; Pomerleau, 1975; Stokols, 1975). These behavioural scientists have demonstrated that simple awareness of what is beneficial for health is not enough to motivate the majority of people to adopt more desirable behaviours. More effective is a programme of behaviour modification which includes "specifying the problem, collecting the data, identifying patterns, examining possible outcomes, narrowing options and experimenting, collecting more data, comparing data, revising the programmes, and so on" (Mahoney, 1976).

Aronow (1975) reported that knowledge of the presence of coronary risk factors was not enough stimulus to encourage the adoption of a programme of risk-reducing behaviours by the subjects in his study. A second treatment in the same study included knowledge of the presence of coronary risk factors as well as an informational programme on risk factor reducing behaviours. Neither treatment was effective at encouraging lifestyle modification to reduce the risk of coronary heart disease.

The literature documenting the use of behaviour modification techniques to motivate people to increase activity patterns is sparse. However, it would appear that there is a role for such techniques to play

in making fitness programmes more effective (Collis, 1977b; Haggerty, 1977).

Fitness Testing and Lifestyle Modification

In reference to the fitness testing programme at Carleton University in Ottawa, Poole (1977:151) wrote that

> the educational and motivational aspects of the fitness test are invaluable. When faced with objective data describing his lack of fitness, the individual often has difficulty in rationalizing an inactive lifestyle. After realistically examining himself through the test results, there is a greater likelihood that he will take remedial action.

The key phrase from the above quotation relative to this study is "a greater likelihood". The problem under investigation could be phrased as the question: What is the likelihood that after receiving the physical fitness test the subject will take remedial action? This question has not been adequately answered by researchers. An unpublished study by Stewart (1978) showed that 37 percent of subjects who received a "one-time" fitness assessment and counselling treatment increased their activity patterns over the year following the treatment. However, when asked if the testing had any effect on increasing their activity, only 3.5 percent responded in the affirmative. Use of a control group may have aided in separating the external stimulations to increase activity which were, on the basis of the above data, present. Obviously further investigation of this question is warranted.

Summary

This chapter began by noting that one of the commonly acknowledged

objectives of fitness testing is to encourage people to exercise. The possibility of achieving this objective has not yet been established by scientific research. The preceding discussion on physical fitness testing has suggested that test results can provide valuable diagnostic information and an accurate assessment of an individual's functional capacity. On the basis of this information an effective individual exercise prescription can be issued.

A brief review of North American health problems has indicated that a sedentary lifestyle may contribute to the premature onset of degenerative diseases. It has also been reported that regular aerobic exercise patterns can induce some "beneficial" cardiovascular system changes and may have some prophylactic effect against premature degenerative diseases.

If physical fitness is perceived as desirable and if one of the goals of the physical education profession is to encourage people to adopt more physically active lifestyles, then the effectiveness of the techniques employed as motivational tools must be established. It would appear that fitness testing can play an important role as part of an overall fitness programme, especially if some behaviour modification principles are applied. Very often, however, fitness testing seems to be done for its own sake rather than as part of a complete programme. It remains to be seen whether this approach has any lasting effects on the testing programme participants in promoting an increase in exercise habits or other beneficial lifestyle changes.

CHAPTER III

THE METHOD

Introduction

During the summer of 1978 the School of Physical Education at the University of Victoria, Victoria, British Columbia, sponsored a programme of physical fitness appraisals and exercise counselling. This study was undertaken to investigate the effects that programme may have had on increasing the physical activity patterns of the participants. One of the organizations which took advantage of the complimentary service was the Saanich Police Department. Thirty-two male police officers received identical physical fitness appraisals and were subsequently counselled and given an individual training programme. The officers participated voluntarily and were given time off during regular working hours to do so. Following the appraisal, test results were graded against Canadian physical fitness standards, and a written report was prepared for each subject (Appendix E). Results were explained to the subjects individually, and recommendations for fitness improvements were made. Various counselling aids were employed to illustrate the principles of exercise and to supplement the information in the written report (Appendix F).

Subject Selection

The 32 Saanich police officers were selected as potential subjects for the experimental group in the study. These individuals satisfied the following criteria:

1. They had received identical testing and counselling treatments in June 1978.
2. They were male police officers between the ages of 20 and 49 years.
3. They were still active members of the police force in May 1979.

Each member of this group was individually requested by letter (Appendix G) to participate in the study. The investigator made subsequent requests by addressing the musters which precede each shift and by individual telephone contacts. Those subjects who returned for the second test in 1979 formed the Experimental Group. Those subjects who declined to return for the second test formed the first Control Group (C_{78}).

Those officers on the Saanich police force who did not participate in the 1978 testing programme were invited by letter (Appendix H) to participate in the 1979 appraisal as members of the second Control Group (C_{79}). Subsequent requests were made when the investigator addressed the shift musters and in some cases by telephone. Additional subjects for the C_{79} group were recruited by written invitations (Appendix I) sent to the Victoria City Police Department and the Colwood Detachment of the Royal Canadian Mounted Police. Ultimately 48 male police officers between the ages of 20 and 49 years with at least one year of service participated as subjects in the study.

The groups of subjects were defined as follows:

1. Experimental Group (E) consisted of 17 members of the Saanich Police Department who participated in the 1978 appraisal and the 1979 appraisal.
2. Control Group One (C_{78}) consisted of 15 members of the Saanich

Police Department who participated in the 1978 appraisal and declined to participate in the 1979 appraisal.

3. Control Group Two (C_{79}) consisted of 16 members of a number of local police departments who did not participate in the 1978 appraisal and who agreed to participate in the 1979 appraisal.

The number of subjects from each police department are reported in Table I, and the age distributions of each group are reported in Table II. The

TABLE I

Distribution of Subjects among Police Departments

Department	Group		
	Experimental	$Control_{78}$	$Control_{79}$
Saanich	17	15	8
Victoria	-	-	5
Colwood	-	-	3

TABLE II

Distribution of Subjects among Age Categories

Age Category	Group		
	Experimental	$Control_{78}$	$Control_{79}$
20 - 34 years	12	9	8
35 - 49 years	5	6	8

three groups were matched by age. All subjects were volunteers as the nature of the study did not allow random sampling techniques to be employed.

It was assumed that the members of the second Control Group (C_{79}) were subject to the same environmental factors as the Experimental Group (E) which might influence their exercise habits. Such a factor would be the media campaigns by Sport Participation Canada. The primary difference between the E and the C_{79} groups was assumed to be the fitness appraisal and exercise counselling treatment.

It should be made clear that the 1978 appraisal was part of a service programme designed to encourage interest in physical fitness. The current study was developed after that programme had ended.

Ultimately four sets of data were used in the study. These data sets were defined as follows:

1. Experimental data set 1978 (E_{78}) referred to the measures of physical and performance characteristics obtained from the 1978 appraisal of the 17 members of the Experimental Group.
2. Experimental data set 1979 (E_{79}) referred to the measures of physical and performance characteristics and the responses to the Structured Interview-Questionnaire from the 1979 appraisal of the 17 members of the Experimental Group.
3. Control data set 1978 (C_{78}) referred to the measures of physical and performance characteristics from the 1978 appraisal of the 15 members of the first Control Group.
4. Control data set 1979 (C_{79}) referred to the measures of physical performance characteristics and the responses to the Structured Interview-Questionnaire from the 1979 appraisal of the 16 members

of the second Control Group.

Data Collection

All data were collected in the Exercise Physiology Laboratory of the School of Physical Education at the University of Victoria. The initial period of data collection was the month of June 1978. The second period of data collection was between the months of May and August 1979.

The 1978 fitness appraisal consisted of the following measures:

1. standing height and body weight;
2. skinfold thickness measurements to predict percentage of body fat;
3. flexibility tests for trunk flexion and shoulder extension;
4. strength tests for:
    a. shoulder extension,
    b. knee extension,
    c. ankle plantar flexion,
    d. forearm (grip), and
    e. abdominal musculature; and
5. cardiovascular endurance assessment from the Bruce Treadmill Test.

The 1979 appraisal included only those measures which were selected for investigation in the study. They were as follows:

1. standing height and body weight,
2. skinfold thicknesses,
3. trunk flexion, and
4. cardiovascular endurance.

As part of the 1979 appraisal subjects responded to the Structured Interview-Questionnaire (Appendix J). Prior to both the 1978 and 1979 appraisals subjects completed the PAR-Q screening device (Appendix A).

Instrumentation

Structured Interview-Questionnaire

The Structured Interview-Questionnaire was designed to provide the following information:

1. participation/non-participation in the 1978 appraisal;
2. participation/non-participation in any similar appraisal;
3. current (1979) exercise behaviour:
   a. type,
   b. frequency,
   c. perceived intensity, and
   d. duration;
4. current (1979) attitudes towards physical activity;
5. changes, if any, in exercise behaviour since the summer of 1978; and
6. what influence, if any, the 1978 appraisal had on the exercise habits of the subject.

The questionnaire was modelled on the instrument designed by Jackson (1975) for use in his study of the consequences of the Sport Participation Canada campaign in Saskatoon, Saskatchewan, during 1971 to 1974. A discussion of each question, including the rationale for inclusion of each, was included in Appendix K. The responses to the questions were used to clarify the results of the 1979 physical fitness appraisal.

Interviewer behaviour adhered closely to the following principles (Lovell and Lawson, 1970:119):

a. The interviewer must convey the impression to the subject that he is in possession of information and knowledge which the interviewer needs and which no one else can provide.

b. The respondent must be assured that the information given will be treated confidentially.

c. If the interviewer is outside the hierarchial system in which the subject works or studies, then the subject should be informed of this.

d. The interviewer must be pleasant and restrained in manner rather than being too friendly. He should also avoid giving the impression of being superior, patronizing, clever or sly, and should not threaten or bully the subject.

e. The rules or procedure of the interview must be followed carefully.

f. The interviewer should avoid giving hints by his facial expression or his tone of voice as to the answers he would prefer to be given.

Jackson (1975:51) noted that the age, sex, and appearance of the interviewer may cause variance in answers or unreliable responses. For consistency, the interviewer conducted all interviews and attempted to maintain a neat, well-groomed appearance throughout the study.

Physical Fitness Appraisal

The Physical Fitness Appraisal involved assessment of the following variables:

1. body composition (Appendix B),
2. trunk flexion (Appendix C), and
3. aerobic capacity (Appendix D).

The tests were administered in the above order and according to the pro-

cedures outlined in the appropriate appendices.

Treatment of Data

The t-test statistic was employed to indicate differences between physical and performance variables. A comparison of data sets from the 1978 appraisal and the 1979 appraisal of the Experimental Group was made using a correlated t-test. The variables of weight, skinfold thickness, trunk flexion, and treadmill time were compared. A comparison of data sets using an independent t-test was made for the variables of age, height, weight, skinfold thickness, and treadmill time as follows:

1. E_{78} data set vs. C_{78} data set, and
2. E_{79} data set vs. C_{79} data set.

Each of the above comparisons was made on the data sets with respect to previously mentioned age categories and with age categories pooled.

A probability value of less than five percent ($p < .05$) was selected as the criterion for rejection.

A subjective analysis was conducted on the questionnaire responses from the data sets E_{79} and C_{79}.

Computer Analysis

The physical and performance data were analyzed in the Academic Systems Department at the University of Victoria on an IBM 370 computer. The descriptive statistics and t-tests were part of the Statistical Package for the Social Sciences (SPSS).

CHAPTER IV

RESULTS

Introduction

In this chapter physical fitness test results, t-test analyses results, and responses to the Structured Interview-Questionnaire are tabled.

Physical Fitness Test

The results from the measurement of the dependent variables of age, body weight, standing height, skinfold thickness, trunk flexion, and treadmill time are reported for each data set and each age-related data subset in Tables III-XI. The results of the t-test analyses conducted on the data are also reported here. Raw scores for each data set are presented in Appendix L. Definitions of each of the groups of subjects and of each data set are listed on pages 29, 31, and 32.

The results of the independent t-test analyses between the E_{78} and the C_{78} data sets were reported in Tables III-V. This analysis was conducted in an attempt to discern whether initial physical and performance characteristics might have influenced the decision to return for the posttest. No differences ($p < .05$) were present between the two data sets on the variables tested in either age category or with age categories pooled.

The results of the correlated t-test analyses for the Experimental

TABLE III

Physical and Performance Characteristics of the Experimental and Control Groups with Ages Pooled (20-49 years) from the 1978 Appraisal

Variable	E_{78} (n = 17) Mean ± (S.E.)		C_{78} (n = 15) Mean ± (S.E.)		2-tail Probability
Age (yrs)	31.0	(1.8)	32.0	(2.1)	0.719
Height (cm)	183.7	(1.7)	182.1	(1.3)	0.469
Weight (kg)	86.4	(2.2)	84.4	(2.1)	0.522
Skinfold Total (mm)	51.5	(5.1)	48.4	(2.3)	0.585
Trunk Flexion (in)	13.0	(0.6)	12.5	(0.7)	0.651
Treadmill (min)	11.27	(0.3)	10.95	(0.4)	0.521

TABLE IV

Physical and Performance Characteristics of the Experimental and Control Groups for Ages 20-34 years from the 1978 Appraisal

Variable	E_{78} (n = 12) Mean ± (S.E.)		C_{78} (n = 10) Mean ± (S.E.)		2-tail Probability
Age (yrs)	27.0	(1.0)	27.4	(1.6)	0.831
Height (cm)	184.7	(1.9)	182.5	(1.7)	0.403
Weight (kg)	85.2	(1.9)	81.7	(1.8)	0.189
Skinfold Total (mm)	48.0	(5.5)	48.7	(3.4)	0.914
Trunk Flexion (in)	13.5	(0.6)	13.2	(0.8)	0.766
Treadmill (min)	11.6	(0.34)	11.5	(0.37)	0.836

TABLE V

Physical and Performance Characteristics of the Experimental and Control Groups for Ages 35-49 years from the 1978 Appraisal

Variable	E_{78} (n = 5) Mean ± (S.E.)		C_{78} (n = 5) Mean ± (S.E.)		2-tail Probability
Age (yrs)	40.6	(2.0)	41.2	(1.9)	0.831
Height (cm)	181.3	(3.3)	181.5	(1.9)	0.960
Weight (kg)	89.1	(6.4)	89.8	(4.6)	0.932
Skinfold Total (mm)	59.8	(11.7)	47.7	(1.9)	0.363
Trunk Flexion (in)	11.75	(1.4)	11.25	(1.5)	0.815
Treadmill (min)	10.48	(0.46)	9.85	(0.8)	0.516

TABLE VI

Physical and Performance Characteristics of the Experimental Group with Ages Pooled (20-49 years) from the 1978 and 1979 Appraisals

Variable	E_{78} (n = 17) Mean ± (S.E.)		E_{79} (n = 17) Mean ± (S.E.)		2-tail Probability
Weight (kg)	86.4	(2.2)	85.7	(2.4)	0.284
Skinfold Total (mm)	51.5	(5.1)	51.6	(3.7)	0.970
Trunk Flexion (in)	13.0	(0.6)	13.1	(0.5)	0.670
Treadmill (min)	11.27	(0.3)	12.3	(0.36)	0.001

TABLE VII

Physical and Performance Characteristics of the Experimental Group for Ages 20-34 years from the 1978 and 1979 Appraisals

Variable	E_{78} (n = 12) Mean ± (S.E.)		E_{79} (n = 12) Mean ± (S.E.)		2-tail Probability
Weight (kg)	85.2	(1.9)	84.9	(1.9)	0.699
Skinfold Total (mm)	48.0	(5.5)	49.1	(4.3)	0.751
Trunk Flexion (in)	13.5	(0.6)	13.3	(0.6)	0.580
Treadmill (min)	11.6	(0.34)	12.73	(0.41)	0.003

TABLE VIII

Physical and Performance Characteristics of the Experimental Group for Ages 35-49 years from the 1978 and 1979 Appraisals

Variable	E_{78} (n = 5) Mean ± (S.E.)		E_{79} (n = 5) Mean ± (S.E.)		2-tail Probability
Weight (kg)	89.1	(6.4)	87.5	(6.4)	0.102
Skinfold Total (mm)	59.8	(11.7)	59.7	(6.9)	0.730
Trunk Flexion (in)	11.8	(1.4)	12.5	(1.3)	0.028
Treadmill (min)	10.48	(0.56)	11.37	(0.62)	0.095

TABLE IX

Physical and Performance Characteristics of the Experimental and Control Groups with Ages Pooled (20-49 years) from the 1979 Appraisal

Variable	E_{79} (n = 17) Mean ±	(S.E.)	C_{79} (n = 16) Mean ±	(S.E.)	2-tail Probability
Age (yrs)	32.0	(1.8)	35.9	(2.1)	0.158
Height (cm)	183.7	(1.7)	182.3	(0.8)	0.464
Weight (kg)	85.7	(2.4)	87.1	(2.3)	0.662
Skinfold Total (mm)	51.6	(3.7)	52.5	(3.4)	0.860
Trunk Flexion (in)	13.1	(0.5)	11.9	(0.8)	0.232
Treadmill (min)	12.33	(0.4)	11.57	(0.4)	0.163

TABLE X

Physical and Performance Characteristics of the Experimental and Control Groups for Ages 20-34 years from the 1979 Appraisal

Variable	E_{79} (n = 12) Mean ±	(S.E.)	C_{79} (n = 8) Mean ±	(S.E.)	2-tail Probability
Age (yrs)	28.0	(1.0)	29.3	(1.5)	0.497
Height (cm)	184.7	(1.9)	182.4	(1.4)	0.358
Weight (kg)	84.9	(2.4)	87.3	(1.5)	0.406
Skinfold Total (mm)	49.1	(4.3)	50.2	(1.9)	0.806
Trunk Flexion (in)	13.3	(0.6)	12.7	(0.9)	0.604
Treadmill (min)	12.73	(0.4)	12.22	(0.5)	0.439

TABLE XI

Physical and Performance Characteristics of the Experimental and Control Groups for Ages 35-49 years from the 1979 Appraisal

Variable	E_{79} (n = 5) Mean ± (S.E.)		C_{79} (n = 8) Mean ± (S.E.)		2-tail Probability
Age (yrs)	41.6	(2.0)	42.6	(1.8)	0.708
Height (cm)	181.3	(3.3)	182.2	(1.0)	0.806
Weight (kg)	87.5	(6.4)	87.0	(4.5)	0.947
Skinfold Total (mm)	57.7	(6.9)	54.7	(6.6)	0.763
Trunk Flexion (in)	12.5	(1.3)	11.2	(1.2)	0.458
Treadmill (min)	11.37	(0.62)	10.93	(0.51)	0.599

Group (E_{78} and E_{79} data sets) are reported in Tables VI-VIII. A significant difference ($p < .001$) in the treadmill time for the group when age categories were pooled is displayed in Table VI. The mean improvement in treadmill test duration of 1.06 minutes represented an increase in $\dot{V}O_2$ MAX of approximately 3.7 ml/kg/min or 8 percent, according to the predictive equation which corresponds to the test protocol (Bruce, 1973). A difference ($p < .003$) for the younger age category on the same variable is reported in Table VII. This difference reflects a mean improvement of about 4.7 ml/kg/min in $\dot{V}O_2$ MAX or an approximate 10 percent increase in that measure.

A difference ($p < .03$) in trunk flexion for the older category was displayed in Table VIII. This represented a mean improvement of approxi-

mately 6 percent for that variable.

The results of the independent t-test analyses between the E_{79} and C_{79} data sets for pooled and separate age categories are displayed in Tables IX-XI. No differences were noted on any variables under study.

Summary of Test Results

No differences were noted on any variables for either pooled or separate age categories between E_{78} and C_{78} or between E_{79} and C_{79} data sets. Improvements in treadmill time for the pooled age and the younger age categories ($p < .001$ and $p < .003$, respectively) were noted between the E_{78} and E_{79} test results. Improvement in the trunk flexion variable ($p < .03$) for the older age category in the E_{78} and E_{79} test results was noted.

Structured Interview-Questionnaire Results

The responses to the 16 questions are tabled in two fashions. The questions which could be completed by only a "yes" or a "no" response are listed in Table XII. Where appropriate, numbers and percentages of responses are given with respect to regular or non-regular exercise patterns. The questions which required an answer other than, or in addition to, "yes" or "no" are dealt with individually and responses were tabled.

Question 2: Have you ever participated in another fitness test and/or exercise counselling programme? If yes, when and where?

Experimental Group (E_{79} data set). Twenty-four percent (four subjects) replied "yes". Of these one had completed the Canadian Home

TABLE XII

Numbers and Percentages* of "yes" and "no" Responses from the E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years) to Questions 1, 4, 5, 6, and 7

Question	Data Set	Yes n	Yes %	No n	No %
1. Did you participate in the physical fitness programme at the University of Victoria last summer (June/July 1978)?	E_{79}	17	100	-	-
	C_{79}	-	-	16	100
4. As a result of your participation in the testing programme, did you decide to become physically active or more physically active than before? (E_{79} only)	E_{79}	10	59	7	41
	Regular Exercise	6	35	4	24
	Non-reg. Exercise	4	24	3	17
5. Have you increased your exercise habits in the past 12 months (since July 1978)? (C_{79} only)	C_{79}	8	50	8	50
	Regular Exercise	7	44	5	31
	Non-reg. Exercise	1	6	3	19
6. Since July 1978 have you increased your exercise habits, then decreased again?	E_{79}	4	24	13	76
	Regular Exercise	1	6	9	53
	Non-reg. Exercise	3	18	4	23
	C_{79}	4	25	12	75
	Regular Exercise	2	13	10	63
	Non-reg. Exercise	2	13	2	13
7. Are you a regular exerciser now (at least 2x/week)?	E_{79}	10	59	7	41
	C_{79}	12	75	4	25

*Percentages are rounded to nearest whole number.

Fitness Test (CHFT) at a training seminar after the pretest in June 1978. Two subjects had performed the Cooper 12-minute run during their police training in 1970. The fourth positive had completed a physical fitness appraisal as part of the selection procedures for admission to the Emergency Response Team in Victoria. Two of the four reported to be regular exercisers, and two reported to have no regular exercise habits.

Control Group (C_{79} data set). Thirty-eight percent (six subjects) answered "yes". All of these subjects reported current regular exercise habits. Three subjects reported completing a timed-run test during their police training from three to five years prior to the study. Three subjects had completed the CHFT during training seminars in Ottawa in 1977. One of the latter three had also had a negative stress test at Royal Jubilee Hospital in Victoria approximately three months prior to his test for this study.

Question 3: (Control Group only) Why did you not participate in the fitness testing programme at the University of Victoria during the summer of 1978?

Responses to Question 3 are reported in Table XIII.

Question 8: How many days do/did you participate in physical activity?

Responses to Question 8 are reported in Table XIV.

Question 9: How hard do/did you exercise?

Responses to Question 9 are reported in Table XV.

Question 10: How long do/did you exercise each session?

Responses to Question 10 are reported in Table XVI.

Question 11: In which sport or fitness activity do/did you mainly participate?

TABLE XIII

Frequencies of Responses from the C_{79} Data Set to Question 3

Response	Regular Exercise n	%*	Non-reg. Exercise n	%*
Not interested in test	4	25	2	13
Unaware of test	4	25	1	6
Test time was inconvenient	3	19	1	6
Subject on holidays	1	6	-	-

*Percentages are rounded to nearest whole number.

TABLE XIV

Reported Frequency of Regular Exercise
from E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
Frequency (days/week)	Regular Exercise n	%*	Non-reg. Exercise n	%*	Regular Exercise n	%*	Non-reg. Exercise n	%*
One	-	-	3	18	-	-	1	6
Two	1	6	-	-	2	13	-	-
Three	2	12	3	18	2	13	-	-
Four	3	18	-	-	4	25	-	-
Five	3	18	-	-	-	-	-	-
Six	-	-	-	-	-	-	-	-
Seven	1	6	-	-	4	25	1	6

*Percentages are rounded to nearest whole number.

TABLE XV

Reported Intensities of Regular Exercise Bouts from E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Intensity	n	%*	n	%*	n	%*	n	%*
Very hard	-	-	-	-	-	-	-	-
Hard	4	24	3	18	8	50	1	6
Not too hard	5	29	3	18	3	19	1	6
Not hard at all	1	6	-	-	-	-	1	6

*Percentages are rounded to nearest whole number.

TABLE XVI

Reported Durations of Regular Exercise Bouts from E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Duration (minutes)	n	%*	n	%*	n	%*	n	%*
Less than 10	-	-	-	-	-	-	-	-
10 to 20	4	24	3	18	4	25	2	13
20 to 30	-	-	-	-	2	13	-	-
More than 30	6	35	3	18	6	38	-	-

*Percentages are rounded to nearest whole number.

Responses to Question 11 are reported in Table XVII.

TABLE XVII

Reported Distribution of Exercise Modalities from E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Activity	n	%*	n	%*	n	%*	n	%*
Running	5	29	2	12	4	25	-	-
Weightlifting	2	12	1	6	2	13	-	-
Swimming	3	18	1	6	-	-	-	-
Calisthenics	2	12	-	-	4	25	1	6
Individual sports	1	6	-	-	-	-	-	-
Team sports	1	6	-	-	4	25	1	6
Walking	2	12	1	6	1	6	-	-
Cycling	-	-	1	6	-	-	-	-

*Percentages are rounded to nearest whole number.

Question 12: Where do/did you participate in physical activity?

Responses to Question 12 are reported in Table XVIII.

Question 13: Very briefly, why do/did you participate in regular physical activity?

Responses to Question 13 are reported in Table XIX.

Question 14: Does/did your physical activity give you:

a. enjoyment?
b. a relaxed feeling?
c. an increased state of well-being?

TABLE XVIII

Reported Distribution of Exercise Venues*
from E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Venue	n	%**	n	%**	n	%**	n	%**
Neighborhood	4	24	2	12	4	25	-	-
Community Recreation Facility	4	24	1	6	3	19	1	6
Home	2	12	1	6	3	19	1	6
Parks	2	12	1	6	1	6	-	-
Work	1	6	-	-	1	6	-	-
Health Clubs	-	-	1	6	-	-	-	-

*Subjects could report more than one venue.
**Percentages are rounded to nearest whole number.

d. increased energy and vitality?
e. a more positive mental attitude?
f. improved family life?
g. enjoyable social or club activity?
h. other?

Respondents were to choose the <u>one</u> answer which <u>best</u> summarized their positive feelings about exercise. One subject from the Experimental Group and two subjects from the Control Group declined to answer. Responses to Question 14 are reported in Table XX.

<u>Question 15</u>: Do/did you find your physical activity:

a. boring?
b. hard work?
c. too time consuming?
d. too difficult?
e. makes/made you tense?

TABLE XIX

Distribution of Reported Reasons for Exercise Participation from the E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Reason for Exercising	n	%*	n	%*	n	%*	n	%*
Better health	3	18	2	12	3	19	1	6
Social interaction (fun)	3	18	1	6	3	19	-	-
Increased fitness	1	6	2	12	5	31	1	6
Weight control	3	18	-	-	5	31	1	6
Appearance	2	12	-	-	1	6	-	-
Job requirements	1	6	1	6	-	-	-	-
Self concept	-	-	-	-	1	6	-	-

*Percentages are rounded to nearest whole number.

f. has/had disrupted family life?
g. leads/led to unpleasant social or club activity?
h. other?

Respondents were to choose the <u>one</u> response which <u>best</u> summarized their negative feelings towards exercise. Two regular exercisers from each group declined to answer, noting that they had <u>no</u> negative feelings towards their exercise. Responses to Question 15 are reported in Table XXI.

<u>Question 16</u>: If an employee fitness programme was offered at your place of employment, would you participate? If yes, would you prefer a group or an individual exercise programme?

TABLE XX

Distribution of "positive" Responses towards Exercise from the E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Response	n	%*	n	%*	n	%*	n	%*
Enjoyment	1	6	1	6	1	6	-	-
A relaxed feeling	-	-	1	6	-	-	-	-
An increased state of well-being	5	29	2	12	5	31	1	6
Increased energy and vitality	2	12	2	12	3	19	1	6
A more positive mental attitude	1	6	-	-	2	13	-	-
Improved family life	1	6	-	-	-	-	-	-
Enjoyable social or club activity	-	-	-	-	1	6	-	-
Other	-	-	-	-	-	-	-	-

*Percentages are rounded to nearest whole number.

Responses to Question 16 are reported in Table XXII.

Information on the type, frequency, intensity, and duration of exercise for each subject was converted to a "point" value (Cooper, 1970) to allow comparison of the relative merits of the training programmes of each group. The results of this comparison are reported in Table XXIII.

TABLE XXI

Distribution of "negative" Responses towards Exercise from the E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
Response	n	%*	n	%*	n	%*	n	%*
Boring	1	6	2	12	1	6	-	-
Hard work	2	12	2	12	3	19	-	-
Too time consuming	5	29	3	18	6	33	2	13
Too difficult	-	-	-	-	-	-	-	-
Makes/made you tense	-	-	-	-	-	-	-	-
Has/had disrupted family life	-	-	-	-	-	-	-	-
Leads/led to unpleasant social activity	-	-	-	-	-	-	-	-
Other**	-	-	-	-	-	-	2	13

*Percentages are rounded to nearest whole number.
**Requires leadership and motivation.

TABLE XXII

Distribution of Responses Regarding Participation in a Hypothetical Employee Fitness Programme and Preference for Group or Individual Exercise Programme from the E_{79} and C_{79} Data Sets with Ages Pooled (20-49 years)

Response	E_{79}				C_{79}			
	Regular Exercise		Non-reg. Exercise		Regular Exercise		Non-reg. Exercise	
	n	%*	n	%*	n	%*	n	%*
Participation in an employee fitness programme, if available: (a) yes	9	53	6	35	12	75	4	25
(b) no	1	6	1	6	-	-	-	-
Programme preference: (a) group	5	29	3	18	5	31	1	6
(b) individual	4	24	3	18	7	44	3	19

*Percentages are rounded to nearest whole number.

TABLE XXIII

Mean Point Values for Exercise and Predicted $\dot{V}O_2$ MAX Scores from the E_{79} and C_{79} Data Sets for Each Age Group and with Ages Pooled

Age Category	Points/Week		$\dot{V}O_2$ MAX	
	E_{79}	C_{79}	E_{79}	C_{79}
20-34	21.9 (n = 12)	22.2 (n = 8)	46.6	44.9
35-49	21.1 (n = 5)	19.0 (n = 8)	42.7	42.5
20-49	21.7 (n = 17)	20.6 (n = 16)	45.5	42.8

CHAPTER V

DISCUSSION

Introduction

As stated above, one of the major reasons for the administration of fitness appraisals is to use the results to encourage subjects to begin an exercise programme. This study was designed to investigate the effectiveness of this technique. The results demonstrated that some significant improvements in performance were made by the Experimental Group following the test and programme prescription. However, at the time of the posttest, another group of policemen (C_{79} data set) were tested. The physical and performance characteristics of that group were used as control data against which the results of the 1979 assessment of the Experimental Group were measured. No differences were observed when age categories were pooled or considered separately. Therefore, it appeared that any improvements which were observed in the performance of the Experimental Group should not be wholly attributed to the effects of the treatment. These benefits may have accrued as the result of other factors which encourage individuals to increase their exercise patterns. Any credit assigned to the effectiveness of the treatment should be given rather cautiously.

Fitness Test Results

The first set of t-test analyses, reported in Tables III-IV, indi-

cated that there were no differences on physical and performance characteristics between the E_{78} and the C_{78} data sets. Since nearly half of the original group of 32 subjects declined to return for a second test, it was concluded that initial fitness levels had no influence on the decision to return. It was then assumed that other factors, beyond the control of this study, caused the 15 members of the first Control Group not to return. The majority of the members of that group indicated a willingness to attend the second test but ultimately failed to do so. Reasons which prevented attendance included employment, personal commitments, and lack of interest in the second test. It should be reiterated that since subjects were volunteers neither the police administrators nor the investigator had any means of coercing participation.

Exercise programme prescriptions were developed from the results of the initial testing programme. The major areas of deficit were identified as excessive levels of fat tissue, low trunk flexibility and low aerobic capacity (Appendix M). It was found that body weight and relative fat increased with age while trunk flexibility and $\dot{V}O_2$ MAX decreased with age. Training programmes were designed to encourage loss of excess fat ($\bar{x}$ loss of 4.3 kg) and to enhance both trunk flexibility and cardiovascular endurance. Because of the sedentary nature of most police work, with its occasional demand for a rapid physical response to an emergency situation, these variables were felt to be most critical to the officers.

The results of the correlated t-tests reported in Tables VI-VIII indicated an improvement ($p < 0.001$) in the cardiovascular endurance of the Experimental Group when ages were pooled. When the age categories were examined separately, however, it was noted that the younger officers

were responsible for the improvement ($p < .003$) as insignificant changes ($p < .095$) were observed in the endurance of the older officers. The older group did improve ($p < .03$) trunk flexion performance. No other changes were observed between the initial and final test results.

The results of the independent t-test analyses reported in Tables IX-XI indicated that no differences were present on any physical or performance variables between the E_{79} and C_{79} data sets for either age category or when age categories were pooled.

Data reported elsewhere (Stamford et al., 1978) indicated that fitness standards for police officers decline with age. Therefore, the two groups of officers were matched for age. The height, weight, and skinfold thickness characteristics were the same for both groups. The test results for trunk flexibility and cardiovascular endurance indicated no differences in performance capability on those tests. It appeared that receiving the treatment a year prior to the 1979 test did not cause the Experimental Group to perform differently than the Control Group which did not receive that treatment. These results may indicate that such fitness improvements as were observed in the Experimental Group may have accrued as the result of some other factor(s).

The responses to the questionnaire reported that 59 percent of the Experimental Group found the treatment effective in encouraging them to increase their exercise patterns. However, of these ten subjects, only six (35 percent) continued to exercise on a regular basis at the time of the posttest. These results indicated that while a majority of subjects increased their activity level as a direct result of the testing programme, such increases were in fact only short term. Therefore, a true change in

exercise patterns had not occurred.

Fifty percent of the Control Group also reported an increase in exercise patterns since the time that the initial test was given to the Experimental Group. Of these eight subjects, five (31 percent) continued to exercise regularly at the time of the second fitness assessment. It was apparent that factors other than the treatment caused a similar increase in regular and occasional exercise patterns.

In his study of the Participaction campaign in Saskatoon, Jackson (1975) reported that 16.9 percent of subjects polled had become regular exercisers as a result of that campaign. He also reported that 25.5 percent attributed their regular exercise patterns to some other factor, and those habits were established prior to the advent of the Participaction campaign. An unpublished study (Stewart et al., 1978) of the effectiveness of a single fitness assessment and counselling session reported that 37 percent of subjects reported an increased level of activity 6 to 12 months following the treatment. However, only 3.5 percent felt that the treatment had any effect on increasing their activity level. In summary, it would appear that treatments similar to that employed in the current study may encourage some individuals to exercise more but other factors may be equally effective at accomplishing the same purpose.

The responses to Question 6 identified those subjects who had adopted an increased activity level since the time of the initial test but who had rejected those habits prior to the final test. Four subjects from both the Experimental (24 percent) and the Control (25 percent) groups responded affirmatively to that question. Those responses demonstrate a problem often faced by fitness professionals which is the task

of sustaining the enthusiasm of an individual once he has begun a programme. Exercise programme participants may need regular reinforcement and encouragement to maintain participation (Collis, 1976). This may take the form of success in sport, encouragement from peers or instructors, monitoring and evaluation of progress, or participation in a group. Ultimately the encouragement for participation must be found intrinsically; for if the person does not perceive that the benefits were worth the effort required to attain them, it is unlikely that he would continue under any circumstances. Until he reaches the point of self motivation, some external motivation may be required.

The responses to Question 16, reported in Table XXII, provided further insight into the problem of reinforcement. Fifteen subjects (88 percent) from the Experimental Group reported that they would participate in an employee fitness programme if it was offered at their place of employment. Six of the above were not regular exercisers but indicated that if the facility and the leadership were made available, they would participate regularly. One of the subjects who responded negatively already exercised regularly and reported no interest in such a programme. The other negative response came from a subject who maintained absolutely no interest in physical activity whatsoever.

Sixteen subjects (100 percent) from the Control Group reported that they would participate in such a programme if available to them. Four of the above (25 percent) were not regular exercisers but reported that the right kind of programme would encourage them to adopt regular exercise habits.

In the Experimental Group eight subjects (47 percent) reported a

preference for exercising in a group of peers and indicated that they felt a group would provide a greater stimulus to continue exercising. Seven subjects (41 percent) reported a preference for exercising individually but indicated that supervision from a programme leader would facilitate adherence to activity. Six members (38 percent) of the Control Group reported preference for the group programme, while ten (63 percent) reported a preference for a supervised individual programme.

The responses to this question indicated a high preference for a structured exercise programme and that a greater number of subjects would adopt regular exercise patterns if such a programme was available. Several subjects reported that they felt physical fitness was important to success as a police officer but that they found it difficult to maintain a reasonable level of fitness on their own.

Data describing the type, frequency, intensity, and duration of exercise were reported for both groups in Tables XIV-XVII. This information was then converted to a point value for aerobic exercise as described by Cooper (1970). The results of the treadmill test for cardiovascular endurance (Tables IX-XI) indicated that no differences were present between the two groups. A comparison of the relative merits of the training programmes for each group according to the "Aerobics" system (Table XXIII) demonstrated that no differences were present in the volume of training accomplished by each group. It could then be assumed that the treatment had no effect on the amount of training accomplished by the Exoerimental Group as compared to the Control Group.

The responses to Question 12 on the location(s) where physical activity took place were reported in Table XVIII. Although subjects could

report more than one exercise venue, there was no apparent difference between the two groups. This result indicated that neither group had any advantage over the other in the availability of facilities or that a disproportionate percentage of either group was involved in a specific type of activity.

The responses to Question 13 on the reasons for participation in physical activity were reported in Table XIX. Again, subjects could report more than one reason if they felt strongly about each one. There were no apparent differences in the distribution of reported reasons why subjects felt that exercise was important. From the responses it was apparent that none of the subjects were coerced into performing physical activity; however, two subjects from the Experimental Group reported that they exercised because they felt that fitness was critical to their performance as police officers.

Attitudes towards exercise were evaluated from the responses to Questions 14 and 15. Subjects were asked to select the one response which most closely mirrored their positive and negative feelings towards physical activity. Results were reported in Tables XX and XXI. Again, it was evident that no differences in attitudes towards activity were present between the two groups. Apparently the initial treatment had no effect on the attitudes maintained by the Experimental Group towards activity in 1979.

Implications of the Study

While the study could not provide conclusive results, several implications were evident which could form the hypothesis for replication of

the investigation on a larger scale. These implications are discussed in this section.

It became apparent when collecting and analyzing the final data that the initial treatment had little effect on the physical and performance characteristics of the Experimental Group. Several individuals made remarkable improvements in their personal fitness levels during the study, as evidenced by the raw individual scores reported in Appendix M. A few of these subjects commented that the treatment had been most effective at encouraging their increased activity levels. However, for the entire group, in light of the physical and performance data from the Control Group, the treatment may not have accounted for a great deal of the improvement.

As reported in Chapter II physical fitness tests are often given with the intent of encouraging the recipient to increase his activity level. The results of this study imply that that objective may be inappropriate. More precisely, a single test and counselling session may be an inappropriate means of achieving that objective. Those agencies involved in fitness testing might well examine their programmes to ensure that their objectives are realistic. The following suggestions are offered, in order of priority:

1. Wherever possible, fitness testing and exercise counselling should be incorporated with an ongoing programme of training sessions. The testing should be used to embellish the training programme by adding the benefits of objective physiological evaluation.
2. When the above is not possible, the exercise counsellor should

endeavour to direct the clients towards alternativeswhich appear to best meet their needs. These may be structured programmes in community or private facilities, or the informal use of such facilities under the guidance of a fitness professional. In order for this concept to work effectively, the exercise counsellor must first achieve a liaison with other professionals in the community.

3. The exercise counsellor should implement a system to follow up treatment with the client. The intent of the follow-up should be to discuss the progress of the suggested exercise programme and to provide modifications if necessary.
4. The exercise counsellor must be available should the clients wish to make contact to discuss the progress of their training programme.
5. Agencies which choose to provide one-time fitness testing services on a large scale with the intent of facilitating increased interest in personal fitness should evaluate the cost of their programmes in light of the potentially low rate of return.

Summary

The outcomes of this study provided some insight into the isolated use of fitness testing and exercise counselling treatments where the primary goal is to encourage the subjects to increase their exercise habits. In this study the treatment was partially successful at accomplishing its purpose, as the Experimental Group demonstrated an increased level of cardiovascular endurance ($p < .001$) one year after the treatment was

given. As noted in Chapter II, the variable of cardiovascular endurance is usually weighted the highest in a discussion of factors which constitute the concept of physical fitness. Consequently the improvement was very important. However, credit for the improvement could not be wholly assigned to the treatment since the data set (C_{79}) from the Control Group demonstrated equal levels of cardiovascular fitness without the benefit, if any, of the treatment. An increase in activity patterns was reported by the members of the second Control Group which was similar to the increase reported by the Experimental Group members after they had received the treatment. Therefore, while the treatment may have stimulated members of the Experimental Group to exercise more, other factors caused a similar increase in the activity habits of the Control group members.

It appeared that, in isolation, a single physical fitness test and counselling session was no more effective at encouraging activity habit changes than were other factors which may have influenced the Control Group. This result, demonstrated here on a small scale, should cause agencies which use single tests as a means of increasing interest in physical fitness to examine the effectiveness of their programmes. It appeared that the stimuli to exercise were multifactoral. Each factor may have relative merit; and used collectively, such factors as media campaigns, physical fitness programmes, health and lifestyle improvement programmes, physical education programmes in schools, athletics, recreation services, and physical fitness testing programmes have, and will likely continue to foster increased interest in physical fitness.

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APPENDIX A

PAR-Q SCREENING FORM

PARTICIPANT IDENTIFICATION

PHYSICAL ACTIVITY READINESS QUESTIONNAIRE (PAR-Q)*
A Self-administered Questionnaire for Adults

7+

PAR Q & YOU

PAR-Q is designed to help you help yourself. Many health benefits are associated with regular exercise, and the completion of PAR-Q is a sensible first step to take if you are planning to increase the amount of physical activity in your life.

For most people physical activity should not pose any problem or hazard. PAR-Q has been designed to identify the small number of adults for whom physical activity might be inappropriate or those who should have medical advice concerning the type of activity most suitable for them.

Common sense is your best guide in answering these few questions. Please read them carefully and check the ☑ YES or NO opposite the question if it applies to you.

YES NO

☐ ☐ 1. Has your doctor ever said you have heart trouble?

☐ ☐ 2. Do you frequently have pains in your heart and chest?

☐ ☐ 3. Do you often feel faint or have spells of severe dizziness?

☐ ☐ 4. Has a doctor ever said your blood pressure was too high?

☐ ☐ 5. Has your doctor ever told you that you have a bone or joint problem such as arthritis that has been aggravated by exercise, or might be made worse with exercise?

☐ ☐ 6. Is there a good physical reason not mentioned here why you should not follow an activity program even if you wanted to?

☐ ☐ 7. Are you over age 65 and not accustomed to vigorous exercise?

If You Answered

YES to one or more questions

If you have not recently done so, consult with your personal physician by telephone or in person BEFORE increasing your physical activity and/or taking a fitness test. Tell him what questions you answered YES on PAR-Q, or show him your copy.

programs

After medical evaluation, seek advice from your physician as to your suitability for:

- unrestricted physical activity, probably on a gradually increasing basis.
- restricted or supervised activity to meet your specific needs, at least on an initial basis. Check in your community for special programs or services.

NO to all questions

If you answered PAR-Q accurately, you have reasonable assurance of your present suitability for:

- A GRADUATED EXERCISE PROGRAM - A gradual increase in proper exercise promotes good fitness development while minimizing or eliminating discomfort.
- AN EXERCISE TEST - Simple tests of fitness (such as the Canadian Home Fitness Test) or more complex types may be undertaken if you so desire.

postpone

If you have a temporary minor illness, such as a common cold.

* Developed by the British Columbia Ministry of Health. Conceptualized and critiqued by the Multidisciplinary Advisory Board on Exercise (MABE). Translation, reproduction and use in its entirety is encouraged. Modifications by written permission only. Not to be used for commercial advertising in order to solicit business from the public.

Reference: PAR-Q Validation Report, British Columbia Ministry of Health, May, 1978.

* Produced by the British Columbia Ministry of Health and the Department of National Health & Welfare.

APPENDIX B

BODY COMPOSITION TEST PROCEDURE

Body Composition - percentage of body fat (Kuntzleman, 1975)

1. Subject stands with weight equally distributed on both feet, looking straight ahead, with arms hanging at the sides in a relaxed fashion.

2. Tester measures skinfold thicknesses at four sites on the right side of the body as follows: (recorded to the nearest .1 mm)

   a. Tricep - located on the arm at the midposterior midpoint between the tip of the acromion and the tip of the olecranon with the extremity hanging straight in an extended but relaxed position. The skinfold should be lifted parallel to the long axis of the arm.

   b. Subscapular - taken below the tip of the inferior angle of the scapula. The fold is taken in the diagonal plane at about a 45° angle from the horizontal and vertical planes medially upward and laterally downward.

   c. Bicep - the site is located on the front of the upper arm over the midpoint of the muscle belly of the biceps brachii muscle.

   d. Supra-iliac - the skinfold is located one to two inches immediately above the crest of the anterior, superior iliac spine. The thumb is placed over the iliac crest, and the fold is listed at a slight angle to the vertical along the normal fold line on the midaxillary line.

3. The tester will take one measurement at each skinfold site in the following order:

   a. triceps
   b. subscapular
   c. biceps
   d. supra-iliac.

   At least three complete sets of measurements will be taken in total to ensure consistent results.

4. The mean values for each measurement site skinfold thickness are determined and added together to obtain a total skinfold thickness. This value is compared to a chart to obtain a prediction of percentage of body fat (Kuntzleman, 1975).

APPENDIX C

TRUNK FLEXION TEST PROCEDURE

<u>Sit and Reach</u> - Hamstring flexibility (Wells and Dillon, 1962).

1. The subject should be instructed to warm-up before the test in order to avoid injury to joints, muscles, or connective tissue. The suggested warm-up exercise is a toe touch with the legs spread well apart. The warm-up should last no longer than 30 seconds.

2. During the warm-up, the test objectives and procedure should be explained to the subject. At this time, he should be cautioned against breathholding during the test.

3. The subject is seated on the floor with the heels pressed against the sit and reach apparatus. During the test the subject's knees must remain fully extended.

4. The subject reaches forward and, with the fingertips of both hands, pushes the slider bar down the track as far as possible. The distance the bar has travelled is recorded and a second trial is completed.

5. The greater of the scores is then applied to norm tables to obtain a percentile ranking for the subject's age and sex category.

APPENDIX D

BRUCE TREADMILL TEST PROCEDURE

Bruce Treadmill Test - Aerobic Capacity

1. The subject should not eat or smoke for at least two hours prior to the test.

2. The subject is connected to the electrocardiograph using the CM_5 electrode configuration. During the test and recovery period, the subject is constantly monitored with an ECG oscilloscope and an ECG strip is recorded for the last ten seconds of each minute.

3. The subject's pretest ECG is recorded and the subject is introduced to the treadmill. He is allowed to warm-up and become familiar with the treadmill for a period of two minutes. This time may be extended if necessary at the tester's discretion.

4. During the warm-up phase, the entire test procedure is explained to the subject and any questions he may have are answered.

5. The test begins at Stage I and each three minutes the workload is increased as follows:

	SPEED (mph)	% GRADE
Stage I	1.7	10
Stage II	2.5	12
Stage III	3.4	14
Stage IV	4.2	16
Stage V	5.0	18
Stage VI	5.5	20
Stage VII	6.0	22

6. The test is terminated for one or more of the following reasons:

   a. Subject indicates that he cannot continue to exercise because of exhaustion. This procedure is established before the test begins. At the point of exhaustion, the subject grasps the treadmill hand-rail. On this signal, the test administrator immediately returns the treadmill belt to 2.5 mph and 0% elevation.

   b. Subject reaches his age-related maximum predicted heart rate (220 beats minus age).

   c. Appearance of abnormal ECG recordings.

   d. Presence of the following symptoms:

      i. ataxia.
      ii. chest pain.
      iii. musculo-skeletal pain or discomfort.
      iv. pallor.
      v. nausea.
      vi. shortness of breath.

   Several of the above endpoints may occur simultaneously.

7. As soon as the test is terminated, the speed of the treadmill belt is reduced to 2 mph and the inclination of the belt is reduced to 0% grade. The subject should continue to walk slowly during the recovery phase. He should be encouraged to hold on to the handrail.

8. The subject's ECG should be monitored for at least 5 minutes of recovery exercise, or until the heart rate drops significantly to about 125 beats per minute. At the time the subject may cease activity.

9. The subject should be seated in the laboratory and kept under observation until he is completely cooled down. He should be cautioned against taking a prolonged hot shower following the test.

10. The prediction of $\dot{V}O_2$ MAX for healthy adults is made from the following formula (Bruce, 1973):

$$\dot{V}O_2 \text{ MAX} = 6.70 - 2.82 \text{ (weighting factor for sex*)} + 0.056 \text{ (duration of exercise in seconds)}$$

*Sex weighting factor: Males = 1
Females = 2

APPENDIX E

TEST RESULTS REPORT FORM

(TESTING PROGRAMME 1978)

UNIVERSITY OF VICTORIA
PHYSICAL EDUCATION DIVISION

EXPLANATION OF FITNESS APPRAISAL SUBJECT NAME ____________________

1. BODY COMPOSITION

The skinfold measurements allow for an accurate estimation of the percentage of body weight which is adipose (fat) tissue. Recommended percent body fat is 15% for males and 20% for females. Anything in excess of these norms is "excess baggage" and only increases the workload of the cardiovascular system. Remember that in order to lose weight, caloric expenditure must exceed caloric intake. A balanced programme of sensible diet and conscientious exercise is the best way to lose weight and keep it off.

Your percent body fat is ______________.

2. CARDIORESPIRATORY

This is our measure of aerobics based on the Bruce Treadmill Test. It is an estimation of your body's ability to use oxygen and is dependent on the pumping ability of the heart and the circulatory system. Research indicates that good performance levels in this area decrease risks of heart disease and atherosclerosis. Running, cycling and swimming are the types of activities that enhance this aspect of fitness.

According to the Canadian norms for your age group and sex, you are in the __________________________ category.

MVO_2 __________________________ ml/kg/min

3. FLEXIBILITY

Flexibility is the ability to move the body and its parts through as wide a range of motion as possible without undue strain to the joints and muscle attachments. Lack of flexibility has been linked with low back pain as well as with muscle and joint complaints and injuries. Your score is expressed as a percentile which compares you with individuals of a similar age and same sex.

Sit and Reach performance ____________________%ile

Shoulder flexibility __________________________%ile

4. STRENGTH TESTS

Grip strength is generally a good indicator of total body strength. The score is expressed as a percentile (%ile). Percentile simply indicates where you are placed relative to your population of this test. If %ile = 70, it means you did better than 70% of the other people but worse than 30%. 100% means you are "tops". Strength is usually improved through calisthenic types of activities, especially if done with resistance (e.g., weight training).

Grip strength performance ______________________%ile.

Abdominal muscle strength and endurance was assessed by the sit-up test. Maintenance of this muscle group is most important, for they contribute to both posture and "controlling the waistline".

Sit-up performance ______________________%ile

Shoulder extension ______________________%ile

Knee extension ______________________%ile

The vertical Jump Test measures "explosive power". Your %ile rank in this test is ________________.

If we can provide any further information regarding the fitness appraisal, or if you have any questions regarding how to improve your personal fitness level, please feel free to contact us at the University of Victoria, 477-6911, local 4784 or 4509.

Many thanks for your co-operation and best wishes in your future pursuits of a healthy life.

Dan Lomas
Stu Petersen

APPENDIX F

EXERCISE COUNSELLING AID

"PRESCRIPTION FOR FITNESS"

Reprint from the
British Columbia Medical Journal
Vol. 16, No. 9, September 1974

86

An approach to fitness for apparently well adults

Prescription for fitness

By DR. MARTIN COLLIS, faculty of education, University of Victoria, DR. DAVID CHISHOLM and DR. LINTON KULAK, preventive medicine consultants, BC Department of Health; MR. SANDY KEIR, director of fitness methodology, Recreation Canada; and MERILEE SANDS, R.N. (art work).

Recently the public has become aware of the threat to the ecology as a result of industrialization and technological growth. On another level, health professionals now are noting health problems that result from the inability of the human body to adapt to the low-activity life style made possible by mechanization.

Disease states related to lack of activity are proliferating. There has been a steady rise in cardio-vascular disease, tension-related complaints, obesity, low back pain and other problems which result from musculoskeletal weakness.

Physical activity is now clearly an important aspect of preventive medicine, as well as playing a key role in many treatment regimens. Physical activity is often as abhorrent to some adults as codliver oil is to children, particularly as the prescription is for life.

Part of the problem lies in the general lack of understanding of what constitutes an adequate activity program. In the past, many of us were taught to exercise with almost military precision and were told no benefits would occur without pain; today, many commercial concerns offer programs which claim to get one fit with no effort or personal inconvenience.

As is often the case, the answer lies somewhere between these extremes; some time and effort must be expended by the participant in a fitness program, but it doesn't have to be painful. In fact, the search for fitness can be one of the most pleasant and rewarding pursuits available to modern man.

It's impossible to summarize briefly all the approaches to obtaining a state of personal physical fitness as it can be reached by many different routes. However, it is possible to indicate the important elements of a fitness program.

Arithmetic fitness (Caloric balance)

When you take more out of the bank than you put in, you may develop a financial problem. Conversely, if you put more calories into your body than you use, you may develop a weight problem. Therefore, one aspect of fitness is simply balancing the caloric budget.

In terms of expenditure, the easiest way to do this is not by sudden violent bursts of activity, but by numerous small life style changes. Using the stairs instead of the elevator at work seems insignificant over a short period, but could burn the equivalent of 10 pounds of bodyweight over the period of a year.

Functional fitness

Merely balancing the caloric budget is not enough. The human machine has some very specific needs which can only be met by a well structured program of purposeful movement.

Flexibility

As people grow old, their attitudes tend to become inflexible and so do their joints. A series of simple exercises, such as those illustrated on the following page, can help maintain the full range of movement for the various parts of the body. Do not attack the exercises in a competitive or agressive style but perform them smoothly and gracefully so that the body can adapt gradually rather than be challenged to breaking point.

Muscle Tone

Many sedentary people become virtually incapacitated by muscular weakness. For effective living, basic maintenance of muscular tone through regular activity is vital.

Two strengthening exercises are shown for the arm and stomach muscles, while the back extension activity will help strengthen the back muscles. Muscle tone of the legs can be maintained by a regular program of walking, bicycle riding or other endurance activity. Regular lifting and carrying available in a daily routine will help to maintain arm strength.

Endurance

Endurance fitness concerns the effective functioning of heart, lungs and blood vessels. In thinking about what is involved in a program of endurance fitness, the key word to remember is **FITT**. *(Frequency, Intensity, Time, and Type of activity).*

To function effectively the human machine needs some regular sistained activity of a reasonably vigorous nature. This requirement can be fulfilled by participation in a vigorous game, or by a variety of individual activities such as swimming, cycling (stationary or regular bike), brisk walking, jogging, skipping, cross-country skiing or any other activities that elevate the heart rate for a sustained period. Endurance fitness is the most important component of any fitness program.

The core components for a balanced functional fitness program including flexibility, muscle tone and endurance are described on the following page, with diagrams. Regular use of these should do much to help you achieve an adequate level of physical fitness.

If you are considering beginning a personal fitness program, treat yourself and your body well. Warm-up carefully with flexibility activities and shaking arm and shuffling leg movements before any vigorous exercise. Buy yourself the right equipment, if needed, so that you feel good.

Take time to enjoy a bath or shower after you work out. Don't apologize for turning down an appointment or having to arrive late to a meeting because it conflicts with your work-out time. Keep your health & fitness priorities in good order!

The above exercises can be carried out by almost any healthy adult. However, if you are concerned about your health or if you have any disease or physical condition that may affect your exercise program, you are advised to consult your doctor before you begin.

Reprints courtesy of the British Columbia Medical Association
and Action BC, 2735 E. Hastings Street, Vancouver, B.C., Telephone 253-8248

FUNCTIONAL FITNESS

CORE COMPONENTS

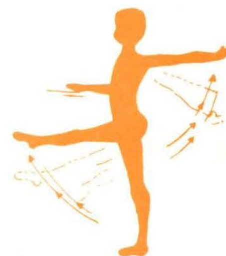
FLEXIBILITY

Arm Swings
Stand with feet apart, make full sweeping circles with both arms across the body. Repeat opposite direction.

Hip Rotation
Feet apart, slowly rotate hips through full circle. Repeat opposite direction.

Trunk Twist
With arms extended to the side & feet at shoulder width, slowly twist around each side and back, following the leading hand with your eyes. Avoid violent twisting.

Head Swivel
Slowly rotate your head through a full circle. Repeat in opposite direction.



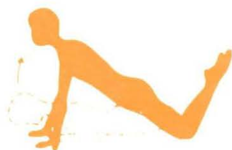
Arm and Leg Swings
Stand on one leg, support yourself with one hand. Swing an arm & leg back and forth in opposite directions. Repeat with other side.

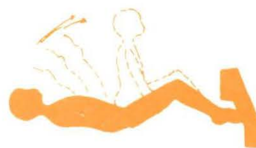
Back Flexing
Sit with legs spread apart, then slowly bend forward sliding your hands along the floor towards your feet. Return to upright position. Do not bounce.

Back Arching
Lie on your stomach. Keep your arms at your sides or stretched outward. Tighten your back muscles so that your legs and upper body are lifted from the floor at the same time.

MUSCLE TONE

Push-Ups
Lie on your stomach. Place hands beneath shoulders, palms down. Push up until arms are straight. Lower body to floor. Repeat. Beginners should keep knees on floor (see diagram). Advanced may pivot at toes, keeping entire body straight.





Sit-Ups
Sit on floor with knees bent and feet supported. Lie down, then sit up. As you improve, place hands behind head.

Gradually increase so you can do 20 or more repetitions of each exercise at each session.

ENDURANCE

Remember, Think FITT!

Just follow the simple formula in the exercise prescription (Rx). There are several ways of assessing how well your body is responding to the activity. One of these is heart rate. For your age, suggested target heart rates are given in the box. Simply stop your activity, take your pulse for 10 seconds, then multiply by six. Attempt to work up to and maintain this target heart rate. As your fitness level increases, you may elect to go to higher heart rates or continue longer at that level. The pulse can be felt through gentle pressure on one side of the neck about one inch behind the Adam's apple or, preferable, in the hollow of the wrist just above the thumb. Use the index and middle fingers — and gentle pressure only.

℞

Frequency: 3 to 5 times per week

Intensity: Work up to and sustain a target heart rate (for age) during exercise.

Age (either sex)	20-29	30-39	40-49	50-59	60-69
Target Heart Rate (per minute)	133	127	125	120	115

Time: attempt to keep moving for at least 15 minutes (even if it means slowing down a little).

Type: any endurance exercise — walking, jogging, swimming, cycling, skipping, vigorous ball games, ski touring, etc.

(Cool Down: keep moving doing light activities for at least five minutes after your endurance exercise).

COMPLEMENTARY PROGRAMS AND ACTIVITIES

Numerous other, and often more strenuous, exercise programs are available to help you get fit. Four are widely accepted by doctors and physical fitness experts. These are the **New Aerobics** program (for men) and **Aerobics for Women,** both drawn up by Dr. Ken Cooper of Dallas, Tex., and the **5BX** (for men) and the **10BX** (for women) programs, drawn up by the Royal Canadian Air Force. Although systemic programs like these may not appeal to you, they offer many useful pointers about physical activity.

Most recreation, amateur sports and fitness programs are complementary to one another. However, seldom will any one sport or activity meet all your physical fitness needs. Try to balance them.

APPENDIX G

LETTER TO EXPERIMENTAL GROUP

UNIVERSITY OF VICTORIA
P.O. BOX 1700, VICTORIA, BRITISH COLUMBIA, CANADA V8W 2Y2
TELEPHONE (604) 477-6911, TELEX 049-7222

Dear

I am currently involved in a research project to investigate some of the effects of fitness testing and counselling programs. This research has been undertaken to complete a Master's degree in Physical Education at the University of Victoria.

Since you participated in the fitness testing program offered by the Physical Education Division during the summer of 1978, I am interested in using your test results in my study. In order to complete the follow-up of last year's program, it is necessary for you to be re-tested on certain fitness parameters. These include: body composition, low back and hamstring flexibility, and aerobic capacity. In addition to the three tests I wish to briefly interview you to note your opinions on physical fitness. In return for your co-operation and participation your test scores will be explained and further exercise programs will be recommended.

You have information which I need in order to complete my research. I assure you that both your test results and your personal interview responses will remain confidential.

Officers participating in the testing program will be given time off during working hours to do so. Sgt. John Fahey will schedule the testing sessions. Please indicate to him whether or not you are willing to participate.

If you have any questions regarding the research study, please feel free to call me at the University, 477-6911, local 4518. Thank you for your co-operation.

Yours truly,

S. R. Petersen

SRP/ny

APPENDIX H

LETTER TO CONTROL GROUP SUBJECTS

AT THE SAANICH POLICE DEPARTMENT

UNIVERSITY OF VICTORIA
P.O. BOX 1700, VICTORIA, BRITISH COLUMBIA, CANADA V8W 2Y2
TELEPHONE (604) 477-6911, TELEX 049-7222

Dear

I am currently involved in a research project to investigate some of the effects of fitness testing and counselling programs. This research has been undertaken to complete a Master's degree in Physical Education at the University of Victoria.

Last summer (June, 1978) 46 members of the Saanich Police Department participated in a fitness testing program which was offered by the University of Victoria's Physical Education Division. This summer, I will be conducting a follow-up study to look at the effects of last year's program. To this end, a number of those who participated last year will be re-tested. As well, I am interested in testing a selection of those members of the Department who were not tested last year. Since you are part of this group, I am requesting your co-operation to help complete the study.

Three physical fitness tests will be administered to evaluate the following: body composition, low back and hamstring flexibility, and aerobic capacity. In addition to these tests, I wish to briefly interview you to note your opinions on physical fitness. In return for your co-operation and participation, your test scores will be explained and exercise programs will be recommended. You have information which I need to complete my research. I assure you that both your test results and your personal interview responses will remain confidential.

Officers will be given time off during working hours to participate in the study. Sgt. John Fahey will schedule the testing sessions. Please indicate to him whether or not you are willing to participate. If you have any questions regarding the research study, please feel free to call me at the University, 477-6911, local 4518. Thank you for your co-operation.

Yours truly,

S. R. Petersen

SRP/ny

APPENDIX I

LETTER TO CONTROL GROUP SUBJECTS FROM OTHER POLICE DEPARTMENTS

UNIVERSITY OF VICTORIA
P.O. BOX 1700, VICTORIA, BRITISH COLUMBIA, CANADA V8W 2Y2
TELEPHONE (604) 477-6911, TELEX 049-7222

Faculty of Education

20/7/79

FITNESS TESTING PROGRAM

The Physical Education Department at U.Vic. is conducting a research project to investigate some of the effects of physical fitness testing programs. A number of police officers from various municipal departments were tested last summer, and we are conducting a follow-up study this year on those officers. We are also interested in testing a number of officers now, who did not have the opportunity to be tested last year. The purpose of this memo is to request your cooperation in helping to complete this study.

Three fitness will be administered to evaluate the following: body composition, low back and hamstring flexibility, and aerobic capacity. In addition to these tests, we wish to briefly interview you to note your opinions and attitudes towards physical fitness. In return for your cooperation and participation, your test scores will be explained and exercise programs will be recommended. You have information that we need in order to complete this important study. We assure you that both your test scores and your interview responses will remain confidential.

If you are interested in taking part in the project or if you wish to obtain more information, please call Stu Petersen at 477-6911, local 4518 or 4509. If possible we would like to complete the testing by August 3rd. Simply call the above numbers to make an appointment.

Thank you for your cooperation.

APPENDIX J

STRUCTURED INTERVIEW-QUESTIONNAIRE

STRUCTURED INTERVIEW-QUESTIONNAIRE

NAME____________________________________ AGE__________________________

SUBJECT NUMBER___________________ GROUP: EXP._______ CONT.________

NOTE: (a) Check appropriate group above; (b) This is not a knowledge test. You (subject) have information that I (researcher) want; (c) The information which you give me will not be given to the Saanich Police Administration except as it appears in the results of the study. All information will remain strictly anonymous; (d) Check one answer in the closed questions; (e) Answer yes/no to most questions.

1. Did you participate in the physical fitness testing programme at the University of Victoria last summer (June/July 1978)? Yes ___ No ___

2. Have you ever participated in another physical fitness test and/or exercise counselling programme? Yes ___ No ___
   If yes, when and where?_____________________________
   ____

3. (Control Group only) Why did you not participate in the fitness testing programme at the University of Victoria during the summer of 1978?
   ____
   ____

4. (Experimental Group only) As a result of your participation in the testing programme, did you decide to become physically active, or more physically active than before? Yes ___ No ___

5. (Control Group only) Have you increased your exercise habits in the past 12 months (since July 1978)? Yes ___ No ___

6. Since July 1978, have you increased your exercise habits, then decreased again? Yes ___ No ___

7. Are you a regular exerciser now (at least 2 times per week)? Yes ___ No ___

8. How many days per week do/did you participate in physical activity?

   1 2 3 4 5 6 7

9. How hard do/did you exercise?

   Very yard ____ Hard ____ Not too hard ____ Not hard at all ____

10. How long do/did you exercise each time?

    10 min. or less ____ 10-20 min. ____ 20-30 min. ____
    30 min. or more ____

11. In which sport or fitness activity do/did you mainly participate?______________________________

12. Where do/did you participate in physical activity?

    ____

13. Very briefly, why do/did you participate in regular physical activity?

    ____

    ____

    ____

14. Does/did your physical activity give you:

a.	enjoyment?	Yes ___
b.	a relaxed feeling?	Yes ___
c.	an increased state of well-being?	Yes ___
d.	increased energy and vitality?	Yes ___
e.	a more positive mental attitude?	Yes ___
f.	improved family life?	Yes ___
g.	enjoyable social or club activity?	Yes ___
h.	other______________________	

15. Do/did you find your physical activity:

a.	boring?	Yes ___
b.	hard work?	Yes ___
c.	too time consuming?	Yes ___
d.	too difficult?	Yes ___
e.	makes/made you tense?	Yes ___
f.	has/had disrupted family life?	Yes ___
g.	leads/led to unpleasant social or club activity?	Yes ___
h.	other______________________	

16. If an employee fitness programme was offered at your place of employment, would you participate? Yes ___ No ___
    If yes, would you prefer a group or an individual fitness programme?

    Group__________________ Individual______________

THANK YOU FOR YOUR CO-OPERATION.

APPENDIX K

DISCUSSION OF QUESTIONS

The Questions

1. Did you participate in the physical fitness testing programme at the University of Victoria last summer (June/July 1978)?

This question identified the subject as a member of the Experimental Group or as a member of the Control Group.

2. Have you ever participated in another physical fitness and/or exercise counselling programme? If yes, when and where?

The first response showed whether the subject's exercise behaviour might have been influenced by prior treatments of a similar nature. If the subject belonged to the Experimental Group, a previous test might affect the consequences of the treatment under study. If a Control Group subject had had a test and exercise counselling at the same time as the Experimental Group, this treatment might confound the results.

3. (Control Group only) Why did you not participate in the fitness testing programme at the University of Victoria?

For the Control Group only, this question was intended to distinguish between those subjects who were not interested in the original programme and those who were unavailable for some other reason.

4. (Experimental Group only) As a result of your participation in the testing programme, did you decide to become physically active, or more physically active than you were before?

This question was intended to identify those members of the Experimental Group who felt that the testing programme was a motivating factor in their decision to become more active than they were prior to the test. If the answer was "yes", then one of the major goals of the programme would have been achieved. If the answer was "no", then it would be

assumed that the programme failed as a motivational tool. However, if the subject was very active prior to the test, it is possible that the information might be used to modify his existing training regime without altering the value of his training.

5. (Control Group only) Have you increased your exercise habits in the past 12 months (since July 1978)?

The response to this question would identify those Control Group subjects who increased their exercise habits without the possible influence of the exercise test and counselling treatment.

6. Since July 1978, have you increased your exercise habits, then decreased again?

This question was intended to identify those respondents who may have temporarily become more physically active, but did not sustain the increased activity level.

7. Are you a regular exerciser now (at least 2 times per week)?

It was desirable to establish the subjects' current exercise habits, as well as to use this response as a follow-up to Questions 4 and 5. It was felt that two exercise sessions per week were the necessary criteria to establish regularity.

8. How many days per week do/did you participate in physical activity?

The answer to this question would provide information on the frequency of activity sessions; an important component of exercise behaviour. The past tense option in this and subsequent questions allowed for those subjects who were no longer regular exercisers.

9. How hard do/did you exercise?

As intensity of exercise is important to the "training effect" achieved,

it was necessary to obtain information in the subjects' perceived exercise intensity.

10. How long do/did you exercise?

Duration of each exercise session was felt to be important when measuring the effects of a training programme.

11. In which sport or fitness activity(ies) do/did you mainly participate in?

Replies to this question would provide information on the type of exercise, another factor in evaluation of the fitness test results. Certain activities may have been more convenient or appealing to this occupational group. Subjects could provide more than one response if each activity was a major component in their programme (e.g., running to build endurance for another sport).

12. Where do/did you participate in physical activity?

This question was asked to determine if any type of exercise venue was especially appealing or convenient for this occupational group.

13. Very briefly, why do/did you participate in regular physical activity?

The responses to this question would provide some indication towards the perceived benefits of regular exercise among this group.

14. Does/did your physical activity give you:

a. enjoyment?
b. a relaxed feeling?
c. an increased state of well-being?
d. increased energy and vitality?
e. a more positive mental attitude?
f. improved family life?
g. enjoyable social or club activity?
h. other?____________________

This question was adapted from the instrument used by Jackson (1975:46) who noted that the options given "were made up from the claims made for physical activity by Sport Participation Canada." The question might be rephrased as, "What are the positive results of your exercise?" Subjects were asked to choose one response that best summarized their feelings.

15. Do/did you find your physical activity:

    a. boring?
    b. hard work?
    c. too time consuming?
    d. too difficult?
    e. makes/made you tense?
    f. has/had disrupted family life?
    g. leads/led to unpleasant social or club activity?
    h. other?____________________

The options for Question 15 were seen as possible negative aspects of exercise. The question might be rephrased as, "Why don't you exercise more than you do?"

16. If an employee fitness programme was offered at your place of employment, would you participate?

    If yes, would you prefer a group or an individual fitness programme?

The leadership provided by an on-going programme conveniently located at the workplace might have been the stimulus that some subjects required in order to engage in regular activity. This question was designed to indicate those subjects who felt that such a programme would be beneficial to them. The second part of the question would identify those subjects who found a group situation more motivational than an individual programme.

APPENDIX L

RAW FITNESS TEST SCORES FOR DATA SETS

C_{78}, C_{79}, E_{78}, E_{79}

Raw Fitness Test Scores for Control Group C_{78}

Subject	Age	Height	Weight	Skinfold Total	Trunk Flexion	Treadmill Time
01	22	186.5	79.8	35.5	14.50	13.00
02	22	173.5	78.5	60.3	15.25	10.08
03	24	182.0	76.0	35.9	14.25	11.92
04	26	182.5	80.9	45.1	14.75	12.00
05	27	187.0	70.8	42.4	16.75	12.50
06	29	178.0	84.2	69.1	13.00	11.38
07	34	178.5	83.4	43.9	9.00	12.00
08	31	191.5	87.4	58.8	10.00	9.08
09	34	186.0	87.7	48.1	11.75	11.00
10	35	179.0	88.1	48.1	12.50	12.00
11	38	182.5	88.1	47.7	12.00	10.33
12	39	182.5	91.2	48.4	14.25	12.00
13	41	178.0	87.6	40.6	14.50	10.33
14	45	187.5	105.4	49.6	8.50	7.08
15	48	177.0	76.7	52.0	7.00	9.50

Raw Fitness Test Scores for Control Group C_{79}

Subject	Age	Height	Weight	Skinfold Total	Trunk Flexion	Treadmill Time
01	22	178.0	88.2	56.4	13.75	14.08
02	26	186.0	89.1	47.0	17.50	12.58
03	27	179.0	85.2	42.8	12.00	12.75
04	29	180.0	82.5	55.1	9.50	12.66
05	29	186.0	93.8	52.9	13.75	13.00
06	33	188.0	88.2	49.8	13.50	12.50
07	34	178.0	80.6	54.3	12.25	10.00
08	34	184.0	90.9	43.6	9.50	10.17
09	37	179.5	76.6	35.0	12.25	12.00
10	38	180.0	77.8	29.5	10.50	12.00
11	39	182.0	77.4	44.0	16.00	13.42
12	39	181.0	75.4	49.4	10.50	10.00
13	43	179.5	93.0	79.4	12.50	11.00
14	47	184.5	85.6	64.2	14.00	10.00
15	49	187.0	108.9	57.4	8.00	10.00
16	49	184.0	101.0	78.9	5.50	9.00

Raw Fitness Test Scores for Experimental Group

(Pre-E_{78}, Post-E_{79})

Subject	Age	Height	Pre Weight	Post Weight	Pre Skinfold Total	Post Skinfold Total	Pre Trunk Flexion	Post Trunk Flexion	Pre Treadmill Time	Post Treadmill Time
01	26	182.5	83.0	75.6	57.3	39.6	13.00	14.50	11.08	14.42
02	24	192.0	83.3	87.5	28.5	46.4	11.75	11.75	13.50	13.00
03	28	184.0	91.8	92.8	82.3	74.6	14.00	13.50	10.00	11.00
04	24	171.5	75.5	71.7	53.8	44.8	15.00	13.25	13.05	15.17
05	28	186.5	92.0	91.5	47.0	50.2	11.00	9.00	10.75	12.75
06	28	186.8	88.6	90.0	44.8	58.7	15.50	15.00	10.50	10.83
07	25	184.0	78.4	80.1	29.2	35.3	15.25	15.25	12.42	14.00
08	25	176.0	85.4	86.7	55.3	65.8	16.50	15.75	10.67	12.00
09	31	191.0	89.2	91.8	29.5	37.9	12.75	13.50	12.75	13.75
10	33	184.0	73.4	71.3	22.2	20.6	14.25	14.50	12.00	12.33
11	37	177.5	92.7	93.7	47.4	52.3	13.00	13.50	10.17	11.00
12	31	196.0	93.5	93.5	76.6	63.7	11.25	11.50	10.33	11.00
13	33	181.5	88.8	88.2	49.7	51.1	11.25	12.00	12.17	12.50
14	38	173.0	80.8	79.5	67.0	65.9	10.50	10.75	9.67	10.00
15	43	192.0	112.2	108.9	100.7	76.0	7.00	8.50	10.00	11.33
16	48	185.0	84.5	83.0	31.3	35.2	15.25	15.75	12.25	13.00
17	42	179.0	75.3	72.4	52.7	59.0	13.00	14.00	10.33	12.50

VITA

Surname: PETERSEN Given Names: Stewart Richard

Place of Birth: PORT ALBERNI, B.C. Date of Birth: Sept. 5, 1951

Educational Institutions Attended, with Dates of Entering and Leaving:

Institution	Entering		Leaving
UNIVERSITY OF VICTORIA, B.C.	1969	to	1975
UNIVERSITY OF BRITISH COLUMBIA, B.C.	1975	to	1977
UNIVERSITY OF VICTORIA, B.C.	1977	to	1981
		to	

Degrees, Diplomas, etc., Awarded with Dates and Names of Institutions:

B.A. 1975 University of Victoria

Honors and Awards:

None

Publications:

None

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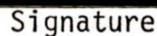
Title of Thesis

THE INFLUENCE OF A PHYSICAL FITNESS APPRAISAL AND EXERCISE COUNSELLING ON SELECTED MEASURES OF FITNESS

Author 
Signature

STEWART RICHARD PETERSEN
Name

March 26, 1981
Date