

EVALUATION OF A SHORT-TERM  
HEALTH EDUCATIONAL PROGRAM

BY

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A THESIS SUBMITTED IN PARTIAL FULFILLMENT  
OF THE REQUIREMENTS FOR THE  
DEGREE OF MASTER OF SCIENCE

IN

THE FACULTY OF GRADUATE STUDIES  
UNIVERSITY OF BRITISH COLUMBIA  
(Department of Health Care and Epidemiology)

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ABSTRACT

An intervention study was conducted in a Vancouver, British Columbia High School in the Spring of 1977. The objective of the study was to measure changes in knowledge, attitude and behaviour in regard to the cardiovascular risk-factors, smoking, physical inactivity and high-fat diet, following a short-term educational program. The principal hypotheses were that students exposed to an educational program directed towards reducing cardiovascular risk-behaviours will:

- (1) have more knowledge about cardiovascular risk-behaviours than students who are not exposed to the program.
- (2) have a more positive attitude towards reducing cardiovascular risk-behaviours than students who are not exposed to the program.
- (3) will change their behaviour in such a way as to practice fewer risk-behaviours than students who are not exposed to the program.

The majority of the students in the study school were from middle-class backgrounds and were in the university entrance program. The study population consisted of all of the students in grade 9 and one-half of the students in grade 10 and 11 for a total of 510 students. The students were randomly assigned to two groups. One group was exposed to a health educational program directed towards reducing risk of cardiovascular disease. The program consisted of a presentation by a health

educator, a film and written materials provided by the British Columbia Heart Foundation. The control group took part in the regular school guidance classes. A pretest, posttest research design was used. The measuring instrument used was a written questionnaire developed from the content of the educational program. The students completed the same questionnaire before and after their exposure to the educational program. The students also took part in pretest, posttest fitness testing using the Canada Home Fitness Test.

The 287 students exposed to the educational program were compared with 187 from the same grade and school who were not exposed to the educational program. In regard to the hypotheses stated above, significantly more students in the intervention group answered 11 of the 34 of the knowledge questions correctly.

There were no differences between the intervention and non-intervention groups indicated by replies to the questions about attitude towards reducing cardiovascular risk.

There were no differences between the intervention and non-intervention group in self-reported, cardiovascular risk-behaviour. Fitness levels as measured by the Canada Home Fitness Test showed a puzzling increase in fitness among the non-intervention group.

In summary, the study indicated that students exposed to a health educational program in school had a significant increase in health knowledge but not in health attitude nor behaviour.

The evidence in this study that students made significant knowledge gains following an educational program, together with the theory that knowledge of factual information is often the first step in the decision making process (Bloom, 1956), justifies continued health educational programs in schools. Although this study did not provide evidence of attitude or behaviour change in the short-term, further long-term evaluative studies of health educational programs in the schools are indicated.

TABLE OF CONTENTS

	<u>PAGE</u>
ABSTRACT . . . . .	i
TABLE OF CONTENTS . . . . .	iv
LIST OF TABLES . . . . .	vi
ACKNOWLEDGEMENTS . . . . .	vii
INTRODUCTION . . . . .	1
CHAPTER I      BACKGROUND OF STUDY . . . . .	4
Risk-Factors . . . . .	4
Risk-Behaviours . . . . .	5
Knowledge of Risk Factors . . . . .	6
Risk Attitudes . . . . .	7
Other Studies of Educational Health Programs . . . . .	10
CHAPTER II      THEORY, RATIONALE AND OBJECTIVES OF STUDY . . . . .	13
Theory and Rationale . . . . .	13
Conceptual Scheme . . . . .	16
Hypotheses . . . . .	17
Educational Program . . . . .	17
Physical and Socio-demographic Setting of the Study . . . . .	17
Research Objectives . . . . .	18
Significance . . . . .	19
CHAPTER III      METHODS . . . . .	20
Independant Variable . . . . .	20
The Dependant Variables . . . . .	21
Research Design . . . . .	23
Measuring Instruments . . . . .	24
Sampling Methods . . . . .	26
Implementation of Study . . . . .	27
Procedure . . . . .	28
CHAPTER IV      RESULTS . . . . .	30
Hypothesis I . . . . .	30
Hypothesis II . . . . .	62
Hypothesis III . . . . .	64
Canada Home Fitness Test . . . . .	66

	<u>PAGE</u>
CHAPTER V      DISCUSSION AND CONCLUSION . . . . .	72
Discussion . . . . .	72
Conclusion . . . . .	74
BIBLIOGRAPHY . . . . .	75
APPENDIX A      Questionnaire . . . . .	82

LIST OF TABLESPAGE

<u>TABLE</u>	I - XI		
	Number and Percentage Distribution of Responses to Knowledge Questions About Cardiovascular Risk		
I	. . . . .	40	
II	. . . . .	42	
III	. . . . .	44	
IV	. . . . .	46	
V	. . . . .	48	
VI	. . . . .	50	
VII	. . . . .	52	
VIII	. . . . .	54	
IX	. . . . .	56	
X	. . . . .	59	
XI	. . . . .	61	
XII	Number and Percentage Distribution of Ten Second Pulse Recorded During the Canada Home Fitness Test . . . . .	68	
XIII	Number and Percentage Distribution of Differences Between Pre- and Posttests of Ten Second Pulse Rates in Students Recorded during the Canada Home Fitness Test . . . . .	70	



ACKNOWLEDGEMENTS

I would like to acknowledge the cooperation, help and assistance of many people in the preparation of this paper; the Vancouver School Board for giving their approval; the administrative, teaching and clerical staff of Eric Hamber School for administering tests and collecting data, planning timetables, typing and copying; the British Columbia Heart Foundation for presenting the educational program, supplying the film and the written materials and also supplying a grant to the Y.M.C.A. to pay their staff to conduct the Canada Home Fitness Test; the Y.M.C.A. for administering the Canada Home Fitness Test; the Vancouver Health Department for help in many areas. I would like to particularly acknowledge the help of Dr. M. Vernier of U.B.C., Dr. F. Bass and Mr. Guy Constanzo of the Vancouver Health Department for their help in preparing the paper and Mrs. Judy Charlton for her devoted typing.

## INTRODUCTION

Coronary heart disease and the cardiovascular complications of hypertension are major health problems in North America.

The first major, long term epidemiological studies in Framingham (Dawber, 1951) and Minnesota (Keys, 1963) began about 30 years ago. The risk-factor concept has become firmly established and the influence of the environment, comprising habits of living, has been shown to have a decisive impact on the origin and course of the disease.

Elevated levels of serum cholesterol, blood pressure and smoking are by far the three most firmly established coronary heart disease risk-factors. (The Pooling Project Research Group, 1963.) To the extent that health practices can be modified, the prevalence of coronary heart disease can be reduced. (Belloc, 1972; Turner, 1963.) Thus a major task for preventive medicine in western society has become changing the patterns of behaviour that increase the risk of chronic disease in the population. (Turner, 1973; Pomerleau, 1975.)

The desirability of changing behaviour to improve health has been discussed at length in a Canadian Government Working Document entitled "A New Perspective on the Health of Canadians" (Lalonde, 1974) and there is no question that the promotion of sensible living habits is a priority task for community medicine.

The establishment of the risk-factor concept in relation to cardiovascular disease led to the development of strategies directed towards encouraging the formation of positive attitudes and behaviours and modifying existing negative attitudes and behaviours. These strategies included the introduction of health educational programs into schools with the expectation that an increase in knowledge about the implications of certain risk-behaviours for future health would affect the students' attitude and behaviour. Implicit in the programs, directed towards improving cardiovascular health, is the message that avoiding smoking, reducing fat intake and exercising regularly are positive health behaviours.

Experts in health education are agreed that attitudes play an important role in health behaviour. (Spitznagel, 1969.) Attitudes consist of one's knowledge and belief about an entity in the world, one's positive or negative feelings toward it and one's behavioural tendencies regarding it. (Baron, 1977.) Attempts at changing attitudes must involve the alteration of one or more of the three basic elements of which they are composed. Since attitudes are often acquired very early in life and strengthened through reinforcement over a period of years they are resistant to change.

Although a program may be successful in modifying the attitude of the recipient this does not necessarily assure a change in behaviour. Existing evidence suggests that the relationship between attitude and behaviour is complex. A

number of studies (Wicker, 1971; Wrightman, 1969) have indicated that attitude and behaviour are not closely related. Other evidence (Fishbern, 1975; Rokeach, 1972) suggests that attitudes can often serve as effective predictors of behaviour.

Despite the difficulties involved in modifying established beliefs, programs directed towards persuading students to behave in such a manner as to reduce their risk of developing cardiovascular disease, have proliferated. The evaluative literature with regard to school health programs is sparse and is limited to a few subject areas, primarily drug use and nutrition. No studies of the long-term effects of health education in the schools have been reported to date.

Short-term studies of the effectiveness of health educational programs in the areas of drug use and nutrition indicate an increase in the level of knowledge of the students involved in the programs, but evidence of attitude and behaviour change is more difficult to illustrate. (Spitznagel, 1969; Amendolara, 1973; Swisher, 1972; Podell, 1978; McAlister, 1979).

It is expected that this study will indicate whether students exposed to an educational program developed by the B.C. Heart Foundation to alert students to the risks of smoking, high-fat diet and physical inactivity will show evidence of more knowledge of these risks, will indicate a more positive attitude towards the importance of reducing these risks and will report fewer risk-behaviours than students who are not exposed to the program.

CHAPTER I

BACKGROUND OF THE STUDY

Risk-Factors

Smoking is the single most preventable cause of cardiovascular disease, chronic obstructive pulmonary disease and cancer. (American Heart Association Report, 1977.) The risk of cardiovascular disease increases in proportion to the number of cigarettes smoked and the duration of exposure to the habit. It is estimated that cigarette smoking is responsible for 325,000 premature deaths each year. Total mortality is 1.6 times higher in cigarette smokers than among non-smokers. (Fernleib, 1975.) The effect of cigarette smoking on cardiovascular disease risk is independent of other major risk factors and this risk is greatly aggravated when such factors as high blood pressure or diabetes mellitus are present. (DHEW, 1975.)

Elevated serum cholesterol has the highest single correlation with the risk of major coronary heart disease. (American Heart Association, 1978.) Average values in a North American population tend to be much higher than in populations where there is a low incidence of atherosclerosis. Students of U.S. school-age children from 6 to 16 years have shown that 10 to 20 percent have elevated serum cholesterol. (Glueck, 1974.)

Modest shifts in dietary patterns with a reduction in meat, eggs and dairy products have been shown to reduce atherosclerosis. (Wissler, 1973.)

The precise role of physical activity as a prophylactic against the development of cardiovascular heart disease has not yet been determined. Various epidemiological studies have isolated the lack of physical activity as a coronary risk factor, and reviews by Fox and Skinner (1964), Fox, Naughton and Haskell (1971) and Froelicher and Oberman (1972) have generally shown decreased mortality from cardiovascular heart disease in physically active populations. Recent studies by Paffenberger (1975) and Cooper (1976) have placed strong evidence in favour of the role exercise plays in preventive medicine.

#### Risk-Behaviours

A review of the literature regarding adolescent health behaviours indicates that the U.S. Department of Health, Education and Welfare (U.S. Public Health Service, 1976) reports that 15.3 percent of males and 15.8 percent of females between the ages of 12 and 18 consider themselves regular smokers. A Canadian study (Hanley, 1976) reported 10 percent of the 13 year age group, 20 percent of the 14 year age group and 30 percent of the 15 year age group stated that they smoked daily. Health and Welfare Canada (1976) reported a decrease in non-smokers in the 15 to 19 year age group from 68.9 percent to 64.3 percent. This change was due primarily to a decline in the non-smoking behaviour of teenage girls.

A report on the food consumption patterns of Canadians (Department of National Health and Welfare, 1976) indicated that the average daily intake of fat in the 12 to 19 age group was

40 percent of the total calorie intake. It was reported that many authorities considered this high-fat intake deleterious to health and that a lower percentage of calories consumed from fat be recommended. Meat, poultry, fish and eggs were reported as the main source of fat in the diet. The average adolescent consumed 2 - 2 3/4 cups of milk daily.

### Knowledge of Risk-Factors

A review of the literature indicates a low level of knowledge of cardiovascular risks in the community. The Harris study (1973) revealed that the general public has little knowledge of the risk-factors of cardiovascular disease. Among all educational groups only 40 percent knew that people could have high blood pressure without obvious symptoms. Only 13 percent related high blood pressure to heart trouble and 24 to 36 percent mentioned smoking as a risk-factor.

A community survey in Calgary, Alberta (Mackie, 1973) found that 53 percent mentioned overweight as a cardiovascular risk-factor, 42 percent mentioned smoking, 12 percent mentioned cholesterol and 25 percent mentioned insufficient exercise.

A study from the University of Iowa looked at the status of cardiovascular health knowledge among sixth, seventh and eighth grade students. (White, 1977.) The students completed a knowledge questionnaire. Ninety percent was considered an adequate score. They found the average sixth, seventh and eighth grade students could answer correctly only 38, 41 and

44 percent of test items, respectively. Following an educational program there were significant but small gains.

The School Health Education Study (1964) investigated health educational programs on a national basis. This study found that nutrition was one of the most frequently taught subjects at all grade levels, but was one of the subjects in which high school students were least able to answer questions correctly. A study in selected schools in the State of South Carolina, which has mandated health education, indicated that students health knowledge was weak. (Conley, 1978.)

### Risk Attitudes

There has been a vast amount of research in recent years on the effects of persuasion communications and the impact of verbal communication on knowledge, attitude and practice. McGuire (1969) describes the independent variables in most attitude change studies as the source of the message, the message itself and the recipient of the message.

The source person is described as having persuasive impact to the extent that he is considered to be communicating the truth. (McGuire, 1969.) The persuasive impact is described as increasing linearly as a function of the perceived similarity between the source and the recipient. (Byrne, 1971.) The expert source is often very dissimilar to the recipient; for example, the cancer expert and the 12-year old. A study shows that the most effective source is an intermediate level between these two extremes. (Latane and Wheeler, 1966.) It is suggested that



the perceived power of the source also enhances the persuasive impact. (McGuire, 1969.)

The second component of the communication situation is the message itself. Research findings clearly indicate that persuasive impact is greatest when the message not only includes all the arguments but also explicitly draws the conclusion for the listener. (McGuire, 1969; Hovland and Mandell, 1952.) Most studies also tend to indicate that the amount of opinion change generally increases with discrepancy, the larger the change advocated the more likely it will occur. (Bergin, 1962; Hovland and Pritzker, 1957.) Many studies have looked at "fear arousal" messages. The assumption is that threat mediates fear, and that fear is a basic drive that engenders responding. The hope is that the responses engendered will be those advocated in the message. Studies have shown that certain fear-arousing messages lead to more change although generation of a high level of fear may prevent change. (Leventhal, 1970; Leventhal, Watts and Pagano, 1967.)

The third component in the persuasion model is the receiver. What does the receiver bring to the message? Studies have shown there may be a negative relationship between self-esteem and influenceability. However, it has been shown that optimal persuasion occurs when the audience is high enough in self-esteem to ensure a high level of reception-comprehension, but not so high as to ensure the kind of self-confidence that makes rejection of the message a likely outcome. (McGuire, 1969.)

There is little consistency in the data on intelligence and influenceability. McGuire (1969) indicates that intelligence leads to better reception and comprehension but implies a lower probability of yielding. When a message is presented in a situation which ensures attention, i.e., the classroom in a form which is not difficult to learn, comprehension is most likely. (Hovland, 1953.)

When a persuasive message is presented to an adolescent population several specific factors should be taken into consideration. Adolescence is a time when some rebellion against the adult world takes place and peer influence is most important and it is unlikely that health-related behaviour can be affected in this age group unless the peer group phenomena is taken into account. It is also a time when risk-taking emerges and is deliberately entered into as a form of challenge. (Rosenberg, 1965.)

The influence of psychosocial factors in school childrens' smoking has been the subject of a number of studies. Some of these have paid particular attention to parental smoking (Bewley, 1974), peer group smoking (Bynner, 1969), and type of school (Holland, 1969). Many habits of lifestyle are acquired by children during their years at school and the development of these is influenced by various factors acting both inside and outside school: the actions of teachers are a major influence at this time. (Egsmose, 1973.) Morrison and MacIntyre (1971) suggest that children imitate what they perceive as correct

grownup behaviour and this probably includes smoking behaviour. One review cites over 60 scholarly investigations pertinent to adolescent smoking behaviour. (Williams, 1972.)

#### Other Studies of Educational Health Programs

Because of the recency of heart health education few studies have been reported. There are a number of reports of educational programs directed towards specific health-risk behaviours. A California State Department of Education (1969 and 1970) before-and-after study of knowledge, attitude and use of drugs associated with a traditional drug educational program in the schools showed positive results in the knowledge and attitude areas but showed no decrease in drug use. However, most students felt their school program had some positive influence on their decision not to misuse drugs. A before-and-after evaluation of a short-term drug educational program (Swisher, 1971) showed a knowledge increase but little attitude or behavioural change.

A very well designed study by Swisher in 1972 comparing three different educational drug programs with a control group showed that nothing seemed to influence attitudes or reported behaviour. Further studies by Swisher (1973) and Tennant (1973) came to the same conclusion.

Spitznagel (1978) showed an appreciable increase in knowledge following a program of standardized instruction in factors relating to smoking. He also showed a positive change in attitude of non-smokers but a relatively unchanged attitude in smokers.

A study in the New York metropolitan area indicated that a behaviourally-oriented cancer and cardiovascular disease educational program increased the knowledge of the participants. (Eng, 1979.)

The Berkley Project provided a multiplicity of learning experiences that emphasized health problems affecting the digestive tract, lungs, heart and brain. Research on the effects of the project indicate that students' cardiovascular health knowledge improved. (Hert, 1977.)

A study of the effects of a Heart Health Instructional Model upon the heart health behaviour of asymptomatic university students was conducted at two S.U.N.Y. campuses in western New York. Experimental groups at both campuses received instruction related to nutrition, exercise, smoking and relaxation while control groups at both campuses received instruction in non-heart health areas. Although data collected on exercise, smoking and stress changed in the expected direction, only the nutritional hypothesis was supported. (Affleck, 1978.)

The effects of a cardiovascular nutritional educational program upon high school biology students' nutritional behaviour were evaluated by an analysis of before-and-after program data. Improvements were observed in nutritional knowledge, nutritional attitudes and reported eating behaviour. (Podell, 1978.)

A study by McAlister (1978) reported results of a smoking intervention program based on psychological inoculation theory.

The idea is that we can expect adolescents to be exposed to pressures to start smoking. If the adolescent has been exposed to possible pressure situations, and taught skills to deal with these situations, the initiation of smoking behaviour may be avoided. The study by McAlister (1979) reported that classes exposed to a program utilizing inoculation theory did in fact have fewer students who adopted smoking behaviour.

## CHAPTER II

### THEORY, RATIONALE AND OBJECTIVES OF STUDY

#### Theory and Rationale

The theory behind measuring the effects of an educational program on the knowledge, attitude and practice of risk-behaviours of a group of high school students stems from learning and behavioural theory. The authors of "Taxonomy of Education Objectives" (Bloom, 1956) refer to the concepts of knowledge, attitude and practice as the cognitive, affective and action domains. The cognitive domain relates to the individual's ability to deal with knowledge and factual information from an intellectual perspective. It is arranged into six major classes which move from a knowledge of facts to the comprehension, application, analysis and synthesis of the facts. In the final step the individual makes a decision based on the qualitative or quantitative judgments of the accuracy, effectiveness or value of an idea or solution.

The affective domain includes attitudes and values. Rokeach (1966) defined attitude as a relatively enduring organization of beliefs about an object or situation. McGuire (1973) described six behavioural steps in the process of attitudinal development; being presented with the stimulus, attending to it, comprehending, yielding, retaining the new position and behaving on the basis of it.

The possession of correct information will not always lead to a person choosing healthful behaviour. Humans are moved to

action for a variety of reasons. The factors that influence health behaviour can be categorized into external factors such as environment, family, peers, mass media and internal factors such as personality, intelligence, emotion.

Knowledge may or may not motivate an individual to a more healthful state. Many factors influence the reception of the information including qualities attributed to the source, the content of the message and inherent factors of the recipient. There are various stages between knowing a fact and executing a behaviour. Throughout their lives individuals are bombarded by an infinite number of stimuli. They perceive only those that are important to them at the time because of their initial mental set. Once the stimuli is perceived, it is analysed in terms of personal experience and, if it has personal meaning, the individual will proceed to the final step of action.

The likelihood of action depends on the balance between the rewards and pay-offs for change and the cost, inconvenience, pain or social obstacles associated with the change. It also depends on the complexity and the magnitude of the change expected.

The following conceptual scheme (see Figure One) attempts to explain health behaviour change by describing some of the many factors involved in this change. The individual with certain health knowledge attitudes and behaviours, because of prior influence and experiences, is exposed to a new influence, such as

an educational program. The effect of this stimulus is described in terms of the source and content of the stimulus and the age, sex, personality, social class, intelligence, peers, family, of the individual exposed to the stimulus. The genetic background, prior contact with disease, and experience of ill health of the individual are also considered. The decision reached by the individual after comprehending, analysing, synthesizing and evaluating the stimulus may effect behaviour change depending on the positive or negative support of family, peers and environment.



## SOCIAL INFLUENCES

### Demographic Variables

Age, Sex, Race,  
Education

### Socio-psychological Variables

Personality Traits,  
Social Class,  
Peers, Intelligence,  
Family

## COMMUNICATION STIMULI

### Source of Communication

School Health  
Education, Mass Media

### Characteristics of

### Source of Communication

Credible,  
Similar to Recipient

### Content of Communication

Fear,  
Logic

## INDIVIDUAL BEFORE INTERVENTION

### Individual's

Knowledge,  
Attitude,  
Practice of  
Relevant Risk

## DECISION

### Components of Decision

Comprehension,  
Analysis,  
Synthesis,  
Evaluation

## INDIVIDUAL AFTER INTERVENTION

### Individual's

Knowledge,  
Attitude,  
Practice of  
Relevant Risk

## SOCIAL SUPPORTS

### Social Support For or Against Risk-Factor Change

Family,  
Peers,  
Environment

FIGURE 1 - CONCEPTUAL SCHEME

Describing Health Behaviour Change

### Hypotheses

The hypotheses to be tested in this study are that students exposed to an educational program directed towards reducing cardiovascular risk-behaviours will:

- (1) have more knowledge about cardiovascular risk-behaviours than students who are not exposed to the program;
- (2) have a more positive attitude towards reducing cardiovascular risk-behaviours than students who are not exposed to the program;
- (3) will change their behaviour in such a way as to practice fewer risk-behaviours than students who are not exposed to the program.

### Educational Program

The educational program provided by the British Columbia Heart Foundation was selected as the program to be used in testing the hypotheses. It was chosen because the health objectives of those who developed the program were similar to the hypotheses to be tested and because it was the only educational program available in Vancouver at the time of this study directed towards the topic of cardiovascular risk-factors and used in the high school setting.

### Physical and Socio-demographic Setting of the Study

Eric Hamber School was chosen as the setting for the study because it is situated in the service area of the author

and because the administration and staff of the school were interested and cooperative. It is a school situated in the west area of the City of Vancouver. The 1976 census gives the population of Vancouver as 396,563 with an average income of \$10,519.00. Eric Hamber is a public high school under the jurisdiction of the Vancouver School Board. The student population of the school is 1,832 with an approximate student teacher ratio of 30:1. The ratio of males to females is approximately equal. The school includes grades 8 to 12 inclusive. The majority of the students come from a middle-class background. The majority of the students in the school are preparing for university entrance. The school is organized on a two-semester program each year; the first semester runs from September to the end of January, the second semester runs from February to the end of June.

### Research Objectives

The objectives of the present study are to measure:

- (1) the change in knowledge of a group of high school students about the cardiovascular risk-factors; smoking, physical inactivity, high-fat diet;
- (2) the change in attitude of a group of high school students towards the cardiovascular risk-factors; smoking, physical inactivity and high-fat diet;
- (3) the change in practice of these risk-factors by the students;

following exposure to a short-term educational program directed towards reducing cardiovascular risk.

### Significance

There is an ever-increasing demand by health educators for a larger share of time and money resources of the school system. Many community organizations, including the Alcohol and Drug Foundation, Planned Parenthood, the B.C. Heart Foundation, to name a few, ask the citizen and the government for funds to finance educational programs in the schools. School administrators are asking for evidence that there is value in allocating time to these programs.

With the present-day interest in methods of modifying cardiovascular risk-behaviours, there has been little work done in the area of evaluating educational programs directed towards modifying these behaviours.

This study is expected to provide some evidence of the efficacy of a short-term health educational program and help school administrators to plan future programs.

### CHAPTER III

#### METHODS

A sample of high school students who were exposed to an educational program were examined in an attempt to identify differences in knowledge, attitude and practice of designated cardiovascular risk-factors when compared with a group that did not receive the educational program.

##### Independent Variable

The independent variable is the stimulus variable or input. In this study the independent variable is the educational program that is presented to one group and withheld from the other.

The educational program offered by the B.C. Heart Foundation to each class was a one-hour presentation by the health educator of the B.C. Heart Foundation who was a middle-aged female who admitted to the students that she smoked. The program was presented in a regular classroom situation. The educator presented the same film in the same way to each class. The health educator introduced herself, said who she represented and why she was in the school. She then showed a film "I Am Joe's Heart" produced by the American Heart Association. Henry Morgan is the personality voice in this animated and lively film. Joe, an average American, does not exercise, smokes heavily, is overweight, and gives little thought to proper diet. The drama and fear of Joe having a heart attack is portrayed. Joe recovers and changes his life style. The message is a plea for

understanding the heart and risk-factors in order to reduce the risk of heart attack.

The written material discussed briefly with the students and given to them to keep included pamphlets:

- (1) "Food and Your Heart" - Discussed how the food eaten affects the heart, what should be eaten to reduce the risk of heart disease, limiting the amount of fat in the diet, what is cholesterol.
- (2) "Physical Activity and Your Heart" - Discussed the known effects of exercise on the functioning of the heart, types of activities and frequency necessary to reduce the risk of heart attacks.
- (3) "What Everyone Should Know About Smoking and Heart Disease" - Discussed the effects of smoking on the heart function and the risks of smoking in relation to heart disease.
- (4) "About Your Heart and Your Bloodstream", "Your Heart and How It Works" - Discussed the anatomy and physiology of the heart.

The package also included drawings of the heart and circulation and anti-smoking posters.

#### The Dependent Variables

The dependent variables are the response or output variables. The dependent variables are those factors which are observed and measured to determine the effect of the independent variable.

The dependent variables in this study are the levels of knowledge, attitude and behaviour of cardiovascular risk-factors. The cardiovascular risk-factors are defined as smoking, physical inactivity and high-fat diet. The level of knowledge of cardiovascular risk-factors is defined by the number of correct answers to factual questions about cardiovascular risk-factors. The level of attitude is defined by the number of answers to questions about cardiovascular risk-factors which indicate a positive attitude towards behaviours that reduce the risk. The levels of behaviour are defined by the responses to questions about actual behaviour of the subject.

Activity level is defined by the level of physical fitness as measured by the Canada Home Fitness Test.

In this study it is expected that students who are exposed to the educational program will answer correctly more questions about the effects of smoking, physical inactivity and high-fat diet on the functioning of the heart. It is expected that students exposed to the educational program will answer more questions in a manner which indicates they have a positive attitude towards the importance of reducing smoking, increasing activity and eating a diet low in fats.

It is expected that students exposed to the program will indicate by their responses to questions asking about behaviours that they smoke less, are more active and eat less fat than students not exposed to the program.

## Research Design

A pretest, posttest control design was used in this study. Two groups were employed in this design; one group, the experimental group, received a treatment, while the second group, the control group, did not. Both groups were given a pretest and posttest. The assignment of subjects to both groups was done on a random basis.

By the utilization of a control group, which has all the same experiences as the experimental group, other than the experience of the treatment itself, this design controls for history, maturation and regression. By randomizing subjects across experimental and control conditions, both selection and mortality are controlled. This design controls many threats to validity or source of bias.

One problem with this design is that it does not control for gain in the posttest due to learning in the pretest and this may reduce internal validity. A study has internal validity if the outcome of the study is the function of the program being tested rather than the result of other causes not systematically dealt with in the study. Factors which, if not controlled, may be a source of internal invalidity include history, maturation, testing, instrumentation, selection, experimental mortality or statistical regression. A study has external validity if the results obtained would apply in the real world to other similar programs and approaches. The more controlled and specific the study is the more difficult it is to



generalize the results to other situations.

The pretest scores for each group were compared to assess pre-experimental equivalence of groups and then the posttest scores for each group were compared to determine the effects of the treatment.

### Measuring Instruments

The measuring instruments used were a paper and pencil questionnaire and the Canada Home Fitness Test.

The questionnaire was used to measure what the students knew, what the students believed, and self-reported behaviours. The information was described by counting the number of students who gave a particular response.

Some question items were in the form of questions requiring a "yes", "no", or a "true", "false" response. Some questions required the student to fill in a blank with a correct word. Some questions required the student to make a choice of the correct answer from several offered responses. In preparing the questionnaire the content of the program was delineated and the objectives examined in an attempt to develop test items which reflected the content and objectives of the program.

The questionnaire was not tested for reliability. A pilot test was not done and test items were not tested for difficulty nor for discriminability. The questionnaire used was not a standardized test so its validity cannot be reported.

The data generated by the questionnaire was nominal data. Categorical responses were obtained on single items and the number of respondents who gave a particular response to that item were counted.

The Canada Home Fitness Test was used as a measure of fitness as a product of activity. The Canada Home Fitness Test was administered to fifteen students at one time using the specially-constructed step benches. The students were taught to take their pulse. Several practice runs and tests for accuracy were made. The 10 second resting pulse after three minutes of exercise was recorded. The recording was done by senior students who recorded the pulse as reported to them by the participants.

The Canada Home Fitness Test is a self-administered procedure in which the participant steps at a particular rate designed for each age group and controlled by recorded music. The pulse is palpated immediately following activity.

Validation of the test has shown a correlation of 0.72 with the results of a standard submaximum bicycle ergometer test, while the directly-measured maximum oxygen intake is correlated even more closely ( $r = .88$ ) with the attained stepping rate, body weight and recovery heart rate. Given modest training, subjects could measure their immediately post-exercise heart rate (correlation with electro-cardiographic data  $P = 0.94$ ), although the 10 second counts underestimated the true rate by an average of seven beats. (Shephard, 1976.)

### Sampling Methods

The study sample consisted of all the students in grade 9 and one-half of the students in grades 10 and 11, and numbered 510.

All of these students attended guidance classes during the second semester from January to June, 1977, which was the time in which the study was carried out. The students were randomly assigned to the guidance classes at the beginning of the semester.

Of the total of 510 students in the study, 287 were randomly assigned to the intervention group and 148 to the non-intervention group. A third group of 74 students were assigned to a group to be posttested only. It was later decided to exclude this group from the study.

A total of 192 students from the 287 students assigned to the intervention group completed both the pre- and post-questionnaires and 109 of the 148 assigned to the non-intervention group completed both the pre- and post-questionnaires. Of the 192 students in the intervention group who completed both the pre- and post-questionnaires, 176 took part in both the pre- and post-fitness testing. Of the 109 students in the non-intervention group who completed both the pre- and post-questionnaires, 89 took part in both the pre- and post-fitness testing.

### Implementation of Study

The project was discussed with the school principal who was encouraging. A meeting was then held with the Guidance and Physical Educational Department heads to explain the project to them and ask for their support. The Physical Educational Department head arranged for time and scheduling of the fitness testing. The Guidance Department head arranged for the distribution, supervision and collection of the questionnaires and the scheduling of the educational program. The health educator of the B.C. Heart Foundation agreed to provide the educational program during the required time. The program provided was similar to one regularly provided on request throughout the schools in British Columbia.

The Y.M.C.A. was approached to provide the personnel to administer the Canada Home Fitness Test. This is a service supplied to schools and other groups on request. The materials were supplied by Action B.C.

The questionnaire was produced with the cooperation of U.B.C., the Vancouver Health Department and the Vancouver School Board. The typing of the questionnaire was done by the Vancouver Health Department and the mimeographing by the office staff at Eric Hamber School. The knowledge questions originated directly from the written material supplied by the B.C. Heart Foundation.

The design for the benches used for the step-testing was received from Action B.C. and the benches, large enough to test

20 students at one time, were built by the Woodworking Department of Eric Hamber School.

An outline of the project was submitted for approval to the research evaluation committees of the Vancouver School Board and the Vancouver Health Department and approval was granted.

### Procedure

The students described above were assigned randomly to Group A and Group B. Group A was defined as the intervention group and Group B the control group.

The guidance counsellors were approached and given instructions on how to present the questionnaire to the class so that each class received it in an identical way. The guidance counsellors administered the questionnaire to each class in Group A and Group B.

The following week the physical education teachers scheduled all of the classes in Groups A and B to take part in the Canada Home Fitness Test which was administered in an identical way to each class by the instructors from the Y.M.C.A.

One week later all the students in Group A were scheduled to be exposed to the educational program during their regular guidance class. Students in Group B received regular guidance instruction during this hour.

Three months later, at the end of the second semester, the same guidance counsellors again administered the same questionnaire using the same method to all the students in Groups A and B. The same instructors from the Y.M.C.A. administered the Canada Home Fitness Test using the same methods, to all the students in Groups A and B.

The results of the questionnaire and the fitness test were prepared for computing and the "Statistical Package for the Social Sciences" was used to generate frequency tables and statistical tests. Differences were examined using the chi-square statistical test. A significance level of .05 was selected.

## CHAPTER IV

### RESULTS

A total of 192 students in the intervention group completed both the pre- and post-questionnaires and a total of 109 students in the non-intervention group completed both the pre- and post-questionnaires. The few non-responses were excluded from the chi-square statistical testing.

The data collected from the questionnaires of the two groups was tested for differences. In this section I would like to address the three hypotheses.

#### Hypothesis I

Students exposed to an educational program directed towards reducing cardiovascular risk-behaviours will have more knowledge about cardiovascular risk-behaviours than students who are not exposed to the program.

Thirty-four questions were asked to measure the knowledge of the students about the functioning of the heart and cardiovascular risks.

The frequency data generated was examined for differences in four directions:

- (1) between pretests of intervention and non-intervention groups;
- (2) between posttests of intervention and non-intervention groups;
- (3) between the pre- and posttests of the intervention group;
- (4) between the pre- and posttests of the non-intervention group.

The data is demonstrated in detail in Tables I - XI.

Examination of the frequency data on the responses to the 34 knowledge questions indicated no differences between the proportion of correct responses on the pretests of the intervention and non-intervention groups.



The frequency data on the responses to the 34 knowledge questions indicated that a significantly larger proportion of students in the intervention group gave correct answers to the following 11 questions on the posttests:

- (1) Is it true or false that people under 40 get heart disease?
- (2) Is it true or false that a man who is physically fit will have a higher heart rate than a man who is unfit?
- (3) Is it true or false that cancer is the only serious disease associated with smoking?
- (4) Check three foods in the following list that are high in cholesterol:
  - (a) whipped cream
  - (b) rice
  - (c) sausages
  - (d) coke
  - (e) eggs

(5) Is it true or false that people who have eaten a diet high in certain fats all their life are more likely to have a heart attack?

(6) Is it true or false that changes in the arteries that cause heart attacks begin in very young people?

(7) Is it true or false that smokers run an extra risk of having a heart attack?

(8) Is it true or false that smoking makes the heart beat faster in most people?

(9) and (10)

More students in the intervention group correctly answered parts "c" and "d" in the following question:

Which three of the following have been found to be closely associated with coronary artery disease (heart attack)?

(a) overweight

(b) regular strenuous exercise

- (c) smoking
- (d) drinking 1 - 2 ounces of  
alcohol a day
- (e) high blood pressure
- (f) a tragedy in the family

(11) Is it true or false that drinking 1 - 2  
ounces of alcohol a day is closely  
associated with coronary artery disease?

The following 22 questions generated responses that  
indicated no posttest differences between the intervention  
and non-intervention groups:

- (1) Name one food from each of the basic four  
food groups?
- (2) Is it true or false that changes in the  
diet can change the level of cholesterol  
in the blood?
- (3) (4), (5) and (6)

There were no differences between the intervention  
and non-intervention groups on their responses  
to parts (a), (b), (e) and (f) of the following  
question:

Which three of the following have been found to be closely associated with coronary artery disease (heart attack)?

Check three only.

- (a) overweight
- (b) regular strenuous physical exercise
- (c) smoking
- (d) drinking 1 - 2 ounces of alcohol  
a day
- (e) high blood pressure
- (f) a tragedy in the family

- (7) Is it true or false that there is no risk in smoking cigarettes if you don't inhale?
- (8) Is it true or false that the more cigarettes you smoke the greater the risk?
- (9) Is it true or false that smoking is more of a health hazard for males than females?
- (10) Is it true or false that there are programmes available to help people stop smoking?

- (11) Is it true or false that most people can smoke a few cigarettes without getting the habit?
- (12) Is it true or false that studies have shown that overweight in adolescents is more often due to inactivity than overeating?
- (13) Is it true or false that if you don't exercise regularly you are better off not to exercise at all?
- (14) Is it true or false that the normal heart rate is 78 beats per minute?
- (15) Is it true or false that high blood pressure adds to the work load of the heart and arteries?

Join by a straight line the body part with the action it performs:

- |      |             |  |
|------|-------------|--|
| (16) | Heart       | Carries blood from cells<br>back to heart.                                 |
| (17) | Arteries    | Pump which drives blood.   |
| (18) | Capillaries | Carries blood from heart<br>to cells.                                      |
| (19) | Veins       | Place where interchange of<br>waste products, food and<br>gas takes place. |

(20) Mark the one correct answer:

The pulse rate measures:

- (a) the flow of blood through an artery
  - (b) the number of times the heart pumps  
in a minute
  - (c) the number of times you breath in a  
minute
- (21) Is it true or false that there is a relation-  
ship between cigarette smoking and heart  
disease?

(22) Is it true or false that filters make cigarettes safer?

The responses to the 11 questions that indicated a significant posttest difference between the intervention and non-intervention groups are described in detail in the following tables.

Variable 45

Responses to the question, "Is it true or false that changes in the arteries that cause heart attacks begin in very young people?" indicated a significant difference between the pre- and posttests of the intervention and non-intervention group ( $P = .0004$ ) and between the posttest of the intervention and non-intervention groups ( $P = .0189$ ). The responses indicated that more students in the intervention group were able to answer this question correctly (See Table I).



TABLE I

VARIABLE: 45

QUESTION: Changes in the arteries that cause heart attacks begin in very young people?

ANSWER: True.

ABSOLUTE AND RELATIVE FREQUENCIES

	NON- RESPONSE #	CORRECT # %	INCORRECT # %	
<u>PRETEST</u>				
INTERVENTION	2	65 33.9	125 65.1	192
NON-INTERVENTION	3	33 30.3	73 67	109
$\chi^2 = .2359$ $P = .6272$	5	98	198	301
<u>POSTTEST</u>				
INTERVENTION	6	98 51.0	88 45.8	192
NON-INTERVENTION	6	39 36.1	63 58.3	108
$\chi^2 = 5.517$ $P = .0189$	12	137	151	300
<u>INTERVENTION</u>				
PRETEST	2	65 33.9	125 65.1	192
POSTTEST	6	98 51.0	88 45.8	192
$\chi^2 = 13.067$ $P = .0004$	8	163	213	384
<u>NON-INTERVENTION</u>				
PRETEST	3	33 30.3	73 67	109
POSTTEST	6	39 36.1	63 58.3	108
$\chi^2 = 1.0567$ $P = .3040$	9	72	136	217

Variable 48

Responses to the question, "Is it true or false that smoking makes the heart beat faster in most people?" indicated a significant difference (to the .05 level) between the pre- and posttests of the intervention group ( $P = .0013$ ) and between the posttests of the intervention and non-intervention groups ( $P = .0044$ ). The responses indicated that more students in the intervention group were able to answer this question correctly (See Table II).

TABLE II

VARIABLE: 48

QUESTION: Smoking makes the heart beat faster in most people?

ANSWER: True.

ABSOLUTE AND RELATIVE FREQUENCIES

	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	7	114	59.4	71	37	192
NON-INTERVENTION	3	71	65.1	34	32.1	109
$\chi^2 = 1.043 \text{ P} = .3072$	10	185		105		300
<u>POSTTEST</u>						
INTERVENTION	3	146	76.0	43	22.4	192
NON-INTERVENTION	1	66	61.1	41	38	108
$\chi^2 = 8.145 \text{ P} = .0044$	4	212		84		300
<u>INTERVENTION</u>						
PRETEST	7	114	59.4	71	37	192
POSTTEST	3	146	76	43	22.4	192
$\chi^2 = 10.77 \text{ P} = .0013$	10	260		114		384
<u>NON-INTERVENTION</u>						
PRETEST	3	71	65.1	34	32.1	108
POSTTEST	1	66	61.1	41	38	108
$\chi^2 = .8170 \text{ P} = .3661$	4	137		75		216

Variable 49

Responses to the question, "Is it true or false that smokers run an extra risk of having a heart attack?" indicated a significant difference (to the .05 level) between the number of correct responses of the pre- and posttests of the intervention group ( $P = .0148$ ) and the posttests of the intervention and non-intervention groups ( $P = .0066$ ). The responses indicated that more students in the intervention group were able to answer this question correctly (See Table III).

TABLE III

VARIABLE: 49

QUESTION: Smokers run an extra risk of having a heart attack?

ANSWER: True.

ABSOLUTE AND RELATIVE FREQUENCIES

ABSOLUTE AND RELATIVE FREQUENCIES						
	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	3	175	91.1	14	7.3	192
NON-INTERVENTION	3	96	89	10	9.2	109
$\chi^2 = .552$ P = .9071	6	271		24		301
<u>POSTTEST</u>						
INTERVENTION	1	187	97.4	4	2.1	192
NON-INTERVENTION	2	98	90.7	8	7.4	108
$\chi^2 = 5.227$ P = .0066	3	285		12		300
<u>INTERVENTION</u>						
PRETEST	3	175	91.1	14	7.3	192
POSTTEST	1	187	97.4	4	2.1	192
$\chi^2 = 5.942$ P = .0148	4	352		18		384
<u>NON-INTERVENTION</u>						
PRETEST	2	96	89	10	9.2	108
POSTTEST	2	98	90.7	8	7.4	108
$\chi^2 = .2428$ P = .6222	4	194		18		216

Variable 30

Responses to the question, "Is it true or false that drinking 1 to 2 ounces of alcohol a day is closely associated with coronary artery disease?" indicated a significant difference (to the .05 level) between the number of correct responses of the pre- and posttests of the intervention group ( $P = .0001$ ) and a significant difference between the posttest of the intervention and non-intervention groups ( $P = .0085$ ). The responses indicated that more students in the intervention group were able to answer this question correctly (See Table IV).

TABLE IV

VARIABLE: 30

QUESTION: Drinking 1 - 2 ounces of alcohol a day is closely associated with coronary artery disease?

ANSWER: False.

ABSOLUTE AND RELATIVE FREQUENCIES

	NON- RESPONSE #	CORRECT #      %		INCORRECT #      %		
<u>PRETEST</u>						
INTERVENTION	0	127	66.1	65	33.9	192
NON-INTERVENTION	3	74	67.9	32	29.4	109
$\chi^2 = .5818$ P = .4456	3	201		97		301
<u>POSTTEST</u>						
INTERVENTION	4	162	84.4	26	13.5	192
NON-INTERVENTION	1	79	73.1	28	25.9	108
$\chi^2 = 6.9418$ P = .0085	5	241		54		300
<u>INTERVENTION</u>						
PRETEST	0	127	66.1	65	33.9	192
POSTTEST	4	162	84.4	26	13.5	192
$\chi^2 = 20.913$ P = .0001	4	289		91		384
<u>NON-INTERVENTION</u>						
PRETEST	3	74	67.9	32	29.4	109
POSTTEST	1	79	73.1	28	25.9	108
$\chi^2 = 2.3536$ P = .5548	4	153		60		217

Variable 29

Responses to the question, "Is it true or false that smoking is closely associated with coronary artery disease?" indicated a significant difference (to the .05 level) between the number of correct responses to the pre- and posttests of the intervention group ( $P = .0001$ ) and the posttests of the intervention and non-intervention groups ( $P = .0001$ ). The responses indicated that more students in the intervention group were able to answer this question correctly (See Table V).



TABLE V

VARIABLE: 29

QUESTION: Smoking is closely associated with coronary artery disease?

ANSWER: True.

ABSOLUTE AND RELATIVE FREQUENCIES

	NON- RESPONSE #	CORRECT #      %		INCORRECT #      %		
<u>PRETEST</u>						
INTERVENTION	0	144	75	48	25	192
NON-INTERVENTION	3	80	73.4	26	23.9	109
$\chi^2 = .0518 \quad P = .8198$	3	224		74		301
<u>POSTTEST</u>						
INTERVENTION	4	170	88.5	18	9.4	192
NON-INTERVENTION	2	77	71.3	29	26.9	108
$\chi^2 = 15.96 \quad P = .0001$	6	247		47		300
<u>INTERVENTION</u>						
PRETEST	0	144	75	48	25	192
POSTTEST	4	170	88.5	18	9.4	192
$\chi^2 = 15.74 \quad P = .0001$	4	314		66		384
<u>NON-INTERVENTION</u>						
PRETEST	3	80	73.4	26	23.9	109
POSTTEST	2	77	71.3	29	26.9	108
$\chi^2 = .3488 \quad P = .5548$	5	157		55		217

Variable 23

Responses to the question, "Is there a relationship between smoking and heart disease?" indicated a significant difference (to the .05 level) between the number of correct responses on the pre- and posttests of the intervention group ( $P = .0050$ ) and the posttests of the intervention and non-intervention groups ( $P = .0111$ ). The responses indicated that more students in the intervention group were able to answer this question correctly (See Table VI).

TABLE VI

VARIABLE: 23

QUESTION: Is there a relationship between smoking and heart disease?

ANSWER: Yes.

ABSOLUTE AND RELATIVE FREQUENCIES

ABSOLUTE AND RELATIVE FREQUENCIES						
	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	1	166	86.5	25	13	192
NON-INTERVENTION	4	89	81.7	16	14.7	109
$\chi^2 = .1024$ P = .7492	5	255		41		301
<u>POSTTEST</u>						
INTERVENTION	5	178	92.7	9	4.7	192
NON-INTERVENTION	1	93	86.1	14	13.0	108
$\chi^2 = 6.4568$ P = .0111	6	271		23		280
<u>INTERVENTION</u>						
PRETEST	1	166	86.5	25	13	192
POSTTEST	5	178	92.7	9	4.7	192
$\chi^2 = 7.906$ P = .0050	6	344		34		384
<u>NON-INTERVENTION</u>						
PRETEST	4	89	81.7	16	14.7	109
POSTTEST	1	93	86.1	14	13	108
$\chi^2 = .07975$ P = .7777	5	182		30		217

Variable 47

Responses to the question, "Is it true or false that people who have eaten a diet high in certain fats all their life are more likely to have a heart attack?" indicated a significant difference (to the .05 level) between the number of correct responses on the posttests of the intervention group ( $P = .0563$ ). The responses indicated that more students in the intervention group were able to answer the questions correctly (See Table VII).

TABLE VII

VARIABLE: 47

QUESTION: People who have eaten a diet high in certain fats all their life are more likely to have a heart attack?

ANSWER: True.

ABSOLUTE AND RELATIVE FREQUENCIES

ABSOLUTE AND RELATIVE FREQUENCIES						
	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	4	148	77.1	40	20.8	192
NON-INTERVENTION	3	87	79.8	19	17.4	109
$\chi^2 = .7251$ P = .3945	7	235		59		301
<u>POSTTEST</u>						
INTERVENTION	6	159	82.8	27	14.1	192
NON-INTERVENTION	4	80	74.1	24	22.2	108
$\chi^2 = 3.3729$ P = .0563	10	239		51		300
<u>INTERVENTION</u>						
PRETEST	4	148	77.1	44	27.9	192
POSTTEST	6	159	82.8	33	17.2	192
$\chi^2 = 2.9059$ P = .0883	10	307		77		384
<u>NON-INTERVENTION</u>						
PRETEST	3	87	79.8	22	20.2	109
POSTTEST	4	80	74.1	28	25.9	108
$\chi^2 = 1.145$ P = .2845	7	167		40		217

Variable 33

Responses to the question, "Is it true or false that at rest a man who is physically fit will have a higher heart rate than a man who is unfit?" indicated a significant difference (to the .05 level) between the correct responses on the pre- and posttests of the intervention group ( $P = .0159$ ). The responses indicated that more students in the intervention group were able to answer the questions correctly (See Table VIII).

TABLE VIII

VARIABLE: 33

QUESTION: At rest a man who is physically fit will have a higher heart rate than a man who is unfit?

ANSWER: False.

ABSOLUTE AND RELATIVE FREQUENCIES

	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	1	159	82.8	32	16.7	192
NON-INTERVENTION	1	96	88.1	12	11.0	109
$\chi^2 = 2.169$ P = .1408	2	255		44		301
<u>POSTTEST</u>						
INTERVENTION	4	172	89.6	16	8.3	192
NON-INTERVENTION	3	90	83.3	15	13.9	108
$\chi^2 = 2.375$ P = .1233	7	262		31		300
<u>INTERVENTION</u>						
PRETEST	1	159	82.8	32	16.7	192
POSTTEST	4	172	89.6	16	8.3	192
$\chi^2 = 5.820$ P = .0159	5	331		48		384
<u>NON-INTERVENTION</u>						
PRETEST	1	96	88.1	12	11	109
POSTTEST	3	90	83.3	15	13.9	108
$\chi^2 = .3488$ P = .5548	4	186		27		217

Variable 43

Responses to the question, "Choose three of the following that are high in cholesterol: whipped cream, rice, sausages, eggs, coke?" indicated a significant difference (to the .05 level) between the correct responses on the pre- and posttests of the intervention group ( $P = .0458$ ). The responses indicate that more students in the intervention group were able to answer the questions correctly (See Table IX).



TABLE IX

VARIABLE: 43

QUESTION: Choose three of the following that are high in cholesterol -  
whipped cream, rice, sausages, eggs, coke.

ANSWER: Whipped cream, sausages, and eggs.

## ABSOLUTE AND RELATIVE FREQUENCIES

	NON- RESPONSE #	CORRECT								
		0		1		2		3		
		#	%	#	%	#	%	#	%	
<u>PRETEST</u>										
INTERVENTION	0	1	.5	11	5.7	91	47.4	89	46.4	192
NON-INTERVENTION	0	0	-	8	7.3	40	36.7	60	56.0	108
$X^2 = 3.746$ $P = .3002$	0	1		19		131		149		300
<u>POSTTEST</u>										
INTERVENTION	4	2	1.0	7	3.6	66	34.4	113	58.9	192
NON-INTERVENTION	4	1	.9	6	5.6	41	38.0	56	51.9	108
$X^2 = 1.4302$ $P = .7085$	8	3		13		107		169		300
<u>INTERVENTION</u>										
PRETEST	0	1	.5	11	5.7	91	47.4	89	46.4	192
POSTTEST	4	2	1.0	7	3.6	66	34.4	113	58.9	192
$X^2 = 8.013$ $P = .0458$	4	3		18		157		202		384

TABLE IX (Cont'd)

ABSOLUTE AND RELATIVE FREQUENCIES										
	NON- RESPONSE	0		1		2		3		
	#	#	%	#	%	#	%	#	%	
<u>NON-INTERVENTION</u>										
PRETEST	1	0	-	8	7.3	40	36.7	60	56.0	109
POSTTEST	4	1	.9	6	5.6	41	38.0	56	51.8	108
$\chi^2 = 5.435$ $P = .6350$	5	1		14		81		116		217

Variable 24

Responses to the question, "Do people under 40 get heart attacks?" indicated a significant difference (to the .05 level) between the number of correct responses on the pre- and posttests of the intervention group ( $P = .0128$ ) and between the posttests of the intervention and non-intervention groups ( $P = .0537$ ). The responses indicated that more students in the intervention group were able to answer the questions correctly (See Table X).

TABLE X

VARIABLE: 24

QUESTION: Do people under forty get heart disease?

ANSWER: Yes.

ABSOLUTE AND RELATIVE FREQUENCIES

ABSOLUTE AND RELATIVE FREQUENCIES						
	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	1	144	75	47	24.5	192
NON-INTERVENTION	3	84	77.1	22	20.2	109
$\chi^2 = .8127$ P = .3674	4	228		69		301
<u>POSTTEST</u>						
INTERVENTION	5	160	83.3	27	14.1	192
NON-INTERVENTION	1	82	75.9	25	23.1	108
$\chi^2 = 3.724$ P = .0537	6	242		52		300
<u>INTERVENTION</u>						
PRETEST	1	144	75	47	24.5	192
POSTTEST	5	160	83.3	27	14.1	192
$\chi^2 = 6.2058$ P = .0128	6	304		74		384
<u>NON-INTERVENTION</u>						
PRETEST	3	84	77.1	22	20.2	109
POSTTEST	1	82	75.9	25	23.1	108
$\chi^2 = .3530$ P = .5524		166		47		217

Variable 36

Responses to the questions, "Is it true that lung cancer is the only serious disease associated with smoking?" indicated a significant difference (to the .05 level) between the pre- and posttests of the intervention group ( $P = .0118$ ). The responses indicated more students in the intervention group were able to answer the questions correctly (See Table XI).

TABLE XI

VARIABLE: 36

QUESTION: Lung cancer is the only serious disease associated with smoking.

ANSWER: No

ABSOLUTE AND RELATIVE FREQUENCIES

ABSOLUTE AND RELATIVE FREQUENCIES						
	NON- RESPONSE #	CORRECT # %		INCORRECT # %		
<u>PRETEST</u>						
INTERVENTION	0	155	80.7	37	19.3	192
NON-INTERVENTION	2	87	79.8	20	18.3	109
$\chi^2 = .00716$ P = .0674	2	242		27		301
<u>POSTTEST</u>						
INTERVENTION	4	169	88.0	19	9.9	192
NON-INTERVENTION	3	89	82.4	16	14.8	108
$\chi^2 = 1.686$ P = .1941	7	258		35		300
<u>INTERVENTION</u>						
PRETEST	0	155	80.7	37	19.3	192
POSTTEST	4	169	88.0	19	9.9	192
$\chi^2 = 6.34$ P = .0118	4	324		56		384
<u>NON-INTERVENTION</u>						
PRETEST	2	87	79.8	20	18.3	109
POSTTEST	3	89	82.4	16	14.8	108
$\chi^2 = .4911$ P = .4835	5	176		36		217

### Summary - Hypothesis I

In regard to Hypothesis I,

Students exposed to an educational program directed towards reducing cardiovascular risk-behaviour will have more knowledge about cardiovascular risk-behaviours than students who are not exposed to the program,

the results of the responses to the knowledge questions indicate that students who were exposed to the educational program had more factual knowledge about cardiovascular risk-factors than students who were not exposed to the program.

### Hypothesis II

Students exposed to an educational program directed towards reducing cardiovascular risk-behaviours will have a more positive attitude towards reducing cardiovascular risk-behaviours than students who are not exposed to the program.

Eleven questions were asked in an attempt to measure the attitude of the students towards changing behaviours that affect cardiovascular risk. The frequency data generated was examined for differences in four directions:

- (1) between pretests of intervention and non-intervention groups;
- (2) between posttests of intervention and non-intervention groups;

- (3) between the pre- and posttests of the intervention group;
- (4) between the pre- and posttests of the non-intervention group.

The responses to the following 11 questions indicated no differences between the groups on the pretest or posttest questionnaires. The following 11 questions were asked to determine the attitude of the students towards cardiovascular risk:

- (1) I think it is important for my heart not to start smoking? Yes or No.
- (2) I think adults should stop smoking? Yes or No.
- (3) I think it is better not to start smoking when you are young? Yes or No.
- (4) I think regular exercise is important or not important for prevention of heart trouble?
- (5) I think maintaining an average weight is worthwhile or very important?
- (6) I think keeping fit is worthwhile or very important?
- (7) Is it true or false that I think that most people can limit themselves to a few cigarettes a day?



- (8) Is it true or false that I think that most teenagers who start with a few cigarettes become habitual smokers?
- (9) Is it true or false that I am convinced that smoking is harmful to my health?
- (10) Is it true or false that if I am not sick I must be eating the right food?
- (11) Is it true or false that I think it is important to limit the amount of fat in my diet?

#### Summary - Hypothesis II

In regard to Hypothesis II,

Students exposed to an educational program directed towards reducing cardiovascular risk-behaviours will have a more positive attitude towards reducing cardiovascular risk-behaviours than students who are not exposed to the program,

the responses to the above 11 questions indicate there were no differences between the two groups.

#### Hypothesis III

Students exposed to an educational program directed towards reducing cardiovascular risk-behaviours will change their behaviour in such a way as to practice fewer risk-behaviours than students who are not exposed to the program.

Thirteen questions were asked to determine cardiovascular risk-behaviours. The frequency data generated was examined for differences in four directions:

- (1) between pretests of intervention and non-intervention groups;
- (2) between posttests of intervention and non-intervention groups;
- (3) between the pre- and posttests of the intervention group;
- (4) between the pre- and posttests of the non-intervention group.

No differences were found between the intervention and non-intervention groups on the responses on the pretest and posttest questionnaires.

The following 13 questions were asked to determine behaviour of the students in both groups:

- |   |  |
|---|--|
| (1) I smoke tobacco cigarettes:<br>(check one only) | (a) not at all<br>(b) less than 5 cigarettes<br>a day<br>(c) 5-20 cigarettes a day<br>(d) more than 20<br>cigarettes a day |
| (2) I play sports:<br>(check one only)              | (a) less than 30 minutes<br>a day<br>(b) between 30 minutes and<br>one hour a day<br>(c) more than one hour each<br>day    |

- (3) I walk: (a) less than 10 blocks  
(check one only) a day  
(b) between 10 and 20  
blocks a day  
(c) more than 20 blocks  
a day

(4) I have smoked tobacco cigarettes for \_\_\_\_\_ years.

Answer the following questions "yes" or "no".

- (5) I drink 2 or more glasses of skim milk a day. \_\_\_\_\_
- (6) I drink 2 or more glasses of whole milk a day. \_\_\_\_\_
- (7) I eat more than 7 eggs a week. \_\_\_\_\_
- (8) I know how much I weigh. \_\_\_\_\_
- (9) I eat chips (french fries) more than four times  
a week. \_\_\_\_\_
- (10) I know my ideal weight. \_\_\_\_\_
- (11) I am overweight. \_\_\_\_\_
- (12) I eat fresh fruit every day. \_\_\_\_\_
- (13) I eat 2 servings of vegetables every day. \_\_\_\_\_

#### Canada Home Fitness Test

The Canada Home Fitness Test was performed by the students as a measure of their fitness levels as an indicator of physical activity. The 10 second pulse was recorded and the frequency data generated was examined for differences in four directions:

- (1) between pretests of intervention and non-intervention groups;
- (2) between posttests of intervention and non-intervention groups;
- (3) between the pre- and posttests of the intervention group;
- (4) between the pre- and posttests of the non-intervention group.

Frequency data on 176 students in the intervention group who had also completed both the pre- and post-questionnaires and frequency data on 89 students in the non-intervention group who had completed both the pre- and posttest questionnaires was examined. The results were categorized into three groups, very fit, fit and unfit. Those with a 10 second pulse rate of 28 or greater were classified as unfit, those with a pulse rate of 27 to 21 were classified as fit, those with a pulse rate of 20 or less were considered very fit. The results are summarized in Table XII.

TABLE XII

10 Second Pulse Recorded During Canada Home Fitness Test.

RELATIVE FREQUENCIES

	VERY FIT		FIT		UNFIT		
	#	%	#	%	#	%	
<u>PRETEST</u>							
INTERVENTION	35	19.8	116	65.9	25	14.2	176
NON-INTERVENTION	12	13.4	59	65.5	18	22	89
$\chi^2 = 2.688$ P = .2610	47		175		43		266
<u>POSTTEST</u>							
INTERVENTION	40	22.7	119	67.7	17	9.6	176
NON-INTERVENTION	27	30.7	54	60.3	8	8.9	89
$\chi^2 = 1.81804$ P = .4130	67		173		25		266
<u>INTERVENTION</u>							
PRETEST	35	19.8	116	65.9	25	14.2	176
POSTTEST	40	22.7	119	67.6	17	9.6	176
$\chi^2 = 1.895$ P = .3877	75		235		42		352
<u>NON-INTERVENTION</u>							
PRETEST	12	13.4	59	65.5	18	22	89
POSTTEST	27	30.7	54	60.3	8	8.9	89
$\chi^2 = 9.8366$ P = .0074	39		113		26		178

Using the data recorded during the Canada Home Fitness Test, changes in fitness levels within subjects were examined. The 10 second pulse rate recorded on the pretest was subtracted from the 10 second pulse rate on the posttest.

Test differences of 176 students in the intervention group, who completed both the pre- and posttest questionnaires and pre- and posttest Canada Home Fitness tests were examined. Test differences of 89 students in the non-intervention group who completed both the pre- and posttest questionnaires and the pre- and posttest Canada Home Fitness Tests were examined. The results are summarized in Table XIII.

TABLE XIII

Number and Percentage Distribution of changes in 10 second pulse rate between pretest and posttest.

10 second pulse rate	Intervention		Non-Intervention	
	#	%	#	%
Reduced	97	54.8	52	58.3
No Change	24	13.6	16	17.4
Increased	55	31.1	21	23.5

$$\chi^2 = 2.06$$

$$P = .3569$$

Summary - Hypothesis III

In regard to Hypothesis III,

Students exposed to an educational package directed towards reducing cardiovascular risk-behaviour will change their behaviour in such a way as to practice fewer risk-behaviours than students who are not exposed to the program,

the response to 13 questions asked to determine the self-reported cardiovascular risk-behaviours of the students indicated no differences between the two groups.

The results of the Canada Home Fitness Test indicated no significant difference in the distribution of differences between the pre- and posttest results of the intervention and non-intervention groups.

The results of the Canada Home Fitness Test indicated no difference in the fitness levels between the initial pretests, or the posttest of both groups. There was no significant difference shown between the pre- and posttests of the intervention group.

Examination of the frequency data from the Canada Home Fitness Test revealed a significant difference between the pre- and post-fitness levels of the non-intervention group. This unexpected result could not be explained by errors in the process of handling the data from collection, to coding, to key punching and computing. A spill over effect from the intervention group to the non-intervention group cannot be ruled out and further studies are suggested.



## CHAPTER V

### DISCUSSION AND CONCLUSION

#### Discussion

This study suggests that high school students do learn some factual information if exposed to a short-term health educational program.

The results of the pretest questionnaire indicated that 80 to 90 percent of students were able to answer basic knowledge questions about the functioning of the heart and the risks of smoking, physical inactivity and high-fat diet. Studies (Swisher, 1971, 1972, 1973; Tennant, 1973; Spitznagel, 1978; Podell, 1978) have demonstrated that health educational programs in schools do increase knowledge. This study supports these studies by demonstrating a significant increase in the knowledge of the students, who took part in the program, about the risks of smoking, physical inactivity and high-fat diet on the functioning of the heart.

Studies have shown that students learn from an educational program depending on the content of the program, the characteristics of the teacher, the characteristics of the students, the method of teaching and the environment. (McGuire, 1969).

The increase in knowledge could be expected in this study as the educational program was conducted in the school environment where the expectation is that students attend and comprehend material that is presented to them in class. The written material was correct and intellectually supportable. The majority of the

students came from middle-class homes where good health is valued. Barriers to knowledge in the study may have been that the teacher was a middle-aged woman with no established scientific or medical qualifications and who smoked. Also, the film presentation portrayed a middle-aged man smoking, being physically inactive and eating a high-fat diet and subsequently suffering a heart attack, a risk they would tend to identify with their parents rather than with themselves. A future study might look at the effect of films more relevant to adolescent behaviour.

The results of this study did not demonstrate, on comparison of posttest results, the hoped for differences in attitude or behaviour between the group that was exposed to the educational program and the group that was not exposed to the program. Attitudes and behaviour are complex and learned over a number of years (Baum, 1977). The development of attitudes and behaviours involves the synthesis of multiple internal and external factors. This study supports the findings of a number of studies evaluating health educational programs where an increase in knowledge occurred, but little or no attitudinal or behavioural change was demonstrated. (Spitznagel, 1969; Amendolara, 1973; Swisher, 1973; Podell, 1978). However, all of these studies have looked at the short-term effects of health education. In order to determine the influence of health knowledge on attitude and behaviour, a long-term study would be necessary.

Examination of the differences between the pre- and posttest results of the non-intervention group on the Canada Home Fitness Test indicated a change within this group. The possibility that

the educational program affected this group in some indirect way cannot be ruled out and further studies are recommended.

The results demonstrated by the pretests of all the students indicated about 80 percent of the students did not smoke, were physically active, and ate a low-fat diet. A suggestion for future research would be to involve the 20 percent of students with risk-behaviours in a variety of programs directed towards behaviour change and evaluate the effectiveness.

For the 80 percent who showed evidence of a basic knowledge of risk, who had positive attitudes and behaviours, a program directed towards reinforcement of existing attitudes and behaviours might be more effective in the long-term.

### Conclusion

This study demonstrated that students in a high-school in Vancouver learned some factual knowledge about cardiovascular risk from a short-term educational program prepared by the B.C. Heart Foundation. No evidence of significant positive change in attitude or behaviour was demonstrated in the comparison of posttest results. A significant unexplained difference was noted between the pre- and posttest results of the intervention group. Further studies are indicated to explain this result. A posttest only research design would not have illustrated the difference.

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APPENDIX "A"

QUESTIONNAIRE

PART A

5. I smoke tobacco cigarettes:  
(check one only in box provided)
- a) not at all ☐
  - b) less than 5 cigarettes a day ☐
  - c) 5-20 cigarettes a day ☐
  - d) more than 20 cigarettes a day ☐

6. I play sports:
- a) less than 30 minutes a day ☐
  - b) between 30 minutes and one hour a day ☐
  - c) more than one hour a day ☐

7. I walk:
- a) less than 10 blocks a day ☐
  - b) between 10 and 12 blocks a day ☐
  - c) more than 20 blocks a day ☐

8. I have smoked tobacco cigarettes for \_\_\_\_\_ years.

Answer questions 9 - 17 "yes" or "no" in column provided.

9. I drink 2 or more glasses of skim milk a day. 9. \_\_\_\_\_
10. I drink 2 or more glasses of whole milk a day. 10. \_\_\_\_\_
11. I eat more than 7 eggs a week. 11. \_\_\_\_\_
12. I know how much I weigh. 12. \_\_\_\_\_
13. I eat chips (french fries) more than four times a week. 13. \_\_\_\_\_

PART A - Pg. 2

- |   |           |
|---|-----------|
| 14. I know my ideal weight.                   | 14. _____ |
| 15. I am over weight.                         | 15. _____ |
| 16. I eat fresh fruit every day.              | 16. _____ |
| 17. I eat 2 servings of vegetables every day. | 17. _____ |

PART B

Join by a straight line the body part with the action it performs.

- |                 |  |
|-----------------|--|
| 18. Heart       | Carries blood from cells back to heart.                              |
| 19. Arteries    | Pump which drives blood.   |
| 20. Capillaries | Carries blood from heart to cells.                                   |
| 21. Veins       | Place where interchange of waste products, food and gas takes place. |

Mark correct answer (one only) in box provided.

- |                              |  |                          |
|------------------------------|--|--------------------------|
| 22. The pulse rate measures: | a) the flow of blood through an artery             | <input type="checkbox"/> |
|                              | b) the number of times the heart pumps in a minute | <input type="checkbox"/> |
|                              | c) the number of times you breathe in a minute     | <input type="checkbox"/> |

Answer "yes" or "no" in the column provided.

- |  |           |
|--|-----------|
| 23. There is a relationship between cigarette smoking and heart disease. | 23. _____ |
|--|-----------|

PART B - Pg. 2

24. People under 40 get heart disease. 24. \_\_\_\_\_
25. High blood pressure adds to the work load of the heart and arteries. 25. \_\_\_\_\_
26. Fainting is usually associated with increased blood pressures. 26. \_\_\_\_\_

Which three of the following have been found to be closely associated with coronary heart disease (heart attack). Check 3 only in box provided,

27. Overweight a) ☐
28. Regular strenuous physical exercise. b) ☐
29. Smoking. c) ☐
30. Drinking 1 - 2 ounces of alcohol a day. d) ☐
31. High blood pressure. e) ☐
32. A tragedy in the family. f) ☐

Write true "T" or false "F" in the column provided.

33. At rest a man who is physically fit will have a higher heart rate than a man who is unfit. 33. \_\_\_\_\_
34. If you don't exercise regularly you are better off not exercising at all. 34. \_\_\_\_\_
35. The normal heart rate is 78 beats per minute. 35. \_\_\_\_\_

Write true "T" or false "F" in the column provided.

36. Lung cancer is the only serious disease associated with smoking. 36. \_\_\_\_\_

PART B - pg. 3

37. There is no risk in smoking cigarettes if you don't inhale. 37. \_\_\_\_\_
38. The more cigarettes you smoke the greater the risk. 38. \_\_\_\_\_
39. Smoking is more of a health hazard for males than females. 39. \_\_\_\_\_
40. Are there programmes available to help people stop smoking. 40. \_\_\_\_\_
41. Most people can smoke a few cigarettes without getting the habit. 41. \_\_\_\_\_
42. Name one food from each of the basic four food groups. a) \_\_\_\_\_  
b) \_\_\_\_\_  
c) \_\_\_\_\_  
d) \_\_\_\_\_
43. Check three foods in the following list that are high in cholesterol:  
a) whipped cream a) ☐  
b) rice b) ☐  
c) sausages c) ☐  
d) coke d) ☐  
e) eggs e) ☐

Write true "T" or false "F" in the column provided.

44. Studies have shown that overweight in adolescents is more often due to inactivity than overeating. 44. \_\_\_\_\_
45. Changes in the arteries that can cause attacks begin in very young people. 45. \_\_\_\_\_

PART B - Pg. 4

46. Changes in diet can change the level of cholesterol in the blood. 46. \_\_\_\_\_
47. People who have eaten a diet high in certain fats all their life are more likely to have a heart attack. 47. \_\_\_\_\_
48. Smoking makes the heart beat faster. 48. \_\_\_\_\_
49. Smokers run an extra risk of having a heart attack. 49. \_\_\_\_\_
50. Filters make cigarettes safe. 50. \_\_\_\_\_
51. The earlier you begin to smoke the greater the risk to your health in future years. 51. \_\_\_\_\_

PART C

Write the answer in the column provided.

52. I think it is important for your heart not to start smoking.  
a) yes b) no 52. \_\_\_\_\_
53. I think adults should stop smoking.  
a) yes b) no 53. \_\_\_\_\_
54. I think it is better not to start smoking when you are young.  
a) yes b) no 54. \_\_\_\_\_
55. I think regular exercise is a) not important  
b) important for prevention of heart trouble. 55. \_\_\_\_\_

PART C - Page 2

56. I think maintaining an average weight is:  
(check one box)
- a) worthwhile ☐
- b) not a bad idea ☐
- c) quite important ☐
- d) very important ☐
57. I think keeping fit is:  
(check one box)
- a) worthwhile ☐
- b) not a bad idea ☐
- c) quite important ☐
- d) very important ☐
58. I think most people can limit themselves to  
a few cigarettes a day.  
a) yes b) no 58. \_\_\_\_\_
59. I think most teenagers who start with a few  
cigarettes become habitual smokers.  
a) yes b) no 59. \_\_\_\_\_
60. I am convinced that smoking is harmful  
to my health.  
a) yes b) no 60. \_\_\_\_\_
61. If I am not sick I must be eating the right  
foods.  
a) yes b) no 61. \_\_\_\_\_
62. I think it is important to limit the amount  
of fat in my diet.  
a) yes b) no 62. \_\_\_\_\_