

UCSF

UC San Francisco Electronic Theses and Dissertations

Title

The effect of a "health and fitness package" on the increase in attitudes toward, knowledge about and involvement in physical activity among adolescent girls' target population

Permalink

<https://escholarship.org/uc/item/1k02x7dk>

Author

Hebert-Martin, Fernande,

Publication Date

1979

Peer reviewed|Thesis/dissertation

THE EFFECT OF A "HEALTH AND FITNESS PACKAGE" ON THE INCREASE
IN ATTITUDES TOWARD, KNOWLEDGE ABOUT AND INVOLVEMENT IN PHYSICAL
ACTIVITY AMONG AN ADOLESCENT GIRLS TARGET POPULATION

by

FERNANDE HEBERT-MARTIN

DISSERTATION

Submitted in partial satisfaction of the requirements for the degree of

DOCTOR OF NURSING SCIENCE

in the

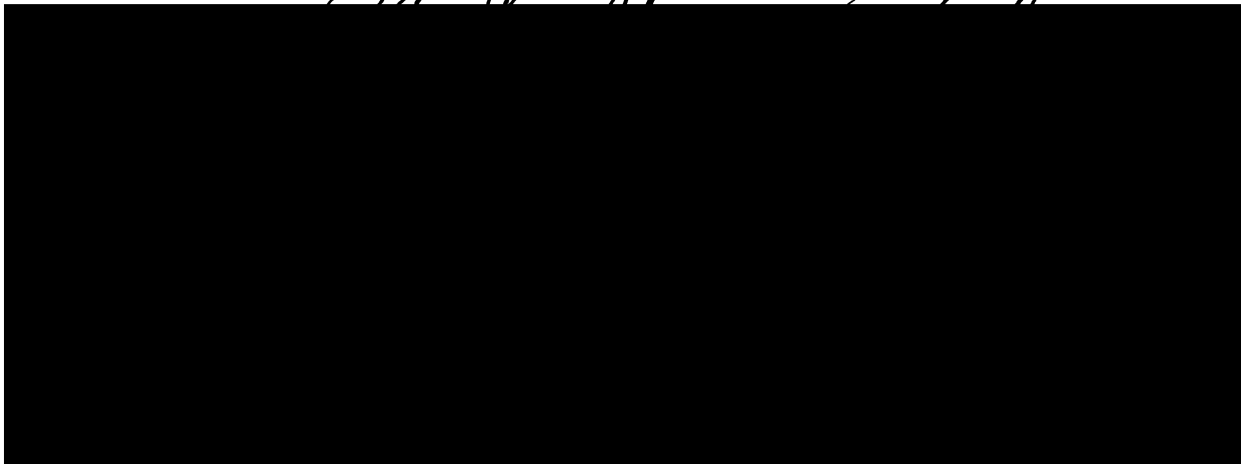
GRADUATE DIVISION

of the

UNIVERSITY OF CALIFORNIA

San Francisco

Fernande Hebert-Martin



Date

University Librarian

Degree Conferred: . . . SEP 26 1979

© 1979

FERNADE HERBERT-MARTIN

ALL RIGHTS RESERVED

The Effect of a "Health and Fitness Package"
on the Increase in Attitudes Toward, Knowledge
About and Involvement in Physical Activity Among
an Adolescent Girls Target Population

ABSTRACT

The problem addressed in this dissertation is to determine whether there were any significant differences in attitudes toward, knowledge about and involvement in physical activity between a group of adolescent girls, aged 15-18 years old, which experiences the "Health and Fitness Package", compared with two similar groups which had the standard "shape up" physical activity class.

Suggestive evidence from epidemiological and other studies indicates that early onset of coronary heart disease may be delayed by increased physical activity. The effect of exercise on the adolescent has been evaluated and most findings support the importance of exercise programs during youth to protect against cardiovascular disease. However, to reap these benefits one must maintain a regular exercise schedule throughout adult life.

In this study it was hypothesized that: 1) the group of adolescent girls which experiences the "Health and Fitness Package" will show a significant increase, compared to a first control group which took the standard "shape up" class, in attitudes toward, knowledge of and involvement in physical

activity, and this significant increase will continue three months after the experiment; 2) the group which experiences the "Health and Fitness Package" will show a significant increase, compared to a second control group which took the "shape up" class three months before the experiment started, in attitudes toward, knowledge of and involvement in physical activity.

Forty-eight girls, 15-18 years of age, volunteered to participate in the study. Sixteen subjects were in the experimental group, fourteen in the first control and eighteen in the second control group. The experimental group experienced the "Health and Fitness Package" where they executed dance exercises to "disco" music for a period of 45 minutes three times a week, with two adolescent girls as models. They participated in a five to ten minute group discussion twice a week, and listened to a lecture, from the regular teacher, on the value of exercises for five minutes once a week. Their cardio-respiratory function and their skinfold measurements were assessed three times during the eight weeks of the program.

The first control group was involved in a standard physical "shape up" education class; the second control group was involved in the same class three months before the experiment started.

The dependent variables were assessed using three instruments: the attitude toward physical activity scale, the

knowledge questionnaire and the involvement inventory. The instruments were given pre and post experiment and three months after the experiment.

None of the hypotheses was supported, although there was a significant change within the experimental group on the social experience and health and fitness attitudes dimensions on the post test as well as three months after the experiment. This group's knowledge level and attitude toward physical activity as an ascetic experience did increase significantly between pre and post test measurements. These differences were no longer evident three months later.

Possible reasons for non support of the study's hypotheses include: sample, inter-group contamination, timing in the administration of the research tools and characteristics of adolescents.

1. Small sample size of 48 adolescents. The second control group was self selected, compared to the other two groups.

2. Cross-group contamination occurred when the type of music used in the experimental group was introduced in the first control group while the experiment was under way.

3. Post test₁ was administered immediately before the Christmas holiday recess which contributed both to actual attrition and to loss of interest in participation.

4. Adolescents' values change rapidly; what was valued yesterday may be discarded today.



ACKNOWLEDGEMENTS

Although there are many people to whom I wish to express my sincere appreciation, I first and foremost wish to thank my mother. Her love, prayers, and kind words encouraged me to continue with this endeavor.

To my dear friend, Anthony Martin, I offer my deepest gratitude. Not only did he give freely of emotional support, but he also offered financial assistance at critical times throughout the program.

Because of the cooperation of the students from McAteer High School, this study was made possible. I am grateful for their personal commitment and cooperation. It is hoped that the information obtained from this investigation will be beneficial for the care of the adolescent.

The wisdom, guidance, and inspiration inherent in my dissertation committee is gratefully acknowledged. To Dr. Sarah Archer, committee chairperson, whose advice helped to clarify the research problem area and whose understanding helped me through times of doubt, I am very thankful. To Dr. Afaf Meleis, I offer my heartfelt appreciation for showing continued faith in my capabilities. Her thoughtful and stimulating questions encouraged my conceptual thinking. I thank Dr. Eugenia Waechter for sharing so freely her expertise in adolescence. Not only did she stimulate my growth, but she added tremendously to my knowledge of youth.

I wish to thank Dr. Fred Dagenais for his expertise in statistical analysis. His humorous and reassuring attitude is gratefully acknowledged.

To Patrick Arbore, I am grateful for his cooperation in the typing and editing of the manuscript and also for the patience he displayed throughout this project. To Dr. Esther Blanc, Dr. Carl Wetzig, and

Claire C. Barrette, I owe much thanks for their thoughtful comments, expert editing and constructive criticism of the manuscript. For their artistic contributions and expertise, I wish to thank Todd Welch and Elizabeth Strand.

The aid of Sandy Mattos, Head Counselor, McAteer High School, was invaluable to me. Not only did she introduce me to members of the school with whom I had to contact, but she went out of her way to make my association with the school a pleasant one. I am deeply indebted to Sandy for giving so freely of her time.

To Frances Tywoniak, Barbara Goldberg, Olga Abad, and Grant Akin, I am extremely grateful for their cooperation which was so needed and so willingly offered. A special thanks to Barbara for caring so much about the study.

To all the faculty and friends at the School of Nursing, University of California, San Francisco, who contributed in various ways to my educational and personal growth, I express my appreciation. I especially offer a word of thanks to Dean Margretta M. Styles and Vice Chancellor Shirley S. Chater for their inspiring presence. To Pat Larson, Juliet Corbin, Georgia Adams, Susan Virden, Virginia Tilden, and Helga Medearis, I thank for caring so much and sharing so freely in both the joys and frustrations of my journey through the doctoral program.

For their long distance support, understanding and joyful appreciation of my achievements, I wish to thank my extended family from Quebec, including Margot Tremblay, the Dorval family, my colleagues from the School of Nursing, University Laval, especially the Dean, Therese Fortier.

The joy of being with the "Taichi" group will always be remembered. Special thanks is extended to Dai Chung, the Master, as well as to Nancy Kwan, Sandy Wong, Alan and Evelia Matsuba, Oscar Louie, Ed Choi, Bill Lew, Roger and Leslie Cockerline for enriching my cultural growth. To the Duggan family, Tad Kumagai, and Stanley Nowicki, I am grateful for their sustained friendship, support, and encouragement.

This investigation was totally supported through the financial assistance of University Laval, Quebec.

TABLE OF CONTENTS

	<u>Page</u>
Abstract-----	iii
Acknowledgements-----	vi
List of Tables-----	xii
List of Figures-----	xv
CHAPTER ONE: INTRODUCTION-----	1
Significance of the Study-----	1
The Proposed Study-----	2
Plan of the Dissertation-----	2
CHAPTER TWO: REVIEW OF THE LITERATURE-----	4
Incidence and Prevalence-----	4
Risk Factors and Heart Disease-----	5
Relationship Between Physical Activity and Heart Disease-----	7
Retrospective Studies-----	7
Prevalence Studies-----	15
Prospective Studies-----	16
Pathological Studies-----	18
Animal Studies-----	18
Amount of Increased Physical Activity-----	19
Athletic Studies-----	20
Summary-----	21
Other Effects of Physical Activity-----	21
Prevention of Coronary Heart Disease in Adolescents-----	22
Exercising During Adolescence-----	25
Summary-----	30
CHAPTER THREE: CONCEPTUAL FRAMEWORK-----	31
Characteristics of Adolescents-----	31
Social Learning Theory-----	32
Synthesis of Theoretical Concepts-----	34
Assumptions of the Study-----	37
Purpose-----	38
Research Questions and Hypotheses-----	38
Operational Definitions-----	41
Summary-----	44

	<u>Page</u>
CHAPTER FOUR: METHODOLOGY-----	45
Design-----	45
Setting-----	46
Sample-----	48
Criteria for Sample Selection-----	48
Method of Sample Selection-----	49
Description of the Sample-----	51
Research Instruments-----	51
Attitudes Toward Physical Activity Scale-----	52
Involvement Inventory-----	53
Knowledge Questionnaire-----	53
Experimental Treatment-----	54
Description-----	55
Description of the First Control Group Program-----	60
Description of the Second Control Group Program-----	60
Personnel in the Research-----	60
Procedure for Data Collection-----	61
Problems Encountered with the Methodology-----	64
Summary-----	65
CHAPTER FIVE: THE RESULTS-----	66
Question One-----	66
Race-----	66
Parent Education-----	68
Age-----	68
Grade-----	70
Cigarette Smoking-----	71
Weight-----	73
Question Two-----	76
Attitudes-----	76
Knowledge-----	77
Involvement-----	77
Hypothesis A-----	80
Hypothesis B-----	82
Hypothesis C-----	84
Hypothesis D-----	84
Hypothesis E-----	86
Hypothesis F-----	86
Hypothesis G-----	89
Hypothesis H-----	91
Hypothesis I-----	91
Question Three-----	93
Question Four-----	93
Question Five-----	97
Summary-----	102

	<u>Page</u>
CHAPTER SIX: DISCUSSION-----	103
Question One-----	103
Question Two-----	105
Question Three-----	107
Question Four-----	108
Question Five-----	112
Summary-----	114
CHAPTER SEVEN: SUMMARY AND CONCLUSION -----	115
Summary-----	115
Limitations-----	121
Implications-----	124
Suggestions for Further Research-----	125
Summary-----	128
Bibliography-----	129
Figures-----	142
Appendices-----	151
Appendix A-----	152
Appendix B-----	153
Appendix C-----	154
Appendix D-----	155
Appendix E-----	156
Appendix F-----	157
Appendix G-----	158
Appendix H-----	167
Appendix I-----	171
Appendix J-----	175
Appendix K-----	177
Appendix L-----	179
Appendix M-----	180

LIST OF TABLES

<u>Table</u>		<u>Page</u>
1	Frequency distribution by Number and Percent of Ethnic background of subjects by groups-----	67
2	Frequency distribution by Number and Percent of subject's Parent Education by groups-----	67
3	Frequency distribution by Number and Percent of Age of subjects by groups-----	69
4	Frequency distribution by Number and Percent of Grade of subjects by groups-----	69
5	Frequency distribution by Number and Percent of Smokers and Non-smokers for Experimental group and First control group at pre test-----	72
6	Frequency distribution by Number and Percent of Smokers and Non-smokers for Experimental group and First control group at post test ₁ -----	72
7	Frequency distribution by Number and Percent of Smokers and Non-smokers for Experimental, First and Second control groups at post test ₂ -----	74
8	Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Weight of subjects by Experimental group and First control group at pre test-----	75
9	Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Weight of subjects by Experimental group and First control group at post test ₁ -----	75
10	Means (\bar{x}) Standard Deviation (SD) F ratio and Statistical significance (P) of Weight of subjects by Experimental, First, and Second control groups at post test ₂ -----	75
11	Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Attitudes dimensions for the Experimental group and the First control group at pre test-----	78
12	Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Knowledge for the Experimental group and First control group at the pre test-----	79

<u>Table</u>	<u>Page</u>
13 Means (\bar{x}) Standard Deviation (SD), t value, and Statistical significance (P) for subjects of Involvement dimensions, for the Experimental group and First control group at pre test-----	79
14 Means (\bar{x}), Standard Deviation (SD), t value, and Statistical significance (P) of Attitudes dimensions for the Experimental group and First control group at post test ₁ -----	81
15 Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Attitudes dimensions for the Experimental group and First control group at post test ₂ -----	83
16 Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Knowledge for the Experimental group and First control group at post test ₁ -----	85
17 Means (\bar{x}) Standard Deviation (SD), t value and Statistical significance (P) of Knowledge for the Experimental group and First control group at post test ₂ -----	85
18 Means (\bar{x}), H value, and Statistical significance (P) for (N) subjects for Involvement dimensions for the Experimental group and First control group at post test ₁ -----	87
19 Means (\bar{x}), H value, and Statistical Significance (P) for (N) subjects for Involvement dimensions, for the Experimental group and First control group at post test ₂ -----	88
20 Means (\bar{x}), Standard Deviation (SD), t value and Statistical significance (P) of Attitudes dimensions between the Experimental group and the Second control group at post test ₂ -----	90
21 Means (\bar{x}), Standard Deviation (SD), t value and Statistical significance (P) of Knowledge of the Experimental group and Second control group at post test ₂ -----	92
22 Means (\bar{x}), H value and Statistical significance (P) of involvement dimensions of the Experimental group and Second control group at post test ₂ -----	92

<u>Table</u>	<u>Page</u>	
23	Mens (\bar{x}), Standard Deviation (SD), t value and Statistical significance (P) of Attitudes dimension between data from pre test and post test ₁ , and pre test and post test ₂ for the Experimental ¹ Group-----	95
24	Means (\bar{x}), Standard Deviation (SD), t value and Statistical significance (P) of Knowledge between data from pre test and post test ₁ and pre test and post test ₂ for the Experimental group-----	96
25	Means (\bar{x}), Z value, and Statistical significance (P) of Involvement dimensions between data from the pre test and post test ₁ and pre test and post test ₂ for the Experimental group-----	98
26	Means (\bar{x}), Standard Deviation (SD), F Ratio, and Statistical significance (P) of Attitudes dimensions for the three groups at post test ₂ -----	100
27	Means (\bar{x}), Standard Deviation (SD), H value, and Statistical significance (P) for Involvement dimensions for the three groups at post test ₂ -----	101

LIST OF FIGURES

<u>Figure</u>		<u>Page</u>
1	Organizational Structure of a San Francisco High School-	143
2	Population of a San Francisco High School-----	144
3	Exercises for "Health Hustle"-----	145
4	Stepping Technique of the Canadian Home Fitness Test----	146
5	Technique for Measurement of the Skinfold Fat at the Triceps Muscle-----	147
6	First Post Card Mailed to Subjects of the Experimental and the First Control Group-----	148
7	Second Post Card Mailed to Subjects of the Experimental and the First Control Group-----	149
8	Heart Shaped Out of "Papier Mache" Given to Students, for their Participation in the Study-----	150

CHAPTER ONE

INTRODUCTION

Evidence is showing that involvement in physical activity by adolescent girls contributes to lowering the risk factors predictive of the coronary heart disease when they become adults so long as they persist in physical activity. A "Health and Fitness Package" program was designed to increase adolescent girls' participation in physical activity assuming that the positive attitudes, knowledge, and skills gained during the experiment will affect their further involvement.

Significance of the study

Preventive approaches so far have had little success in achieving substantial and lasting changes in behavior patterns that contribute to cardiac risk factors, e.g., campaign against cigarette smoking. Since the campaign's inception, smoking has decreased somewhat among middle aged males, but it has increased among women and young people. However, recent studies with communities (Maccoby and Farquhar, 1975; Maccoby, et al., 1977) revealed a statistically significant gain in knowledge about risk factors and changes in risk related behaviors: cigarette smoking, weight, diet, and exercise. In these community studies, a "multifactor health education" program was designed to provide a supportive milieu to the 35-59 year-old target population; in order to teach them the skills necessary to achieve the self-directed changes using role models; to provide face-to-face intensive instructions; and, through the mass

media, to change peoples' living habits. The program developed by Maccoby and associates helps people to learn how to change their behavior to reduce their risks of cardiovascular disease. A similar goal was the objective in developing this experimental exercise program for adolescent girls. Exposing this population to experiences with self-care practices could facilitate their decision making in regard to accepting responsibility for and taking positive steps to promote their own health throughout their lives.

The Proposed Study

This study evaluates the degree of difference in attitudes toward, knowledge about, and involvement in physical activity between an experimental group of adolescent girls who experience the "Health and Fitness Package" and two similar groups who have the standard physical education class offered by the school, called "shape up." These degrees of difference are measured before, immediately after, and three months after the experiment.

Plan of the Dissertation

Chapter One introduces the study as well as the purpose and significance of it. The plan for the dissertation is outlined also.

Chapter Two presents a review of literature of areas related to problems of physical inactivity as a risk factor for cardiovascular disease. In this review, benefits of regular and sustained physical activity are presented as well. Chapter Three describes the rationale for selecting

the particular components of the experiment program. In addition, hypotheses to be tested and research questions to be addressed are discussed. Chapter Four describes the methodology used for testing the hypotheses. Chapter Five presents the results of the study in terms of research questions and hypotheses. Chapter Six is devoted to the discussion of the results. Chapter Seven contains the summary, limitations, and implications of the study as well as the suggestions for further research.

CHAPTER TWO

REVIEW OF THE LITERATURE

This chapter presents a literature review of the following areas: incidence and prevalence of heart disease, risk factors and heart disease, relationship between physical activity and heart disease, amount of increased physical activity, athletic studies, other effects of physical activity, prevention of coronary disease in adolescents, and exercise during adolescence. These areas are related to the problem of physical inactivity as a risk factor for cardiovascular disease.

Incidence and Prevalence

Cardiovascular diseases, especially coronary heart disease, cause two-thirds of all deaths among people over 65 years of age or approximately 160,000 deaths annually in the United States (Fourth Report of the Director of the NHL, 1977; Lalonde, 1977). Even if, in the past fifteen years, the deaths due to cardiovascular diseases have declined by 25%, they still lead all other causes of deaths and disability in the United States (DiGirolamo and Schalant, 1977). In Canada, by the age of 35, cardiovascular diseases become the principal cause of the death and hold this position in increasing ascendancy through all subsequent age groups (Vital Statistics, 1976).

Because coronary heart disease is a disease which characteristically *strikes* with little warning, in which the first symptoms may be sudden *death*, and can be silent in its most dangerous form, only a preventive

approach can be expected to achieve a substantial reduction in mortality.

Risk Factors and Heart Disease

Possible means for prevention of coronary heart disease have been discerned by identifying factors contributing to its occurrence. In the pre-clinical phase a number of risk factors have been shown to be predictive in adults who subsequently develop clinical coronary heart disease. Studies have shown that there is a gradient of risk of coronary heart disease that is associated with serum concentration of cholesterol, level of blood pressure, the amount of obesity, the lack of physical activity, and cigarette smoking (Kannel and Dawber, 1972; Paffenbarger and Wig, 1967). Such risk factors which, in adults, are predictive of coronary artery disease also apply to children (Lauer et al., 1975; Paffenbarger and Wing, 1967; Wilmore and McNamara, 1974; Gilliam, et al., 1977; Shephard et al., 1969; Bailey, et al., 1974). However, data from the Framingham study (Kannel and Dawber, 1972) suggest that, in highly vulnerable young populations, correction of four risk factors--overweight, hypertension, hypercholesterolemia, and cigarette smoking habits--might substantially reduce the incidence of coronary disease.

Although clinically overt symptoms of sudden death, myocardial infarction, or angina pectoris are extremely rare in children and adolescents, the cryptic stage of coronary heart disease may well have *its* origin in childhood and adolescence. Therefore, there is a need to *inform* and develop skills in adolescents, so that they can take personal *responsibility* in lowering their cardiovascular risks.

A simple preventive habit such as an increase in regular physical activity could be beneficial in lowering major risks associated with coronary heart disease. Regular and sustained physical activity increases cardiovascular fitness (Ekblom, 1971; Dobein and Eriksson, 1972; Goode, 1976; Astrand, 1963); lowers body weight (Goode, 1976; Boileau, 1971; Dempsey, 1964; Jokl, 1963; Parizkova, 1963; Wilmore, et al., 1970; Moody, et al., 1969), lowers blood pressure (Naughton, et al., 1966; Boyer and Kasch, 1970; Feinleib, et al., 1975; Clausen, 1976); and lowers serum cholesterol (Feinleib, et al., 1975; Holloszy, et al., 1964; Wood, et al., 1977). Increased physical activity results also in an increase of high density lipoproteins (Wood, et al., 1977) which is a cholesterol fraction, known to be, at least, harmless in its effects on the arteries. This high density fraction is associated with lowered cardiovascular death rate (Farquhar, 1978). To be optimally effective, preventive efforts using physical activity should begin at the earliest time possible and adolescence is a critical period.

There is suggestive evidence from epidemiological studies that early onset of, and death from, coronary heart disease may be delayed and its severity lessened by increase in habitual physical activity. A review of the work of Milvy, et al., (1978), Froelicher and Oberman (1972), Froelicher (1978), Fox, et al., (1971), and Fox (1976), has been utilized to review the population studies dealing with physical inactivity as a risk factor for coronary artery disease. In this review, retrospective, prevalence, prospective, as well as pathological studies, will be presented.

Relationship Between Physical Activity and Heart Disease

The following epidemiological investigations, with a specifically chosen cohort of working men studied over a certain period of time, presents a major limitation which must be borne in mind when reading all studies: job shifts. These studies revealed that when an individual presents the symptoms of coronary artery disease, he will transfer to a less active job. Therefore, the bias resulting from job shifts makes it appear that individuals in active jobs are healthier and less likely to develop coronary artery disease compared to those in the less active jobs. Moreover, confounding variables such as lipids, blood pressure, cigarette smoking, and other risk factor markers were often not considered in these studies, which add to the limitations.

Retrospective Studies

Morris, et al., (1953), utilizing occupational mortality records from England and Wales, have presented the data supporting the hypothesis that occupational physical inactivity is a risk factor for coronary artery disease. In this study three groups of workers were examined: London Transport workers, postal workers, and civil servants. These authors observed that the conductors in the London Transport System were more active, had less coronary heart disease, and the disease seemed to appear later and was less severe, compared to the more sedentary drivers in the same system. Using these conclusions as hypotheses, these researchers also examined postal workers and civil servants in different job classifications with varying activity levels. Similar results were

SUMMARY OF THE EPIDEMIOLOGY STUDIES OF PHYSICAL ACTIVITY AND CORONARY ARTERY DISEASE (C.A.D.)
 Adapted from Froelicher, V. & Oberman, A. (1972) and from Fox, S.M. III, Naughton, J.P. & Haskell, W.L. (See Bibliography)

Study	Author and Period of Observation	Population Size (Middle-Age-Men)	Data Base On	Method of Assessing Physical Activity	Evaluation of Risk Factors	Relation of Coronary Artery Disease to Physical Inactivity and Comments
<u>Retrospective Studies</u>						
England Wales Mortality	Morris et al. 1930-32	2,000,000	London Busmen London Postal Workers Civil Servants	Occupation on death certificates	No	Positive but the diagnosis is based on death certificates. physical activity on the last occupation.
England Wales Mortality	Morris et al. 1949-50	31,000	Conductors Drivers	Occupation on death certificates	No (later done in follow-up)	Drivers had a higher incidence of C.A.D. but this could be due to the selection of other risk factors within this group; later studies showed them to be heavier and to have higher blood pressure and serum cholesterol.
Chicago Mortality	Stamler et al. 1951,53	400,000	Social class	Occupation on death certificates	No	Negative but there is very little gradient in the activity level of the population.

Study	Author and Period of Observation	Population Size (Middle-Age-Men)	Data Base On	Method of Assessing Physical Activity	Evaluation of Risk Factors	Relation of Coronary Artery Disease to Physical Inactivity and Comments
California Mortality	Breslow & Buell 1949-51	1,000,000	Social class	Occupation on death certificates	No	Positive but only after grouping the population according to general mortality.
North Dakota (6 counties)	Zukel et al. 1957	20,000	Occupation	Occupation and Questionnaire	Cigarette smoking	Positive but the questionnaire evaluating physical activity was found to be inaccurate by the authors.
U.S. Railroad Men	Taylor et al. 1955-56	100,000	Switchmen vs. Clerks and Executives	Occupation on death certificates	No	Positive but influenced by differential rate of job transfers; those with C.A.D. transfer most often from active to inactive job.
Washington, D.C. Postal Employees	Kahn, 1940-62	1,500	Mail Carriers vs. Clerks	Occupation on death certificates	No	Positive.
Toronto V.A.	Shanoff et al. 1960	100	Questionnaire	Questionnaire	Yes	Negative for "habitual" physical inactivity.

Study	Author and Period of Observation	Population Size (Middle-Age-Men)	Data Base On	Method of Assessing Physical Activity	Evaluation Risk Factors	Relation of Coronary Artery Disease to Physical Inactivity and Comments
<u>Prevalence Studies</u>						
People Gas Co. Chicago	Stamler 1958	1,465	Occupation and Class		Yes	Positive but effects of differential job transfers obvious: Those with C.A.D. most often transfer from active to inactive jobs.
U.S. Railroad Men	Taylor 1957	3,049	Switchmen vs. Clerks and Executives	Questionnaire	Yes	Positive but effects of of differential job transfers obvious: those with C.A.D. most often from active to inactive jobs.
Evans County Georgia	McDonough et al. 1960	1,062	Black and White men	Occupation	Yes	Positive with similar biases as other prevalence studies.
<u>Prospective Studies</u>						
San Francisco	Paffenbarger 1951-67	3,263	Cargo Workers vs. Clerks	Questionnaires	Yes except cholesterol	Positive but no cholesterol obtained and this is a selective process or men to become clerks or cargo workers.

Study	Author and Period of Observation	Population Size (Middle-Age-Men)	Data Based On	Method of Assessing Physical Activity	Evaluation Risk Factors	Relation to Coronary Artery Disease to Physical Inactivity and Comments
Western Collaborative	Rosenman 1960-65	3,154		Questionnaires	Yes	Positive, main emphasis on personality types.
Framingham	Kannel 1949-67	5,500 Men & Women		Questionnaires and physiological measurements	Yes	Positive but the physiologic parameters are of the uncertain relationship to physical activity.
Los Angeles	Chapman 1949-62	1,400	Job Title	Questionnaire	Yes	Negative but only job title used for activity level.
San Francisco	Paffenbarger 1955-57		Job Activity	Cohort analysis technique	Yes	Positive, combined low energy output, cigarette smoking and hypertension, increased risk by as much as 20 times.

obtained. The coronary heart disease mortality among skilled, semi-skilled, and unskilled workers from England and Wales with coronary heart disease listed in the death certificates was also investigated. These workers were divided into heavy, intermediate, and light and doubtful activity groups. The coronary mortality of the group of heavy activity workers was found to be less than half that of the light work group. Consistent with the hypothesis that physical activity offers protection from coronary heart disease, the authors recognized that a lower incidence of coronary heart disease was associated with more physical activity but not necessarily in "cause and effect" relationship (Morris, et al., 1953, p. 1120). They also indicated that there were some factors in the study that might have introduced bias, such as occupational or social class factors.

Later, in another study, Morris et al., (1956), reported that the drivers had greater girth (measured by waistline and jacket size) than the conductors, even when they were first hired. In another study (1966), Morris et al., showed that the drivers had higher serum cholesterol levels and a higher blood pressure than did the conductors.

Stamler, et al., (1960), analyzed the mortality statistics from Chicago for the years 1951 and 1953. The cause of death and the occupation were listed on the death certificates. The occupations were divided into five categories: (1) professional, semi-professional workers, proprietors, managers, and officials; (2) clerical, sales, and kindred workers; (3) craftsmen, foreman, and operatives; (4) service workers; and (5) laborers. These categories were also combined into white collar (categories 1 and 2) and blue collar (categories 3, 4, and 5) workers. No significant occupational group differences were found in

age-specific coronary artery disease death rate for white males aged 45-65.

Breslow and Buell (1960) analyzed census and death certificate data for California from 1949-1951 in order to validate the apparent protective effect of physical activity found in British studies. They found a decreased mortality rate from coronary heart disease with increasing physical activity but only when occupational groups of similar mortality were considered. Inconsistencies in the records as to whether the last, the usual, or the longest held occupation was reported might have been a bias in the results. Data from specific populations, with activity level assessed by job classification and/or questionnaires, and with coronary artery disease listed on the death certificates, will be described in the following retrospective studies.

Zukel, et al., (1959) in a study with a population from North Dakota, found that farmers had less coronary heart disease than men in other occupations, although diets were "essentially" identical. Physical inactivity was an apparent risk factor. However, the authors reported also that interview information on physical activity was unreliable, because of a tendency for men to report less heavy physical work in their usual occupation after their coronary attack than before.

Taylor, et al., (1962), reported a greater arteriosclerotic death rate among sedentary railroad workers compared to switchmen and, to an even greater degree, section repair categories. The population studied was white, male, and aged 40-64 years. Although the data were consistent with the hypothesis that men in sedentary occupations have more coronary heart disease than those in occupations requiring moderate to heavy physical activity, job transfers (the more active changing to less

active jobs which happens with increasing age) could have explained some of the differences. Further questionnaires (1966, 1967) revealed that men with coronary artery disease withdrew from the ranks of switchmen at a greater rate than those from the ranks of sedentary clerk. These data validate the relationship of job shifts and cardiac disease found by Morris (1953).

Kahn (1963) in a study with 1,500 federal employees' records, analyzed mortality data on men working in the Washington, D. C. Post Office from 1906-1940. This study was designed to test Morris' hypothesis, and has a similar design to the London postal employee studies. Kahn found that the clerks had 1.4-1.9 times more mortality from coronary artery disease than did the carriers. Although job transfers were taken into consideration, the authors mentioned that other factors that might have contributed to the difference included indoor versus outdoor activity, cigarette smoking, original bias of selection, and carriers' use of motor vehicles.

Shanoff, et al., (1961) studied a group of men with documented myocardial infarction, randomly selected from the files of the Toronto V.A. Hospital and matched to a group from the hospital files of patients admitted with non-chronic illness. They found no association between coronary artery disease and habitual physical inactivity. A total of one hundred individuals per group was questioned as to life-long activity including assessment of their physical activity in childhood, youth, and adult life. The two groups did not differ in terms of present activity or occupation but did differ as to habitual activity. *In* this study, coronary artery disease was not associated with habitual *physical* inactivity.

Prevalence Studies

Stamler (1960) performed a complete evaluation on 1465 male employees of a utility company in Chicago. Prevalence of coronary heart disease was lower in blue collar workers than in white collar workers, and in non-sedentary than in sedentary workers. However, the authors mentioned that results were confounded by factors such as differential rate of retirement among blue and white collar workers and shifts from blue to white collar jobs after development of coronary artery disease.

A study of prevalence of risk factors in coronary artery disease was done by Taylor, et al., (1962). A sample of 3049 railroad men was randomly selected for this study. Results were confounded by many factors, for example, occupational mobility of the switchmen with coronary artery disease was greater than that of clerks.

In 1960 McDonough, et al., studied 1062 men in Evans County for the prevalence of coronary heart disease (1965). Social class and occupation were studied and comparison was made between white and black men. McDonough, et al., found that prevalence of coronary artery disease was lower in men with higher activity levels, but only after "correcting" for social class. Social class and occupational comparison among black males was not possible because black men were predominantly of low social class and in physically active populations. In this study, physical activity appeared to be a major determinant of coronary artery disease. However, a report on a seven-year incidence study in the same county showed some contradictions (Hames, et al., 1971). The incidence of coronary artery disease was found to be lowest among professionals (94/1000) and highest among manual laborers and clerks (184/1000).

Prospective Studies

Paffenbarger, et al., (1970) presented a 16-year follow-up mortality data. In 1951 they studied 3263 males aged 35-64 who worked as longshoremen in San Francisco. Two classes of workers whose work day expenditure of energy differed by about 925 calories were identified. The data suggested that the less active group had a 33 percent higher coronary death rate than did the more active one. The two groups did not differ by blood pressure or cigarette smoking; serum cholesterol was not measured. This last factor might have introduced bias in the results or have explained some of the differences.

In another study dealing with San Francisco longshoremen, Paffenbarger, et al., (1977) showed that, in the younger half of the population, less active workers were at threefold increased risk of coronary artery disease. Combined low energy output, cigarette smoking, and hypertension increased risks by as much as twenty times. This study, using a cohort analysis technique, assessed job activity and six personal characteristics, namely: cigarette smoking, blood pressure, prior heart disease, obesity, glucose intolerance, and serum cholesterol. The first three factors were significant.

Rosenman (1970) studied the incidence of coronary heart disease in a sample of 3154 healthy men aged 39-59 in 1960-1961, with follow-up through 1965. The emphasis of this study was on psychological patterns, Type A and Type B individuals. The coronary prone Type A behavior is described (Friedman and Rosenman, 1974) as an individual having a pattern of impatience, hard driving competitiveness, and job involvement. They found that men with Type A behavior patterns who exercised regu-

larly had a coronary heart disease incidence that was only 60% of the rate of the group who did not exercise. However, for Type B men, no such difference relative to exercise was discerned and Type B men, as a group, irrespective of exercise level, had a coronary heart disease incidence that was only 60% of the rate noted in the regularly exercising Type A group.

In Framingham, Massachusetts, Kannel (1967) examined biennially approximately 5000 men and women aged 30-62 who were free of clinical evidence of coronary artery disease at the onset of the study in 1949. A physical index was used to assess a "crude" 24-hour history of physical activity. Physical activity was measured from physiologic tests of weight gain, vital capacity, and resting pulse. Coronary heart disease mortality was subsequently found to be higher in the cohorts with indices or measurements consistent with sedentary life styles.

In the Framingham Offspring preliminary report (Feinleib, et al., 1975), no mention of physical activity as a risk factor is reported. They compared age-sex-specific means (height, weight, cigarette smoking, serum cholesterol, and blood pressure) for the original cohort in 1950 and the 2732 offspring in 1972. They found a reduction in blood pressure, serum cholesterol, and cigarette smoking in the offspring.

In 1949, Chapman, et al., studied 1400 civil service employees aged 18-79, working in 399 different job classifications in Los Angeles (1964). Preliminary findings on the incidence of coronary heart disease versus physical exertion were at variance with almost all other epidemiological studies: 25% more new coronary heart disease and death from coronary heart disease in subjects with the two highest levels of physical activity, as compared with those in the two lowest levels. Level of physical activity was determined by job title.

Pathological Studies

Post-mortem studies were another means to assess the benefit of physical activity on the heart and blood vessels. Several autopsy studies (Spain and Bradess, 1960; Mitrani, et al., 1970; Morris and Crawford, 1958) reported no significant difference in the degree of coronary atherosclerosis between those engaged in sedentary occupations and those engaged in physically active occupations.

However, Rose, et al., (1967), in their study of measurement of post-mortem coronary arteries compared 92 cases without post-mortem evidence of myocardial infarction (or normals) and 79 cases with evidence of acute or healed infarction. The physical activity of the last occupation was determined by job title as light, active, or heavy. The data were only suggestive in that, in the normals, the right coronary artery diameter increased with activity of work while, in the infarction group, it decreased with the activity of work. The differences were not statistically significant.

Currens and White (1961) presented the cardiovascular autopsy results of Clarence DeMar, a famous long distance runner who died of rectal carcinoma. He was still actively involved in long distance running until shortly before his death at age 70. His coronary arteries were found to be 2-3 times normal size with some atherosclerotic involvement, but no narrowing.

Animal Studies

Animal studies have added considerably to the knowledge of the

effects of chronic exercise on the heart and have supported the physical activity hypothesis. Various studies suggested that regular exercise can prevent the manifestation of coronary artery disease by mechanisms including:

- A. Myocardial hypertrophy (Codini, et al., 1977);
- B. Increase in myocardial capillary-to-fiber ratio (Bell and Rasmussen, 1974);
- C. Increase in coronary artery size (Leon and Bloor, 1976); and
- D. Improved cardiac performance (Leon and Bloor, 1976).

These studies also showed that these changes were more marked in young animals than in older ones. In addition, it was found that regular exercise of a certain duration and intensity was necessary to maintain these changes (Cohen, et al., 1977; Leon and Bloor, 1976). However, the danger of extrapolating data from animals to humans is a limitation in the animal studies.

Amount of Increased Physical Activity

Many studies suggested that type, intensity, duration, and frequency of physical activity may have preventive values. Skinner, et al., (1966), calculated that daily caloric expenditure differences of 400 to 500 kcal were associated with a significant difference in the prevalence of coronary heart disease in Evans County. Taylor (1969) reported a similar figure for the railroad workers.

Morris, et al., (1973), in a study of 16,882 British male executive civil servants ages 40-64, free of disease at the onset, found that

vigorous exercises, defined as 7.5 kcal/min., protected against rapidly fatal heart attack and other first clinical attack of coronary disease alike throughout middle age, and that moderately heavy activity, 4 to 7 kcal/min., had no influence. They also suggested that to be "beneficial" the duration of vigorous activities must be over 30 minutes.

Rose (1969) found that a lesser amount of physical activity (walking twenty minutes or more to work) seemed associated with statistically significant differences in coronary manifestation. However, Paffenbarger, et al., (1970) found only a 25% reduction in coronary heart disease rates associated with a 925 kcal per day increase among longshoremen. Paffenbarger, et al., (1978), in the study of Harvard alumni, found that men with an index below 2000 kcal per week were at 65% higher risk of first heart attack than classmates with a higher index. However, former varsity athletes retained lower risk only if they maintained a higher physical activity index as alumni. In other words, only a physically active adulthood is associated with lower heart attack rates. Thus, it appears that regular strenuous physical activity can have a protective effect against coronary manifestations only if it is continued throughout adult life.

Athletic Studies

Methodological problems arose in studies of differences in the incidence of coronary artery disease between persons who participated actively in athletics and persons who were less active. Limitations arose from matching groups (Fox, 1976) and the use of general population as control (Milvy, et al., 1977). Personal characteristics such as:

general or "constitutional" superiority, different life style (the lifelong athlete may be more prudent about smoking, diet, body weight, and exposure to psychic stress than less active persons are), working situation, socio-economic level, and absence of other risk factors present in the general population (debilitating disease) all invalidate the use of general population as the control group for an epidemiological study of athletes such as marathoners (Milvy, 1977). In specific studies, Montoye (1962), Paffenbarger et al., (1966), and Pomeroy and White (1958) reinforce the argument that habitual physical activity, such as that engaged in by athletes, has a beneficial physical effect extending throughout part of their later less active life. Data from a study done by Polednak, et al., (1970), however, show no difference between athletes and non-athletes on long-term follow-up.

Summary

There is suggestive evidence, from epidemiological and other studies, that early onset severity and death from coronary heart disease may be delayed or lessened by increases in habitual physical activity. Numerous, but as yet unproven, mechanisms by which such benefits might be produced have been presented.

Other Effects of Physical Activity

Numerous reports indicated that persons involved in physical activity programs believe they develop an increased tolerance or decreased vulnerability to some psychologic stresses either because their self-

image is enhanced or they have an opportunity to work off anxieties through physical activities. A number of recent reports (Heinzelmann and Bagley, 1970; Durbeck, et al., 1972) stated an increase in "joie de vivre" and tolerance to stress are appreciated by most of the studies' participants, depending upon their degree of participation. These studies utilized an adult population. In an adolescent population, however, physical activity is selected to achieve a positive state, i.e., pleasure and adventures (Barnes and Olson, 1977).

Other benefits associated with participation in physical activity programs that may contribute to protection from coronary heart disease are the modification of other habits in one's life style. One of these is abstinence from cigarette smoking for which there is some encouraging, although not conclusive evidence (Heinzelmann, et al., 1970; Durbeck, et al., 1970). Others are the voluntary reduction of food intake, particularly animal fat (Fox, 1976), reduced blood pressure (Naughton, et al., 1966), heart rate reduction both at rest and at various levels of submaximal exertion (Fox, 1971), decreased level of cholesterol, weight reduction, and reduction of adiposity (Goode, et al., 1966; Holloszy, et al., 1964; Wilmore, et al., 1970).

Prevention of Coronary Heart Disease in Adolescents

The need to begin efforts to prevent coronary artery disease in childhood has been demonstrated by numerous studies. In California, Wilmore and McNamara (1974) screened 95 boys between the ages of 8 and 10 years and found that 13 percent were obese, 20 percent had cholesterol levels greater than 200 mg. and 34 percent had a family history of

premature cardiovascular disease. Gilliam, et al., (1977) found the following prevalences of risk factors in 47 active boys and girls 7-12 years of age: Twenty-nine (62%) of the 47 children had at least one identifiable risk factor and/or family history of coronary heart disease. One child had five risk factors and twenty percent of the children had three. Obesity was found to be the most frequently identifiable coronary heart disease risk factor in children and in adolescents in numerous studies (Gilliam, 1977; Wilmore and McNamara, 1972; Shephard, et al., 1969).

Cigarette smoking is increasing among adolescents. Between 1968 and 1974, the number of teenage smokers increased by 50 percent from 3 million to 4.5 million. During the same period, the percentage of teenage girls who smoke more than doubled (Califano, 1978). Unpublished surveys in Texas have shown an increase in cigarette smoking among youngsters, particularly young girls.

Lack of physical activity leading to low level of cardio-respiratory endurance was found in boys and girls but particularly among girls. Bailey, et al., (1974) tested a sample of 1230 subjects aged 15-69 for cardio-respiratory endurance. Results showed that adolescent girls were lower than adolescent boys in the criterion of cardio-respiratory endurance. Similar results were found by Shephard, et al., (1969) in a study of 70 children aged 10-12. Girls had lower cardio-respiratory endurance than boys. Surveys in Canada (Cummings, 1967) and the United States (Kramer, 1964; Reiff, 1976) reported similar results. Large differences were reported in maximal oxygen uptake between college-age males and females (Pollock, 1975; Drinkwater, 1973).

Maximum oxygen uptake (VO_2 max.) values for males and females are quite similar until 10 to 15 years of age. Beyond this age, however, females' VO_2 max. decreased rather markedly while males' uptake continues to improve. These differences have been attributed partially to physiological factors namely: females' smaller stroke volume which is compensated for by an increasing heart rate response to a certain level of work (Astrand, 1970), females' lower blood hemoglobin concentration, and females' lower absolute lean and higher absolute fat weight (Wilmore and Behnke, 1969-1970). Other factors might be the social and cultural restriction that has been placed on females during the pre-adolescent and adolescent developments (Bailey, 1973a). During adolescence, females' activity assumes a more sedentary character than that of boys (Horrocks, 1976). Girls have significantly more unexcused absences, failure to cooperate and actual dislike of the physical education program than do boys. School authorities must take a consciously greater effort to "sell" the gym program to girls than to boys (Horrocks, 1976). In addition, the disproportionately low resources for an emphasis on physical education for girls (J. Eugene McAteer High School Accreditation Report, 1977), should be mentioned. However, this disproportion is slowly changing under Title IX. Title IX is a passage of the Educational Amendment Act passed by Congress in 1972, which forbids sex discrimination in any educational institution receiving Federal money. The prohibitions applies on the athletic fields as well as in the classrooms. Evidence of risks factors predictive of coronary heart disease in adults are found in children and adolescent population. Studies presenting such evidence have been described.

Exercising during Adolescence

The exact mechanism by which exercise decreases manifestations of coronary heart disease is not known at this time. The physical activity hypothesis centers around hemodynamic changes and the means of obtaining them. The following section reviews some pertinent studies evaluating the effects of exercise in children and adolescents.

The hemodynamic changes secondary to chronic aerobic exercise include:

1. A lower resting heart rate;
2. A lower heart rate and systolic blood pressure for any maximal work load;
3. An increase in maximal cardiac output and maximal oxygen consumption ($\dot{V}O_2$ max.); and
4. A faster return to normal heart rate during recovery (Froelicher, 1978).

$\dot{V}O_2$ max. (the highest O_2 uptake an individual can attain while performing physical work, breathing at sea level) is the best measurement of cardiovascular fitness (Froelicher, 1978; Fox, 1971; Shephard, 1966; Bailey, 1973). $\dot{V}O_2$ max. is influenced by various factors including:

- A. Cardiovascular fitness, reduced by bed rest and increased aerobic exercise training;
- B. Genetic endowments;
- C. Age, sex, and weight;
- D. Oxygen content of the inspired air;
- E. Oxygen carrying capacity of the blood lower in females (Wilmore, 1977);

- F. Previous aerobic training;
- G. Integrity and health status of the entire body, especially the cardio-vascular system; and
- H. Methodology for measuring oxygen consumption (Froelicher, 1978).

Aerobic exercise (exercise which increases O_2 transport in the system) programs can increase VO_2 max. in children and adolescents. Ekblom (1971) found a 15 percent increase in VO_2 max. in six 11-year old boys after a six-months' training program. DobeIn and Eriksson (1972) found a 13 percent increase in VO_2 max. in twelve boys 11 to 13 years of age after a four-months' training program. However, Hamilton and Andrew (1976), in their study of 52 boys of pre and post pubescent age compared to an age-matched control, found that the pre pubertal boys did not differ significantly from their matched controls in regard to heart and stroke volume for any sub-maximal oxygen consumption. In contrast, the trained post pubertal boys had significantly lower heart rates and high stroke volumes than the control group. Unfortunately, VO_2 max. was not measured.

Goode (1976), in a study involving boys and girls in two junior high schools, found that six minutes per day of vigorous activity such that the heart rate reached the minimal level for training effect (150 beats per minute) was sufficient to improve VO_2 max. in children. In the experimental school, the cardio-respiratory endurance (VO_2 max.) improved in children, whereas in the control school it decreased.

Astrand, et al., (1963), in their study of 30 girl swimmers aged 12-16 reported differences in heart and lung volume and functional working capacity (VO_2 max.). These differences were greater for girls

who were involved in vigorous competitive swimming than for the healthy girls of similar body size who had not been involved in a special training. Similar results have been noted by Drinkwater and Horvath (1971) in testing the aerobic capacity of girls 12-18 years of age in training for running events.

One way to measure indirectly (by pulse rate) the maximum oxygen intake is by means of a step test. The Canadian Home Fitness Test, a step test, is an example of this type of measurement (Bailey, 1973; Shephard, et al., 1976). The results of the step test (pulse rate taken after 3 minutes and 6 minutes of exercise at a certain rate) can be used to help prescribe appropriate exercises (Poole, 1977). Therefore, to improve or increase aerobic performance, exercise involving large muscles should be emphasized, because during these exercises the greatest demand for oxygen is made. These activities, which include walking, running, bicycling, swimming, vigorous dancing, etc., can be started with a workout of a few minutes and progressively increased in intensity and duration. Five to ten minutes of warm up and cool down exercise should be incorporated into an exercise session (Poole, 1977; Fox, 1971). The warm up includes static stretching to relieve tension, improve flexibility, and help prepare muscles and joints for more vigorous activities. Static stretching may also be effective in preventing muscle soreness (Poole, 1977). Cool down exercises also involve static stretching.

Exercise programs designed for adolescents should be pleasurable, distracting, and rewarding in order to increase their involvement. According to Barnes and Olson (1977), adolescents most frequently selected physical activity to achieve a positive state, i.e., pleasure and adventure.

What type of exercise will an adolescent girl enjoy the most? According to Presseley (1959) social matters, like dancing, become increasingly important as the adolescent grows older, especially for girls. Dancing may be used as a means of satisfying heterosexual interest or merely as an activity by which relatively uncomplicated needs are satisfied (Phelps and Horrocks, 1958). Empirical data show that adolescent girls are interested in disco music and disco dances and that they own record collections and record players. According to Bernard (1965), modern music was of great importance among French adolescent boys and girls who tended to own large collections of records and had record-players. Dancing can be classified as light exercise (slow step utilizing 4 kcal/min.), or moderate exercise (fast step utilizing 7 kcal./min.) (Stuart and Davis, 1976). Disco dancing can be classified as moderate exercise.

Music acts as an additional stimulus which invites participants to work more energetically. Strobel and Bell (1978) indicated that children enjoy a fitness program set to music, because they can sing along. Similar results can be expected with adolescent girls.

Since dancing has a positive value among adolescent girls, the introduction of a program including disco dancing as aerobic exercise should increase their involvement in physical activity. According to social learning theory (Bandura, 1977), once an activity has acquired a positive value, the individual can administer her own reinforcement by producing the desired behavior and feeling good about her improving skills. Common observation illustrates that this kind of self-reinforcement (Bandura, 1977) can keep the behavior, dancing for example, going for hours after class or during the weekend.

Adolescent exercise programs should have a peer member as models, in addition to the teacher. With adolescents, peer members do serve as models and may actually have greater influence on imitative behavior than do parents and teachers, partly because they share common characteristics, partly because the peer group has control over the rewards that matter to its participants (Horrocks, 1976; Muss, 1976; Bandura, 1977). If the model has some characteristics in common with the observing subject, the subject is more inclined to imitate the model's behavior. Thus, the introduction of an attractive, competent adolescent as a model for a dance program should be effective in producing matching responses because of the characteristics these models have in common with the observing subjects.

Teachers have an indirect but potent influence on adolescents in shaping their values and attitudes. The teacher can use her influence to inform students about the practice of exercise, the likely benefits, and the risks. The individual who thoroughly understands the reason for following a regular program of physical activity will be more inclined to do so (Franklin, 1978). Short lectures (five minutes) dealing with the health benefits of the exercise should increase knowledge and increase positive attitudes towards physical activity.

In addition to the educational aspects, feedback of results of subjects' fitness should provide positive reinforcement. Periodic evaluation of subjects' fitness during the program can provide them with data with which to set goals. Reduction of body fat stores and increase in cardio-respiratory reserves are often powerful motivators to increase efforts to meet the goals (Franklin, 1978). However, results should be transmitted in an easily understood format which should be discussed with the participant.

Summary

There is evidence that physical activity has morphologic and physiologic effects in the young and that also physical activity can have a protective effect against manifestations of coronary artery disease only if it is continued into adult life. Therefore, the importance of participating in pleasurable physical activity programs in adolescence, and the positive attitudes and skills gained in these programs may affect their further involvement. The next chapter will describe the theoretical framework of the study.

CHAPTER THREE

CONCEPTUAL FRAMEWORK

Adolescent girls have a low level of cardio-respiratory endurance, possibly caused by their lack of involvement in physical activity. Thus, the development of a pleasurable physical activity program is an attempt to influence the increase in attitudes toward, knowledge of, and involvement in physical activity among adolescent girls. The rationale for selecting the particular components of this program evolved from the utilization of concepts from adolescent developmental theory and social learning theory. The presentation of the research questions and the statement of hypotheses are also included in this chapter.

A preventive approach such as the promotion of regular and sustained physical activity for adolescent girls could benefit by lowering risk factors which are predictors of the coronary heart disease in adults. Lack of physical activity has been identified as a risk factor associated with coronary manifestations (See Chapter Two). Since a decrease in physical activity, coupled with a dislike of the physical education classes, has been demonstrated by adolescent girls, then a way to increase their involvement in physical activity needs to be developed.

Characteristics of Adolescents

Adolescents learn most complex skills by imitating the behavior of their peers (Bandura and Walters, 1959). For example the factor that

predicts drug use in an adolescent most accurately is whether or not his friends use drugs. The adolescent peer group is particularly influential as a model at least in regard to issues and choices that are of immediate consequence, such as in the use of verbal expressions, hair style, clothing, food, music (disco style which is the fad), and entertainment preferences, as well as in regard to decisions related to rapidly changing social values (Brittain, 1963). Therefore, peer group attitudes, comments, and opinions are important, especially with matters that are related to physical appearance (Horrocks, 1976). Adolescents reach out for new values (Konopka, 1973) and new experiences (Horrocks, 1976). The peer group offers them a milieu where new skills can be mastered.

However, at the same time, the adolescent can adopt a defensive stand against the possible consequences (Horrocks, 1976) associated with the new experiences. Therefore, it is not surprising to see adolescents rejecting the new in favor of the familiar, especially if the new is a threat to one's competency, because during adolescence competencies are highly admired and demanded (Horrocks, 1976) and one desires to appear well to others. The primary theoretical concepts drawn from the above are the concepts that adolescents learn most complex skills by imitating the behavior of their peers and, therefore, that peers are particularly influential as models. These concepts are related to those of social learning which will be discussed next.

Social Learning Theory

Drive reduction theory, reinforcement theory, and psycho-analytic theory provide the theoretical background for social learning theory

(Muss, 1976). Social learning theory, which describes the application of behavioristic constructs to basic social and developmental problems and a belief that environmental, situational, and social, rather than biological and maturational factors, are primarily responsible for learning and development has been developed by Miller and Dollard (1941). This work has been continued by Sears (1957) and Bandura and Walters (1959). While Sears (1957) has contributed a considerable amount of information about patterns of child rearing, the force of his work has been on childhood rather than on adolescence. It is primarily through the work of Bandura and Walters that a number of studies emerge which express an explicit concern with the application of social learning theory, as it refers to a socio-behavioristic approach, to adolescence. Basically, Bandura's social learning theory (1962, 1965, 1969, 1971, 1977) contends that new behaviors can be learned through imitation and that symbolic processes play a crucial role in the regulation of human behavior. The form of learning involves four components: attentional, retentional, motoric-reproduction, and incentive motivational. For the observer to learn, he must first attend to the model activity. Variables affecting the attentiveness of the learner are: attractiveness of the model, frequency of the exposure, and the meaning and/or the value of the learner's model's action. Long term retention of modeled activities involves imagined or verbal coding mechanisms. A significant variable enhancing the retentional process is the frequency of rehearsals of modeled stimuli. The motoric-reproduction components of modeling involve the learner's ability to assemble a sequence of responses according to the modeled pattern. Finally, the incentive and reinforcement components facilitate the observational learning. All four processes occur in a role modeling situation.

In addition to examining the dynamics of behavior acquisition, Bandura provides an extensive analysis of the processes that serve to strengthen, weaken, or facilitate previously learned responses. These are: stimulus, reinforcement, and cognitive control. In contrast to earlier theories of learning, it is assumed that these mechanisms are largely under the individual's control. Stimulus control is reflected in a person's ability to alter his own state of arousal through self-generated imagery. Under the rubric of reinforcement control, three sub-processes are considered: direct, vicarious, and self-monitoring. Direct experiences consequences are classified as either extrinsic or intrinsic, depending upon whether they arise externally or are inherent in a particular behavior. Vicarious reinforcement refers to the observed consequences of another's behavior. These observations can either inhibit or heighten the tendency to enact observed responses. Finally, self-monitored reinforcements include those created through personal monitoring and reward.

Synthesis of Theoretical Concepts

Bandura and his collaborators have shown that children watching the behavior of a model are quick to imitate the specific responses as well as the generalized patterns of the models. The phenomenon of modeling has been observed repeatedly in a variety of experimental situations, for instance: watching unusually aggressive behavior heightened children's aggressive responses significantly (Bandura, Ross and Ross, 1963b); the potency of watching and imitating a model in altering response patterns demonstrated in such areas as moral judgment (Bandura and McDonald,

1963); self-imposed delay of reward patterns exhibited by the model (Bandura and Mischel, 1965); and self-reinforcement patterns closely following those of the models (Bandura and Kupers, 1965). As children grow older, they tend to imitate different models from their social environment. The young child tends to imitate his parents' behavior, including language, gestures, and mannerisms, as well as their more basic attitudes and values. When the child enters school and through the pre-adolescent years, imitation of the teacher is not uncommon. With the onset of adolescence, parents and teachers decline as important models, to be replaced by the peer group and selected entertainment heroes (Bandura and Walters, 1959). These authors suggest that when subjects' behavior patterns are inhibited, observing a model perform that behavior seems to remove personal inhibitions. Apparently, an "if he can do it, I can do it" philosophy prevails.

According to Bandura, a great variety of social learning phenomena is acquired because a learner observes a model's behavior and imitates the behavior observed. Imitation is particularly relevant for the learning of basic perceptual motor skills, such as hand writing and on the sports field, where a model shows how a behavior is done correctly. Modeling or showing is the basic method of teaching when the emphasis is on skills that can be acquired through observational learning (Bandura and Walters, 1963). An adolescent who has the ability and wants to dance, for example, learns to do so first of all by the observation and imitation of a model who shows her how to do it.

Even though adolescents as a group may reject teachers in general as models, it is not uncommon for students to experience adoration for an individual teacher, the physical education teacher, for example.

Teachers have an indirect but potent influence on adolescents in shaping their values and attitudes by what they are as teachers as well as what they do beyond and in addition to their teaching methods (Muss, 1976). The teacher can influence the adolescent's attitudes toward, knowledge of, and involvement in physical activity by teaching and discussing the meaning of the practice of exercise and its likely benefits on one's body. Their modeling of these activities will enhance the attentiveness of students.

Other variables affecting attentiveness of models for the learner are: characteristics of models and frequency of exposure to the models. People tend to be selectively attentive to models who are attractive, competent, and willing to dispense reward and praise (Bandura, Ross and Ross, 1967; Mischel, 1971). If the model has some characteristics in common with the observing subjects, the subjects are more inclined to imitate the model's behavior. With adolescents, peer members do serve as models and may actually have a greater influence on imitative behavior than do parents and teachers partly because they share common characteristics, partly because the peer group has control over the rewards that matter to adolescents. The introduction of an attractive, competent adolescent as a model for a dance exercise to a music program should be effective in producing matching responses because of the characteristics these models have in common with the observing subjects. Three-times-a-week participation in a program will facilitate the attentiveness and give opportunities for rehearsal. Rehearsals enhance the retentional process by creating situations for self rewards.

Students can reward themselves for work that they consider of good quality. Once the performance of a desirable response has acquired a

positive value, they can administer their own reinforcement by producing the desired dance and thereby feeling good about their improving skills. This self-monitoring also has a potent benefit in controlling behavior (Bandura and Perloff, 1967; Mahoney and Thoresen, 1974). The use of feedback serves as self motivation for corrective responding, in the sense that it helps the students to set their level of performance after they see their own results, such as an increase in physical fitness and a decrease in skinfold fat, measures used in the "Health and Fitness Package."

Since social learning theory is concerned with inter-individual variables (Bandura, 1977), some of the environmental variables can be utilized in explaining inter-individual variations in behavior. For example, the rate of involvement in physical activity can be plotted over time and the curve can be segmented into very active (engaged in physical activity 3 to 5 times per week); moderately active (engaged in physical activity at least once a week); occasionally active (engaged in physical activity once or twice a month); rarely active (engaged in physical activity very rarely or never). Differences between very active and rarely active, for example, can be assumed to be influenced by students' personal, social, and economic characteristics, such as age, race, grade, weight, cigarette smoking, and parents' education.

Assumptions of the Study

1. During adolescence, the peer group is particularly influential as a model and learning complex motor skills occurs by observing and imitating peers' actions.

2. The modeling process is particularly successful when models **have some** characteristics in common with the observing subjects, when **subjects** are frequently exposed to the modeled activity, when the modeled **action** is meaningful to the observing subject, and, finally, when the **observed** subject has the capability to reproduce the modeled actions.

3. Observational and retentional learning is facilitated by **incentives** and reinforcements which serve to strengthen or weaken previous **learned** responses.

Purpose

Since the promotion of adolescent girls' physical activity could **result** in lowering risk factors predictive of the coronary heart disease **in the** adult population, a "Health and Fitness Package" was designed to **increase** their participation in physical activity assuming that the **positive** attitudes, knowledge, and skills gained during this experiment **will** affect their further involvement.

Research Questions and Hypotheses

The specific research questions are:

1. Are there any differences between the control groups and the experimental group on demographic variables before the experiment?
2. Are there any differences between the control groups' and the experimental group's attitudes toward, knowledge of, and involvement in physical activity before the experiment?

3. Are there differences between the control groups' and the experimental group's attitudes toward, knowledge of, and involvement in physical activity immediately after the experiment?
4. Are there differences between the control groups' and the experimental group's attitudes toward, knowledge of, and involvement in physical activity three months after the experiment?
5. Within the experimental group, are there any differences in attitudes toward, knowledge of, and involvement in physical activity immediately after the experiment and three months after the experiment?

The hypotheses to be tested in this study are:

- A. The group which experiences the "Health and Fitness Package" will show a significant increase in positive attitude toward physical activity immediately after the experiment, compared to a control group which has the standard "shape up" class.
- B. The group which experiences the "Health and Fitness Package" will still show the significant increase in positive attitude toward physical activity three months after the experiment compared to a control group which has the standard "shape up" class.
- C. The group which experiences the "Health and Fitness Package" will show a significant increase in knowledge of the effects of physical activity immediately after the experiment compared to a control group which has the standard "shape up" class.

- D. The group which experiences the "Health and Fitness Package" will still show a significant increase in knowledge of the effects of physical activity three months after the experiment compared to a control group which has the standard "shape up" class.
- E. The group which experiences the "Health and Fitness Package" will show a significant increase in involvement in physical activity immediately after the experiment compared to a control group which has the standard "shape up" class.
- F. The group which experiences the "Health and Fitness Package" will still show a significant increase in involvement in physical activity three months after the experiment compared to a control group which has the standard "shape up" class.
- G. The group which experiences the "Health and Fitness Package" will show a significant increase in positive attitudes toward physical activity three months after the experiment compared to a second control group which took the standard "shape up" class three months before the experiment.
- H. The group which experiences the "Health and Fitness Package" will still show a significant increase in knowledge about the effects of physical activity three months after the experiment compared to a second control group which took the standard "shape up" class three months before the experiment.
- I. The group which experiences the "Health and Fitness Package" will still show a significant increase in involvement in physical activity compared to a second control group which took the standard "shape up" class three months before the experiment.

Operational Definitions

1. The Health and Fitness Package, administered three times a week, during eight weeks, includes:
 - 1.1 Five minute lecture on the effect of exercise on one's body, given once a week by the physical education teacher.
 - 1.2 Five to ten minutes of group discussion related to the experiences with physical activities, led by the physical education teacher, twice a week.
 - 1.3 Twenty-five minutes of dance exercises, the "Health Hustle" to disco music, three times a week. This includes five to ten minutes of warm up and cool down exercises, and fifteen to twenty minutes of work out exercises, with two adolescent girls as models.
 - 1.4 A test of cardio-respiratory fitness, with the Canadian Home Fitness Test, three times during the experiment.
 - 1.5 Measurement of body fat over the triceps muscle with the Harpenden type caliper three times during the experiment. The investigator was responsible for the measurement of cardio-respiratory fitness and body fat.
2. The attitudes toward physical activity include six dimensions:
 - 2.1 Physical activity as social experience:

Sports, games, and other forms of physical recreation whose primary purpose is to provide opportunities for social participation; that is, to meet new people and continue personal friendships.

- 2.2 Physical activity for Health and Fitness: Participating in physical activity primarily to improve one's health and physical fitness.
 - 2.3 Physical activity as the beauty in human movement (aesthetic): Physical activities which are thought of as possessing beauty or certain artistic qualities, such as ballet, gymnastics, or figure skating.
 - 2.4 Physical activity as a thrill but involving some risk (vertigo): Physical activities providing, at some risk to the participant, thrills and excitement through speed, acceleration, sudden change of direction, and exposure to dangerous situations.
 - 2.5 Physical activity for the release of tension (catharsis): The participation in physical activities to get away from the problems of modern living; to provide a release of "pent-up emotions."
 - 2.6 Physical activity as prolonged and strenuous training (ascetic): Physical activities which require long periods of strenuous and often painful training; which involve stiff competition and demands that the individual give up a number of pleasures for a period of time.
3. Knowledge is measured by a total score from the knowledge questionnaire.
 4. Involvement in physical activity includes activity related to the six dimensions of attitudes toward physical activity:
 - 4.1 Physical activity as social experience:

Sports, games, and other forms of recreation whose primary purpose is to provide opportunities for social participation,

that is, to meet new people and continue personal friendships. Examples: Bicycle riding, running, dancing, tennis, volleyball, etc.

4.2 Physical activity for health and fitness:

Physical activity primarily to improve one's health and physical fitness. Examples: Running, dancing, jogging, going up and down stairs, etc.

4.3 Physical activity as a thrill but involving some risk:

Physical activities providing, at some risk to participant, thrills and excitement through speed, acceleration, sudden change of direction, and exposure to dangerous situations. Examples, skiing, diving, mountain climbing, etc.

4.4 Physical activity as the beauty in human movement:

Physical activities which are thought of as possessing beauty or certain artistic qualities, such as ballet, gymnastics, figure skating, dancing, etc.

4.5 Physical activity for the release of tension:

Physical activities used to get away from the problems of modern living; to provide release from "Pent-up emotions." Examples: Running, dancing, swimming, soccer, basketball, etc.

4.6 Physical activity as prolonged and strenuous training:

Physical activities which require long periods of strenuous and often painful training, which involve stiff competition and demand that the individual give up a number of pleasures for a period of time. Examples: Basketball, volleyball, ballet, swimming, dancing, etc.

Summary

Concepts from adolescent development theory and social learning theory were synthesized to provide a rationale for developing a pleasurable physical activity program for adolescent girls. The assumptions, purpose, research questions, and hypotheses were stated. In the following chapter, the methodology for testing the hypotheses is described.

CHAPTER FOUR

METHODOLOGY

A static group comparison with pre test and post test experimental design was used to measure the effect of the independent variable, the "Health and Fitness Package," on the dependent variable, attitudes toward, knowledge about, and involvement in physical activity. The study design, the setting, the sample criteria, method of selection, description of the research instrument, the experimental treatment, the control groups, personnel involved in the research, procedure utilized, and problems encountered are described in this chapter.

Design

The static group comparison experimental design was composed of three groups, one experimental and two controls. The experimental and the first control group had the pre and both post tests. The first post test was administered immediately after the experiment, the second one three months after the experiment. The second control group had only one post test which was the equivalent of the second post test. They had taken the "shape up" class the semester before the experiment began. This group was selected to control for:

1. The differences in teachers. Two physical education teachers instructed the two "shape up" classes in the Fall of 1978, while in the semester ending June 1978, one teacher instructed the "shape up" class.

2. Contamination between the experimental group and the first control group, since these students were on the same campus and they used the same facilities.
3. The effect of pre test in the experimental group and the first control group.
4. Permitted the comparison of results of attitudes toward, knowledge about, and involvement in physical activity of all the three groups at the second post test.

This design is a variation of Campbell and Stanley's type three design (1963).

Setting

This investigation was conducted in a senior high school in San Francisco. This high school, which is part of the San Francisco Unified School District, was established in 1972; its program was accredited in 1975 (Figure 1). The enrollment in October 1978 was 2,118 students from various ethnic groups (Figure 2). According to an accreditation report (1977) the total current enrollment of all San Francisco high schools was 17,883 students. San Francisco's population at the same time was 668,880. According to the same report, the staff of the study school was composed of specialized teachers from various ethnic groups with a sex ratio of approximately two males to each female. The area served by the high school is mainly middle class. However, since September 1978, a group of black students from a low income neighborhood has been bussed to school.

This high school has more to offer its students in terms of programs and facilities than many other schools. In addition to the regular program, it has more special education programs such as:

- Alternative Education
- Lerning Disability Group
- Educable Mentally Handicapped
- English as Second Language
- Hearing Handicapped
- Orthopedically Handicapped
- Visually Handicapped
- Mentally Gifted Minor

Students enrolled in these programs are bussed to this school from all over the city.

In terms of recreational facilities, there is one large tartan-floored gym that has bleachers and can be divided into two areas. There is a dance studio and weight training room with special equipment for handicapped students, basketball courts, tennis courts, volleyball courts, and a football field surrounded by a tartan track with stationary bleachers on both sides.

The district participates in the financial support of curricular or extra-curreicular recreational activities. The district provides each senior high school with a budget of \$9,780.00 each year; the majority (\$6,880.00) goes to the Boys' Physical Education Department for uniforms, supplies, and transportation. Only \$800.00 is provided for girls' athletic teams; girls receive no money for transportation to sports events (J Eugene McAteer High School Accreditation Report, 1977). This situation is similar to that in other San Francisco high schools.

The Recreational Department has use of the gym during after school hours. The gym is used for community recreation on Mondays through Fridays from 7:00 P.M. to 1:00 A.M. The Department supplies its own recreation director who is paid for from the Community Service Tax.

Sample

Criteria for Sample Selection

The sample was composed of forty-eight adolescent girls fifteen to eighteen years of age. To participate in the study, the adolescent girls had to be currently or have been formerly enrolled in a "shape up" physical education class in the Fall of 1978. The currently enrolled students were in the experimental group and the first control group and the formerly enrolled students were in the second control group. To avoid possible risks associated with the Canadian Home Fitness Test (C.H.F.T.) (Bailey and Shephard, 1973; Shephard, et al., 1976), only students who answered "no" to the Physical Activity Readiness Questionnaire (Appendix A) were eligible for the study. This instrument briefly assesses the physical status and history of subjects and it is required prior to the evaluation of subjects' physical fitness with the C.H.F.T. The Physical Activity Readiness Questionnaire is used to eliminate subjects for whom vigorous exercises could be an above-average risk (Ghisholm, et al., 1975). In addition, to participate in the study, each student had to sign the student's consent form (Appendix B, C) and had also to obtain the written consent of his parents (Appendix D, E). To remain in the study, members of the experimental group and the first control group had to attend the "shape up" physical education class.

Method of Sample Selection

In July 1978, an interview with the school's head counselor was scheduled to discuss access to a population of adolescent girls. The investigator had met the head counselor at an Adolescent Peer Group Counseling Training in April 1978. The possibilities offered by the head counselor were two standard physical education classes called "shape up." These classes were open to all students but, according to the head counselor, it is usually girls who enroll in them. Furthermore, these physical education classes may be used to meet ninth and tenth grade physical education graduation requirements. Physical education is optional for the eleventh and twelfth graders. The teachers of these two classes were approached by the head counselor who asked them if they would be willing to meet with the investigator about a study of adolescent girls. At the meeting, this investigator explained that the study was concerned with different methods of teaching physical education classes. They were told that their involvement would last eight weeks. They were also told that students from the first control group would remain with the regular school physical education program and the other group would have the experimental program. To control for teacher preferences in the selection of control and experimental class and to give an equal chance to both to get the experimental class, the randomization of the experimental class was done. The teachers selected the "hand game" as the method of randomization. (They brought their fingers from behind their back to match odd and even numbers, the best two of three calls.)

Beginning in October 1978, the two teachers told their students that their groups had been selected to participate in a research project

being conducted by an investigator from the University of California, San Francisco. They also told the students that their participation was voluntary and if, for some reason, they did not choose to participate in the study, a special program would be organized to make up for the experimental one they chose not to participate in. This process explains the selection of the experimental group and the first control group.

Members of the second control group were obtained in the following way. The investigator was given a list of students who took the "shape up" class the previous semester which ended June 1978. After revision of the list to conform to the current enrollment, sixty students were found to be still enrolled in the school. A first drawing of twenty students' names from the list was randomly done. The name of each student was written on a separate piece of paper and drawn at random. At the end of October 1978, these students were asked by phone to participate in the study. If they agreed to participate, an appointment was made to sign the student's consent form. They were asked to take the parent's consent form home with the Principal's Cover Letter (Appendix F) and bring it back at the next appointment when data collection would take place. This appointment was scheduled during one of the student's free periods.

Because only seven subjects from the first drawing completed this process, a second and a third random drawing from the list were necessary. These three processes resulted in a total of eighteen students who agreed to be in the second control group. Student refusals were for a variety of reasons. They were not interested; they did not have time; they did not want to do it.

Description of the Sample

A total of fifty-seven students originally agreed to participate in the study, twenty-one in the experimental group, eighteen in the first control group and eighteen in the second control group. . However, only forty-eight students completed the study, sixteen in the experimental group, fourteen in the first control group, and eighteen in the second control group. Nine students from each of the experimental and control groups did not finish the study because they were not present at the time of the first post test and the investigator was not able to reach them because of the Christmas Holiday.

The subjects were all girls, from various ethnic backgrounds, such as Spanish speaking, Black, Caucasian, Filipino, and Chinese. Other demographic and personal characteristics such as age, grade, parent education, weight, and cigarette smoking were obtained through the completion of an information sheet (Appendix G by all students.

Research Instruments

The dependent variables, attitudes toward, knowledge about, and involvement in physical activity, were measured before the study began, immediately after the experiment, and three months following the study. The research instruments included the Attitudes Toward Physical Activity scale, the Involvement Inventory, and the Knowledge Questionnaire. These instruments will be discussed separately.

Attitudes Toward Physical Activity Scale

The Attitude Toward Physical Activity scale (Appendix G) with semantic differential scales was used to measure attitudes. This instrument was developed by Kenyon (1968a, 1968b). This instrument consists of six scales which deal with six dimensions of physical activity. The six dimensions evaluated in this study were as follows:

1. Social experience;
2. Health and fitness;
3. Aesthetic experience (beauty in human movement);
4. Pursuit of vertigo (thrill involving some risk);
5. Catharsis (release of tension); and
6. Ascetic experience (prolonged and strenuous training).

This inventory is appropriate for us with people in all age groups, and has provided instrumentation for numerous studies of adolescent populations such as Kenyon (1968c), Schutz and Wood (1974), Blair (1972), Francis (1973), and McMullen (1975).

Validity of all scales used has been developed (Kenyon, 1968a). Hoyt's reliabilities for each of the six scales are as follows: social experience, .72; health and fitness, .83; aesthetic experience, .81; pursuit of vertigo, .86; catharsis, .79; and ascetic, .78. The scales were scored 1 through 7. Maximum score in each dimension was 56 on the basis of eight dichotomous statements: good - bad; worthwhile - worthless; pleasant - unpleasant; sour - sweet; nice - awful; sad - happy; clean -dirty; relaxed - tense. Each scale was scored individually and the results of the test are not cumulative.

Involvement Inventory

Involvement in physical activity was measured by the Involvement Inventory (Appendix H). The same six dimensions used to measure attitudes were used to assess behavioral aspect by having the subjects respond to the amount of time spent in voluntary physical activity. The instrument utilized was adapted by Schutz and Wood (1974) from the work of Kenyon who reported its validity (Kenyon, 1968c) and its reliability ranging from .76 - .86. The dimensions were scored with a rank number of 1 through 4. Each dimension is scored individually and the results of the test are not cumulative.

In addition to this Involvement Inventory, fourteen open-ended questions were asked to determine the specific types of activity the students were involved in during their leisure time.

Knowledge Questionnaire

Knowledge was measured by a thirty-question test, sixteen true and false questions and fourteen multiple choice questions (Appendix I). The statements dealt with information vital to an understanding of health and physical fitness as well as the popular myths concerning health and fitness. This test was designed by Schutz and Wood (1974) to measure the knowledge level of people fifteen years of age and older in seven categories concerned with "the healthful benefits of physical fitness." These categories are as follows:

1. Cardiovascular;
2. Respiratory;
3. Physical fitness related to mental and physical stress;
4. Strength;
5. Posture;
6. Diet; and
7. Miscellaneous.

This test, constructed and evaluated by experts, is considered to have a face validity (Schutz and Wood, 1974). Test-retest reliability of this test was .89 (Schutz and Wood, 1974). The results of the test were cumulative. The maximum score for this test was 30.

These Attitude, Involvement, and Knowledge Inventories were the instruments administered in a high school in San Francisco in October and December, 1978 and in March 1979 for the experimental and first control group, and in November 1979 for the second control group, by this investigator.

Experimental Treatment

The experimental treatment consisted of the "Health and Fitness Package," administered three times a week, during eight weeks to a group of adolescent girls enrolled in a physical education class. The "Package" was operationally defined as twenty-five to thirty minutes of exercise (dance) to disco music, with two adolescent girls as models for the group; a five-minute lecture once a week on the effect of exercise on one's body; a five- to ten-minute group discussion relative to experience

with exercise with the teacher as model two times per week; and two feedback tests which were administered three times during the experiment. The rationale for developing this "package" included: (1) Adolescents learn most complex skills by imitating the behavior of their peers; (2) Dancing becomes very important as the adolescent girl grows older; (3) Music acts as a stimulant while exercising; (4) Teachers can influence adolescents' attitudes, knowledge, and involvement in physical activity by teaching and discussing the meaning of their action; and (5) Reinforcement facilitates the occurrence and maintenance of the behavior.

Description

The forty-five minute physical education periods were expected of all experimental subjects. Each week students participated in the dance activity. The dance activity program called "Health Hustle" (Appendix J, Figure 3) was designed with simple dance routines to disco music so that all students could participate. Disco music, according to Stim (1979) is a mixture of minority music specifically Black, Latin Salsa, and European techno-music (rhythm machine and synthesizers). Each week the dance routine was taught to the two student models and the teacher by the investigator during one of their free periods before each class. The two student models were accepted by this investigator as volunteers for this modeling activity because they matched the following criteria:

1. Average weight for their height (at sight);
2. Non-smokers;
3. Willing to dance; and
4. Willing to act this role for the duration of the program, i.e., eight weeks.

Two students volunteered for the role, both at the time were smokers. After consultation with the investigator, the physical education teacher made it clear to the experimental group that being a smoker was not acceptable for this role. Then the first two volunteers agreed to give up smoking to get the role. Thereafter, the two student models were accepted by this investigator on the recommendation of the physical education teacher.

Student models demonstrated the steps for the subjects on slow tempo first and then on the regular tempo. Then subjects were asked to execute the modeled steps, by pairs if they wanted. The dance exercises called "Health Hustle" consisted of warm-up, cool-down, and work out exercises. The warm-up and cool-down consisted of flexibility and stretching exercises. The work out included movements that involved the use of the legs and coordination at a tempo which characterized moderate exercises, or 7 kcal/min. (Stuart and Davis, 1976).

After one exercise period each week, subjects were asked by the teacher to attend a short lecture on the benefit of exercises (See Appendix K). These lectures were prepared by the investigator and included the relationship between exercises and:

1. Cardiac fitness;
2. Cardio-respiratory endurance;
3. Lung capacity;

4. Endurance, strength, and flexibility;
5. Attractive slender figure;
6. Nutrition and weight control;
7. Mental health, "joie de vivre," tension, stress; and
8. Proper clothing and environmental considerations.

These lectures included illustrations of the concepts developed in order to facilitate the learning process (Bandura, 1977). The physical education (PE) teacher also used the blackboard during these lectures. The plan of the lecture as well as the major points to remember were written on the blackboard, so that all students could see them. At the termination of the program, a booklet entitled "Health and Fitness," complimentary copies of which were obtained from the Health and Welfare Ministry of Canada (1975), was given to each of the students. This booklet illustrated and described some of the concepts taught during the program.

In addition to the lecture, students were also asked by the teacher to participate in an unstructured group discussion on their experience with physical activity and how they used exercise in their lives, for example, to release tension or for fun (Barnes and Olson, 1977). This activity was planned to last 5-10 minutes, twice a week with the PE teacher as the leader of the group.

Part of the program was also the testing of students' cardio-respiratory fitness and the measurement of the body fat, with the skinfold technique. These two tests were used as a feedback in this study. Students were tested during the third week of October 1978, the third week of November 1978, and finally the second week of December 1978.

The students' cardio-respiratory fitness was tested with the Bailey-shephard step test or Canadian Home Fitness Test (C.H.F.T.) developed in 1973 at the University of Saskatchewan Canada (Bailey, D.A., 1973; Shephard, et al., 1976). As mentioned earlier, the students answered the Par-Q questionnaire to qualify for the C.H.F.T. The C.H.F.T. is a two-step, six-beat test of cardio-respiratory fitness. It involves a simple skill, stepping up and down a double eight-inch step (Figure 4) performed over a duration long enough to elicit a change in heart rate (Appendix L). Unlike many step tests, however, the C.H.F.T. utilizes three three-minute bouts of exercise of increasing intensity, thus providing a greater challenge for the physically fit person while allowing the unfit person to terminate the test when the heart rate exceeds the criterion heart rate for a given level. In this study, only two three-minute bouts of exercise were administered because of the time schedule. However, students were told they could go for another three minutes when their pulse rate did not exceed the criterion heart rate from their first level.

The C.H.F.T. has a low but statistically significant validity as shown by Spearman's correlation coefficient, male .49 - .76, female .40 - .65. The test re-test reliability from day 1 to day 2 for the step test indicated .79 (Bailey 1973; Shephard, et al., 1976). Reliability is reduced when an inexperienced individual makes errors reading a pulse (Bailey, 1973; Shephard, et al., 1976). The pulse rates were taken beginning five seconds after the termination of the stepping for a ten-second period and then were compared with the recovery pulse rate table for the specific age and sex. If the heart rate exceeded or equaled 30 for the ten seconds (for a girl aged 15-19 years) after three

minutes of exercise, subjects were asked to terminate the test. Otherwise, they could go for the second three minutes of exercise. To control for incorrect pulse taking, the investigator and the PE teacher took subjects' pulse after each bout of exercise, even if the students had learned how to take their own pulse rates. This test lends itself to the testing of subjects (males and females) from fifteen to sixty-nine years old, and the validity and reliability were done with Canadian subjects.

The measurement of the skinfold with a Harpenden Caliper (Figure 5) at one site, at the triceps muscle, was the other feedback test used in this program. Skinfold measurement is a simple way to measure the amount of body fat (Appendix M). The use of skinfold measurement has been accepted by most researchers (nutritionists and anthropometrists) as a valid measure of body fat. Significant decreases in percentage of body fat have been found in a 9-week training program with young women (Smith, 1965). However, it must be realized that measurement at only one site does not provide enough information with which to generalize about the total quantity of body fat tissue.

Skinfold measurement has several drawbacks, the greatest of which is accuracy of measurement with the caliper. The pressure exerted by the spring-loaded caliper is greatly affected by friction and the size of the skinfold (Edwards, 1956). The accuracy of the Harpenden Caliper has sufficient reliability for any presently conceivable purpose. The standard deviation, differences between duplicate measurements, varies from .3 - .6 mm. (Edwards, 1956).

Description of the First Control Group Program

Subjects of the first control group were enrolled in the standard "shape up" physical education class during the experiment. Classes met three to five times a week for lengths of time which varied from 45 to 90 minutes. Most of the exercises were done in the gymnasium with the exception of running which was done on the campus track. Exercises taught included: flexibility exercises for the whole body, some endurance exercises such as jumping rope, running, and going up and down the stairs; and strength exercises including push-ups and sit-ups. Music was not usually used in this type of class but, during the period of the study, from time to time, background music was added while students were exercising.

Description of the Second Control Group Program

Subjects from the second control group were enrolled in two "shape up" standard physical education classes the semester before the study began, i.e., the semester ending June 1978. They also met three to five times a week and music was not part of the program. In these two earlier classes, the instructor was the one involved with the experimental group in the Fall of 1978.

Personnel in the Research

The PE teacher and the two student models from the experimental group along with the investigator were the personnel in this research

project. The PE teacher taught the short lectures and led the discussion period. The written plan and content of the lectures was given to her by the investigator three to four days before the selected day in order to give her time to read the material, ask for clarification, or make modifications. The student models demonstrated the dance exercises called "Health Hustle" to students of the experimental group as described earlier in this chapter. The teacher participated in the dance exercises as an assistant to the student models. The investigator conducted all the testing, i.e., cardio-vascular fitness and skinfold measurement with the assistance of the teacher. The teacher assisted the investigator during the cardio-vascular fitness test by taking the subjects' pulse and during the skinfold measurement by marking the proper site on the triceps.

Procedure for Data Collection

The selection of the setting and the subjects was described earlier. The research study proposal was received and approved by the Committee on Human Research, University of California, San Francisco, in terms of subject risks involved and the procedure for obtaining informed consent. Permission to conduct the study was also obtained from the Principal of the high school in a written statement which served as the cover letter for the parents' consent form.

The research study was begun on October 15, 1978. This investigator was introduced to students in the experimental and control "shape up" classes by the teachers as a nurse researcher getting her doctorate in Nursing at University of California at San Francisco. The teachers

initially explained the project to students, but the investigator explained the study again. Students who agreed to participate in the study and who signed the consent form were asked to take the parents' consent form home with the Principal's cover letter and bring it back to the teacher within two school days.

The following Monday, the Attitudes, Knowledge, and Involvement Inventory instruments and Information data sheet were completed. In addition, as mentioned earlier, the experimental group completed the Physical Activity Readiness Questionnaire required in order to take the C.H.F.T. This was done in the gymnasium in the morning for the experimental group, and in the afternoon for the first control group. The expected time to answer these inventory questions was thirty minutes (Schutz and Wood, 1974). Each group took forty minutes to answer them.

The last week of the experiment, December 15, 1978, a second set of Attitude, Knowledge, Involvement Inventory instruments and demographic data sheet were completed by the first control group and the experimental group. Students of both groups were asked, by the investigator, to write down their names and addresses in order that they could be reached three months later for the last part of the study which consisted of completing the Attitude, Knowledge, and Involvement Inventory instruments for a third time. They were told that they will receive post cards (Figures 6, 7) to remind them of the place and time to meet. Two post cards were mailed to students of the experimental group and the first control group. The first post card was mailed at the end of February, or three weeks before the testing week; the second one was sent three days before the testing week.

The week of March 15, 1979, half of the subjects of both groups came to the first two days of the data collection; by the end of the week, eight subjects had not yet responded. Phone calls were made to find out if they had received the post cards and to make an appointment for one day of the following week. They all came. A heart-shaped pin, of papier mache (Figure 8) with the inscription "What did I do for my Heart Today," was given to each of them, thanking them for their participation. They were also told they would be given a copy of the study results during the summer of 1979.

When students agreed to participate in the second control group in this study at the time of the phone call they were given an appointment with the investigator at the high school in the attendance office. At the time of the phone call, the investigator introduced herself as a doctoral student from the University of California, San Francisco, who was doing a study concerning adolescent girls and exercises. The investigator explained that she got the student's name from a list of formerly enrolled students in the "shape up" class ending June 1978, and asked her if she were willing to answer a thirty-minute questionnaire concerning physical activity. If she agreed, an appointment was arranged. At the time of the appointment, the study was again explained and the student's consent form explained and signed. As with the two other groups, subjects from this group also were asked to take the parents' consent form home with the Principal's cover letter, and bring it back at the next appointment which was set during one of the student's free periods. After the parents' consent form was signed, students completed the Attitude, Knowledge, Involvement Inventory instruments, and the demographic data sheet. Students were told that they will receive a copy of the study

results during Summer, 1979. Enclosed in the letter was a heart shaped out of papier mache pin with the inscription, "What did I do for my Heart Today," as a reward for their help.

Problems Encountered With the Methodology

Several problems were encountered with the methodology: first with the research tools especially the Attitude Toward Physical Activity Scale; and second, with inter-group contamination.

Problems with the Attitudes Toward Physical Activity Inventory focused around the written instructions, lack of meaning of some adjectives of the scale, and the time of the Administration. Additional explanations were needed regarding the written procedures. Some adjectives such as "worthwhile," "worthless," and "awful" needed to be defined. The written procedures were read to the students by the investigator and the teacher to avoid confusion. The adjectives were defined for all students. Approximately three-quarters of the subjects had problems with the directions and the adjectives on their inventory. At the first post test and the second post test, instructions were read again, and there were no questions. Pre-testing this inventory with a similar population could have reduced these problems.

The time period where the research tools were completed caused other problems: loss of subjects and difficulties getting students for the second post test. A total of nine subjects were lost from the experimental and the first control group, because the first post test was at the end of the week preceding the Christmas Holiday and they could not be reached. If the inventories had been given a week earlier,

it is possible that all subjects would have made a greater effort to complete them. However, the design's time line did not allow for that.

Difficulties involved in organizing the students for the second post test probably arose because students had to come during one of their free periods or at lunch time. In a study like this, additional attention should be given to the students' daily schedule. More success could be anticipated if a student had another free period besides lunch period. These considerations could have reduced the difficulties encountered with the second control group, either related to missing appointments or to refusals because of lack of time.

Inter-group contamination appeared to occur because of the use of music in the first control group. During the third week of the study, observation revealed that the first control group asked that music similar to that used in the experimental group be used as background for this class. The music was introduced at the students' request. More communication with the teacher could have helped to remind her to stick to her program which did not involve music.

Summary

The methodology for studying the effect of the "Health and Fitness Package" on the attitudes toward, knowledge about, and involvement in physical activity has been presented. The results of this study will be presented in the next chapter.

CHAPTER FIVE

THE RESULTS

This chapter contains a presentation of the results of this study. The type of data yielded in this investigation was nominal, ordinal, and internal data. All statistical analyses were done at the Computer Center at the University of California, San Francisco. The accepted level of significance for the study was $P < .05$. The results of this investigation are presented as they relate to the research questions and hypotheses.

Question One

To answer the first question, "Are there any differences between experimental group and control groups on demographic data and other personal characteristics, before the experiment?," several tests were performed on age, grade, parent education, cigarette smoking and weight. The tests include chi-square, Kruskal-Wallis, t-test, and analysis of variance.

Race

Table 1 indicates the frequency distribution of ethnic background of subjects by groups. Because numbers of subjects in five of the six categories were too small to get meaningful results, these five categories, namely: Spanish speaking, Black, Chinese, Filipino, and other

TABLE 1

Frequency Distribution by Number and Percent of Ethnic background of subjects by groups

Race	Experimental		First Control		Second Control	
	N	%	N	%	N	%
Spanish Speaking	3	18.8	3	6.4	4	23.5
Other White	7	43.8	6	42.6	5	29.4
Black	3	18.8	2	14.3	4	23.5
Chinese	2	12.5	1	7.1	2	11.8
Filipino	1	6.3	2	14.3	0	0
Other Non-White	0	0	0	0	2	11.8
Total	16	100.2	14	100.0	17	100.0

TABLE 2

Frequency Distribution by Number and Percent of Subjects' parent education by groups

Parent Education (Father)	Experimental		First Control		Second Control	
	N	%	N	%	N	%
Primary	1	7.1	0	0	1	5.9
Secondary	6	42.9	2	18.2	7	41.2
College	4	28.6	5	45.5	7	41.2
University	3	21.4	4	36.4	2	11.8
Total	14	100.0	11	100.0	17	100.0
Parent Education (Mother)	N	%	N	%	N	%
Primary	0	0	0	0	1	5.6
Secondary	8	57.1	2	18.2	9	50.0
College	5	35.7	5	45.5	4	22.2
University	1	7.1	4	36.4	4	22.2
Total	14	99.9	11	100.1	18	100.0

Non-White, were collapsed into one category called "Others." A chi-square analysis was performed on the two new categories: White and Others. Findings relative to race of subjects indicate that the three groups did not differ significantly in terms of ethnic background ($\chi^2 = 0.89$, $P = 0.64$).

Parent Education

Table 2 indicates the frequency distribution of subjects' parent education by groups. Again, because of the insufficient numbers of subjects per cell, the four categories were collapsed into two categories. It includes: high school (primary and secondary) and college (college and university). A Kruskal-Wallis analysis (a measure of non-parametric statistic for one way analysis of variance by ranks (Siegel, 1956)) was performed on the high school and college categories by groups. Findings relative to parent education data indicate no significant differences. ((Father $H = 3.03$, $P = 0.22$) and (Mother $H = 4.66$, $P = 0.09$)).

Age

The frequency distribution represented in Table 3 indicates that there were 44.5% of 17- and 18-year-old subjects in the second control group compared to 12.5% for the experimental group and 14.3 for the first control group. Results of the analysis of variance for the variable age indicate a significant difference between the three groups (F ratio = 3.56, $P = 0.03$). Further analyses were performed between the experimental

TABLE 3

Frequency Distribution by Number and Percent of Age of Subjects
by groups

Age	Experimental		First Control		Second Control	
	N	%	N	%	N	%
15	6	37.5	8	57.1	4	22.2
16	8	50.0	4	28.6	6	33.3
17-18	2	12.5	2	14.3	8	44.5
Total	16	100.0	14	100.0	18	100.0

TABLE 4

Frequency Distribution by Number and Percent of Grade of Subjects
by groups

Grade	Experimental		First Control		Second Control	
	N	%	N	%	N	%
10	6	37.5	8	57.1	1	5.6
11	7	43.8	4	28.6	11	61.1
12	3	18.8	2	14.3	6	33.3
Total	16	100.1	14	100.0	18	100.0

group and the first control group, between the experimental group and the second control group, and between the first control group and the second control group. Results of a Kruskal-Wallis analysis reveals no significant difference ($H = 0.67$, $P = 0.41$) between the experimental group and the first control group. Findings from comparison between the experimental group and the second control, and the first control and the second control showed a significant difference ($H = 5.55$, $P = 0.01$). The second control had older subjects than the experimental group and the first control group.

Grade

Table 4 shows the frequency distribution by grade of subjects by groups. This distribution showed that 33.3% of subjects in the second control group were in the 12th grade compared to 18.8% for the experimental group and 14.3% for the first control group. Findings resulting from the Kruskal-Wallis analysis on the variable grade reveals a significant difference between the three groups ($H = 7.89$, $P = 0.01$). A Kruskal-Wallis analysis was performed on the data from the experimental group and the second control group, the experimental group and the first control group, and the second control group and the first control group to evaluate this significant difference. No significant difference was found between the experimental group and the first control group ($H = 1.90$, $P = 0.34$), and no significant difference was found between the experimental group and the second control group on grade variable ($H = 0.018$, $P = 0.89$). However, a significant difference was found between the first control group and the second control group ($H = 7.14$, $P = 0.00$).

There were more students in grades 11 and 12 in the experimental group and in the second control group than in the first control group. Thus, the findings for age, race, parental education, and grade indicate that the three groups were similar on ethnic background and parental education, but were different on age and grade.

Personal characteristics of subjects such as cigarette smoking and weight were examined to evaluate similarities or differences among the experimental group and the first control group at the pre test, post test₁, and post test₂.

Cigarette Smoking

The frequency distribution presented in Table 5 indicates that 75% of the experimental group were non-smokers, compared to 46% of the first control group. In this Table, the smokers category includes subjects who smoked any number of cigarettes a day. A chi-square analysis was calculated on smoking habits of subjects and the results indicate a significant difference ($\chi^2 = 51.11$, $P = 0.00$) between the experimental group and the first control group at the pre test.

Similar results were found between the experimental group and the first control group at the first post-test ($\chi^2 = 49.30$, $P = 0.00$). As illustrated in Table 6, the experimental group had the same proportion of smokers and non-smokers that were present at the pre test. However, in the first control group, one subject, who had been a smoker, became a non-smoker.

TABLE 5

Frequency Distribution by Number and Percent
of Smokers and Non-Smokers for
Experimental group and First Control group at pre test

	Experimental		First Control	
	N	%	N	%
Smokers	4	25.0	7	54.0
Non-smokers	12	75.0	6	46.0
Total	16	100.0	13	100.0

TABLE 6

Frequency Distribution by Number and Percent
of Smokers and Non-smokers for
Experimental group and First Control group at post test₁

	Experimental		First Control	
	N	%	N	%
Smokers	4	25.0	6	46.2
Non-smokers	12	75.0	7	53.8
Total	16	100.0	13	100.0

Table 7 presents the frequency distribution of smokers and non-smokers of the three groups at the second post test. An analysis of variance indicates a non-significant difference (F ratio = 0.40, P = 0.66); thus the two groups were similar on smoking habits. In the experimental group, at post test₂, one subject became a smoker, compared to post test₁. The first control group contained the same proportion of smokers and non-smokers. The second control group had 72.2% non-smokers and 27.8% smokers.

Weight

Regarding the characteristic of average weight of subjects in the experimental group and the first control group at the pre test, results presented in Table 8 reveal that subjects from the experimental group had a mean score of 115.15 and a standard deviation of 13.28 and subjects from the first control group had a mean score of 120.00 and a standard deviation of 13.44. A t-test analysis reveals no significant difference (t value = 0.92, P = 0.36).

At the first post test the results of the t-test showed that no significant differences were found on weight of subjects between the experimental group and the first control group. The frequency distribution presented in Table 9 shows that the experimental group had a mean score of 119.07 and a standard deviation of 12.10, and the first control group had a mean score of 123.00 and a standard deviation of 13.76.

At the second post test, the three groups were compared by the analysis of variance. Results of this analysis indicate a

TABLE 7

Frequency Distribution by Number and Percent
of Smokers and Non-smokers

Experimental, First, and Second Control Groups at Post Test₂

	Experimental		First Control		Second Control	
	N	%	N	%	N	%
Smokers	5	31.3	6	46.2	5	27.8
Non-smokers	11	68.8	7	53.8	13	72.2
Total	16	100.0	13	100.0	18	100.0

TABLE 8

Means (\bar{x}) Standard Deviation (SD), t value* and Statistical Significance (P) of Weight of Subjects by Experimental group and First Control group at pre test

	Experimental		First Control	
	\bar{x}_1	SD	\bar{x}_2	SD
Weight	115.15	13.28	120.00	13.44

*t value = 0.92, P = 0.36

TABLE 9

Means (\bar{x}) Standard Deviation (SD), t value* and Statistical Significance (P) of Weight of Subjects by Experimental group and First Control group at post test₁

	Experimental		First Control	
	\bar{x}_1	SD	\bar{x}_2	SD
Weight	119.07	12.10	123.00	13.76

*t value = 0.74, P = 0.47

TABLE 10

Means (\bar{x}) and Standard Deviation (SD), F ratio* and Statistical Significance (P) of Weight of Subjects by Experimental, First, and Second Control Groups at post test₂

	Experimental		First Control		Second Control	
	\bar{x}_1	SD	\bar{x}_2	SD	\bar{x}_3	SD
Weight	118.07	12.802	119.07	11.22	128.52	16.50

*F ratio = 2.61, P = 0.08

non-significant difference (F ratio = 2.61, P = 0.08) between the three groups. The mean score for the average weight of subjects in the second control group was 128.52 with a standard deviation of 16.50, the experimental group had a mean score of 118.07 with a standard deviation of 12.80, and the first control group had a mean score of 119.07 and a standard deviation of 11.22. Results of the frequency distribution are presented in Table 10.

These findings on weight and cigarette smoking indicate no significant difference in average weight between the three groups at the pre-test, post test₁, and post test₂. On cigarette smoking, a significant difference was found between the experimental group and the first control group at pre-test and post test₁. At post test₂, no significant difference was found among the three groups.

Question Two

To answer the second question, "Are there any differences between the experimental group and the first control group on attitudes, knowledge, and involvement in physical activity at the pre-test?," a t-test and a Kruskal-Wallis analysis were used.

Attitudes

A t-test was performed on each of the six dimensions that described attitudes towards physical activity. The dimensions are: social experience, health and fitness, aesthetic (beauty of human movement), vertigo (thrill but involving some risks), catharsis (release of

tension), and ascetic (strenuous training). As presented in Table 11, results of this analysis indicate a significant difference between the experimental group and the first control group on the social experience attitudes dimension ($t = 2.15$, $P = 0.04$). The mean score for the experimental group was 5.38 points higher ($\bar{x} 47.38$ than the mean score for the first control group ($\bar{x} 42.00$). Findings relative to the other attitudes dimensions reveal no significant difference between the two groups.

Knowledge

To test if there were any significant differences between the experimental group and the first control group on knowledge data at pre test, a t-test was performed. The t-test was done on a total score for each subject. As presented in Table 12, the results of this analysis indicate that the two groups did not differ significantly in terms of knowledge ($t = 0.74$, $P = 0.46$).

Involvement

To determine if there were any significant differences between the experimental group and the first control group at pre test, on the involvement inventory dimension of physical activity, a Kruskal-Wallis test was performed on these data. The involvement inventory was coded 4 if subjects were involved in physical activity 3 to 5 times a week (very active); 3 if they were involved at least once a week (moderately active); 2 if they were involved once or twice per month (occasionally

TABLE 11

Means (\bar{x}), Standard Deviation (SD), t value and Statistical Significance (P) of Attitudes Dimensions for the Experimental group and the First Control group at pre test

Attitudes	Experimental		First Control		t value	P
	\bar{x}_1	SD	\bar{x}_2	SD		
Social Experience	47.38	6.85	42.00	5.08	2.15	0.04
Health & Fitness	46.23	5.76	46.63	5.80	-0.17	0.86
Aesthetic	43.30	9.77	43.45	10.40	-0.04	0.97
Vertigo	35.08	11.54	46.00	8.33	-0.22	0.82
Catharsis	40.00	7.87	37.27	14.24	0.59	0.55
Ascetic	31.46	8.46	34.36	9.30	-0.80	0.43

TABLE 12

Means (\bar{x}), Standard Deviation (SD), t value and Statistical Significance (P) of Knowledge for the Experimental group and the First Control group at the pre test

	Experimental		First Control			
	\bar{x}_1	SD	\bar{x}_2	SD	t value	P
Knowledge	14.94	2.95	14.14	2.90	0.74	0.46

TABLE 13

Means (\bar{x}), t value, and statistical significance (P) for Subjects of Involvement Dimensions, for the Experimental group and the First Control group at pre test

Involvement	Experimental		First Control			
	\bar{x}_1	N	\bar{x}_2	N	t value	P
Social Experience	3.06	16	3.14	14	0.11	0.73
Health & Fitness	3.13	16	3.30	14	0.14	0.70
Vertigo	2.06	16	2.00	14	0.00	0.96
Aesthetic	2.31	16	1.76	14	1.95	0.16
Catharsis	2.56	16	2.46	14	0.04	0.83
Ascetic	2.31	16	2.00	14	0.60	0.47

active); and 1 if they were involved less often or never (rarely active). The results of the Kruskal-Wallis analysis presented in Table 13 reveal no significant difference between the two groups on involvement in physical activity: social experience ($H = 0.11$, $P = 0.73$), health and fitness ($H = 0.14$, $P = 0.70$), vertigo ($H = 0.00$, $P = 0.96$), aesthetic ($H = 1.95$, $P = 0.16$), catharsis ($H = 0.04$, $P = 0.83$), and ascetic ($H = 0.60$, $P = 0.43$).

Results from t-test and Kruskal-Wallis at pre-test indicate that the experimental group and the first control group were different on the social experience attitude dimension toward physical activity while they were similar on the other dimensions (health and fitness, aesthetic, vertigo, catharsis, and ascetic). The two groups were similar on knowledge data and involvement dimensions of physical activity. The remaining data will be presented in terms of hypotheses.

Hypothesis A

"The group which experiences the 'Health and Fitness Package' will show a significant increase in positive attitudes immediately after the experiment, compared to a control group which has the standard 'shape up' class." A t-test was performed on these data and the results, presented in Table 14, reveal no significant difference between the two groups at post test₁ on any of the six attitudes dimensions. The mean attitudes dimensions scores of the experimental group were lower than the mean score of the first control group on the following dimensions: social experience, health and fitness, vertigo, catharsis, and ascetic.

TABLE 14

Means (\bar{x}), Standard Deviation (SD), t value and Statistical Significance (P) of Attitudes Dimensions for the Experimental and the First Control group at post test₁

Attitudes	Experimental		First Control		t value P	
	\bar{X}_1	SD	\bar{X}_2	SD	t value	P
Social Experience	41.76	5.37	44.54	6.77	-1.12	0.27
Health & Fitness	41.84	6.69	44.54	9.38	-0.82	0.42
Aesthetic	47.07	5.88	44.45	7.65	0.95	0.35
Vertigo	34.69	9.79	34.09	9.02	0.16	0.87
Catharsis	39.61	8.49	39.00	14.80	0.13	0.90
Ascetic	36.76	7.67	38.18	2.66	1.07	0.29

The mean score of the aesthetic attitude dimension was higher (\bar{x} 47.07) for the experimental group than for the first control group (\bar{x} 44.45) but not enough to reach the statistical significance. The significant difference between the two groups on the social experience attitude dimension noted at pre test did not continue at post test₁. In fact, the scores were reversed, although their difference was not significant. Hypothesis A was not supported.

Hypothesis B

"The group which experiences the 'Health and Fitness Package' will still show the significant increase in positive attitudes three months after the experiment, compared to a control group which had the standard 'shape up' class." A t-test was performed on the data to evaluate their differences after the post test₂. Results of this analysis appear in Table 15. There was no significant difference on attitudes dimensions between the experimental group and the first control group at the post test₂. The mean score of attitudes dimensions for the experimental group was lower than the mean score of the first control group on the following dimensions: health and fitness, aesthetic, catharsis, and ascetic, while the mean score for vertigo was higher for the experimental group than for the first control group. Hypothesis B was rejected because no significant increase was found after the post test₁.

TABLE 15

Means (\bar{x}), Standard Deviation (SD), t value and Statistical Significance (P) of Attitudes Dimensions for the Experimental group and the First Control group at post test₂

Attitudes	Experimental		First Control		t value P	
	\bar{X}_1	SD	\bar{X}_2	SD	t value	P
Social Experience	40.46	4.03	39.82	11.27	0.19	0.84
Health & Fitness	40.31	4.89	45.00	8.78	-1.65	0.11
Aesthetic	39.54	12.37	41.82	9.92	-0.49	0.63
Vertigo	39.54	8.70	38.18	11.84	0.32	0.75
Catharsis	39.08	7.79	44.64	7.50	-1.77	0.09
Ascetic	35.69	9.65	37.54	11.66	-0.43	0.67

Hypothesis C

"The group which experiences the 'Health and Fitness Package' will show a significant increase in knowledge, immediately after the experiment, compared to a group which has the standard 'shape up' class." Results of a t-test on these data, presented in Table 16, indicate no significant difference ($t = 1.69$, $P = 0.10$) between the experimental group and the first control group on knowledge after the experiment.

The mean scores were higher for the experimental group (\bar{x} 16.18) than the mean score for the first control group (\bar{x} 14.35). These results showed a shift toward increase in knowledge for the experimental group but fell short of significance. Thus, the findings do not support Hypothesis C.

Hypothesis D

"The group which experiences the 'Health and Fitness Package' will still show a significant increase in knowledge three months after the experiment, compared to a control group which had the standard 'shape up' class." A t-test was performed on the data to evaluate the differences between the two groups at the post test₂. The results of this analysis are reported in Table 17. There is no significant difference ($t = 0.13$, $P = 0.89$) between the two groups on knowledge three months after the experiment. Hypothesis D was rejected because no significant increase in knowledge was found immediately after the experiment.

TABLE 16

Means (\bar{x}), Standard Deviation (SD), t^* value and Statistical Significance (P) of Knowledge for the Experimental group and the First Control group at post test₁

	Experimental		First Control	
	\bar{X}_1	SD	\bar{X}_2	SD
Knowledge	16.18	2.88	14.35	3.05

* $t = 1.69$, $P = 0.10$

TABLE 17

Means (\bar{x}), Standard Deviation (SD), t^* value and Statistical Significance (P) of Knowledge for the Experimental group and the First Control group at post test₂

	Experimental		First Control	
	\bar{X}_1	SD	\bar{X}_2	SD
Knowledge	14.62	4.66	14.22	3.15

* $t = 0.13$, $P = 0.89$

Hypothesis E

"The group which experiences the 'Health and Fitness Package' will show a significant increase in involvement in physical activity immediately after the experiment, compared to a control group which had the standard 'shape up' class." A t-test was done on the data to generate the mean. The results of a Kruskal-Wallis analysis, reported in Table 18, reveal no significant differences on the dimensions of involvement between the experimental group and the first control group. The mean score of involvement as social experience, health and fitness, aesthetic, and catharsis were higher for the experimental group than the mean score of the first control group. The mean score of involvement as vertigo and ascetic were almost similar for both groups. The scores showed a change in the means of some types of involvement in physical activity but the difference lacks statistical significance. Thus, the findings do not support Hypothesis E.

Hypothesis F

"The group which experiences the 'Health and Fitness Package' will still show a significant increase in involvement in physical activity three months after the experiment, compared to a control group which had the standard 'shape up' class." A Kruskal-Wallis analysis was done to find out if there were any difference between the two groups after the post-test₂. No significant difference was found between the two groups on involvement in physical activity at post test₂. The experimental group had a higher mean score on involvement as social experience,

TABLE 18

Means (\bar{x}), H value, and Statistical Significance (P)
for (N) Subjects for Involvement Dimensions for the
Experimental group and the First Control group
at post test₁

Involvement	Experimental		First Control		H value	P
	\bar{X}_1	N	\bar{X}_2	N		
Social Experience	3.00	16	2.64	14	0.45	0.50
Health & Fitness	3.62	16	2.43	14	0.828	0.36
Vertigo	1.75	16	1.77	13	0.046	0.83
Aesthetic	2.44	16	2.29	14	0.150	0.69
Catharsis	2.37	16	2.29	14	0.067	0.79
Ascetic	1.94	16	2.07	14	0.002	0.96

TABLE 19

Means (\bar{x}), H value, and Statistical Significance (P)
for (N) Subjects for Involvement Dimensions, for the
Experimental group and the First Control group
at post test₂

Involvement	Experimental		First Control		H value	P
	\bar{X}_1	N	\bar{X}_2	N		
Social Experience	3.00	16	2.65	14	0.713	0.39
Health & Fitness	3.12	16	3.21	14	0.319	0.57
Vertigo	2.13	15	2.21	14	0.033	0.85
Aesthetic	2.44	16	2.71	14	0.416	0.51
Catharsis	2.25	16	2.57	14	0.745	0.38
Ascetic	1.81	16	2.29	14	0.455	0.50

compared to the first control group, which had a higher mean score for all the other involvement types of activity. Results are presented in Table 19. Hypothesis F was rejected because no significant increase in involvement was found immediately after the experiment.

Hypothesis G

"The group which experiences the 'Health and Fitness Package' will still show a significant increase in positive attitudes toward physical activity three months after the experiment, compared to a second control group which took the standard 'shape up' class three months before the experiment." A t-test on the data to evaluate the difference between the two groups, presented in Table 20, indicates a significant difference between the experimental group and the second control group on the following attitudes dimensions: social experience ($t = -3.82$, $P = 0.01$), health and fitness ($t = -3.57$, $P = 0.01$), and vertigo ($t = 2.23$, $P = 0.03$). The mean score of the second control group ($\bar{x} 46.58$) were 6.22 points higher than the mean score of the experimental group ($\bar{x} 40.36$) for attitude of social experience. The mean score of the second control group ($\bar{x} 48.17$) were 7.87 points higher than the mean score of the experimental group ($\bar{x} 40.30$) for attitude of health and fitness. The mean score of the experimental group ($\bar{x} 39.54$) were 8.54 points higher than the mean score of the second control group ($\bar{x} 31.00$) for attitude of vertigo. Findings showed that, first, there is a significant difference between the experimental group and the second control group, in favor of the second control group, on attitudes dimensions of social experience and health and fitness. Second, that

TABLE 20

Means (\bar{x}), Standard Deviation (SD), t value, and Statistical Significance (P) of Attitudes Dimensions between the Experimental group and the Second Control group at post test₂

Attitudes		N	\bar{x}	SD	t value	P
Social Experience	GRP ₁	13	40.36	6.03	-3.82	0.001
	GRP ₃	17	46.58	4.57		
Health & Fitness	GRP ₁	13	40.30	4.88	-3.57	0.001
	GRP ₃	17	48.17	6.68		
Aesthetic	GRP ₁	13	39.54	12.36	-1.65	0.03
	GRP ₃	17	46.70	11.31		
Vertigo	GRP ₁	13	39.54	8.70	2.23	0.11
	GRP ₃	17	31.00	11.46		
Catharsis	GRP ₁	13	39.08	7.78	-0.50	0.62
	GRP ₃	17	41.23	14.06		
Ascetic	GRP ₁	13	35.69	9.64	0.31	0.75
	GRP ₃	17	34.76	6.53		

there is a significant difference between these two groups on attitudes of vertigo, in favor of the experimental group. Hypothesis G was rejected since no statistically significant increase in attitude toward physical activity was found for the experimental group at post test₂.

Hypothesis H

"The group which experiences the 'Health and Fitness Package' will still show a significant increase in knowledge three months after the experiment, compared to a second control group which took the standard 'shape up' class three months before the experiment." A t-test was performed on the data of both groups. Results from this analysis, presented in Table 21, indicate no significant difference ($t = -0.41$, $P = 0.61$) between the experimental group and the second control group on knowledge data at the second post test. The second control group's mean score (\bar{x} 15.28) were higher than the mean score of the experimental group (\bar{x} 14.62). Findings suggested that the second control group was more knowledgeable on the effect of physical activity on one's body than the experimental group. Hypothesis H was rejected since no statistically significant increase in knowledge was found for the experimental group at post test₂.

Hypothesis I

"The group which experiences the 'Health and Fitness Package' will still show a significant increase in involvement in physical activity three months after the experiment, compared to a second control group

TABLE 21

Means (\bar{x}), Standard Deviation (SD), t value and Statistical Significance (P) of Knowledge of the Experimental group and the Second Control group at post test₂

		N	\bar{x}	SD	t value	P
Knowledge	GRP ₁	16	14.62	4.66	-0.41	0.61
	GRP ₂	18	15.28	4.50		

TABLE 22

Means (\bar{x}), H value and Statistical Significance (P) of Involvement Dimensions of the Experimental Group and the Second Control group at post test₂

Involvement	\bar{x}_1	N	\bar{x}_3	N	H value	P
Social Experience	3.00	16	2.88	18	0.107	0.74
Health & Fitness	3.12	16	3.33	18	0.752	0.38
Vertigo	2.13	15	1.44	18	4.208	0.04
Aesthetic	2.43	16	2.38	18	0.046	0.83
Catharsis	2.25	16	2.61	18	0.858	0.35
Ascetic	1.81	16	1.94	18	0.213	0.64

which took the standard 'shape up' class three months before the experiment." Results of the Kruskal-Wallis analysis of the data to evaluate the difference between the two groups reveal a significant difference on one dimension of involvement of activity, vertigo ($H = 4.208$, $P = 0.04$). There is no significant difference on the other dimensions of physical activity. Results of this analysis are presented in Table 22. Thus, the findings relative to involvement between the experimental group and the first control group indicate that the experimental group is involved more often than the second control group in activity involving thrill and risk (vertigo). Hypothesis I was rejected because there was no significant increase in involvement at the post test₂ for the experimental group.

Question Three

The findings relative to Hypotheses A, B, C, D, E, and F indicate in answer to Question 3, "Are there any differences between the experimental group and the first control group on attitudes, knowledge and involvement in physical activity immediately after the experiment and three months after the experiment?," that no significant difference between the experimental group and the first control group on attitudes, knowledge, and involvement in physical activity were found immediately after the experiment nor three months after the experiment.

Question Four

The following results address Question 4, which asked: " Within the experimental group are there any differences in attitudes, knowledge,

and involvement in physical activity immediately after the experiment, and three months after the experiment?" To answer Question 4, several tests were performed on the data. A paired t-test was performed on attitudes dimensions data and on knowledge data and a Wilcoxon matched-paired signed ranks test was done on involvement data.

An intra-group paired t-test was performed on the experimental group's attitudes dimensions data, comparing the mean scores resulting from the pre test and post test₁, and pre test and post test₂. Findings from this comparison, reported in Table 23, indicate a significant decrease for social experience attitude dimension ($t = 2.20$, $P = 0.04$) and for health and fitness ($t = 2.37$, $P = 0.03$). Findings indicate a significant increase for the ascetic attitude dimension ($t = -2.92$, $P = 0.01$). The mean of aesthetic dimension changed toward the increase but did not reach statistical significance.

Findings from the comparison of data from pre test and post test₂ indicate a significant decrease in attitudes dimensions of social experience ($t = 3.11$, $P = 0.00$) and health and fitness ($t = 2.64$, $P = 0.02$). No significant difference was found between the other attitudes dimensions. Increase in the means of vertigo and ascetic attitude dimension was found by comparing the data at the pre test and post test₂.

An intra-group paired t-test was done to compare the knowledge results from pre test and post test₁, and pre test and post test₂ for the experimental group. Results from this analysis reveal a significant increase ($t = 2.37$, $P = 0.03$). However, when the data from pre test were compared with the data from post test₂, no significant difference was found between these testings ($t = 0.38$, $P = 0.70$). Results are reported in Table 24.

TABLE 23

Means (\bar{x}), Standard Deviation (SD), t value, and Statistical Significance (P) of Attitudes Dimensions between Data from pre test and post test₁ and pre test and post test₂ for the Experimental group

Attitudes	Pre test vs Post test ₁						Pre test vs Post test ₂					
		\bar{X}_1	N	SD	t	P		\bar{X}_2	N	SD	t	P
Social Experience	Pre Post ₁	47.38	13	6.850	2.20	0.048	Pre Post ₂	47.38	13	6.850	3.11	0.009
Health & Fitness	Pre Post ₁	46.23 41.84	13	5.761 6.694	2.37	0.036	Pre Post ₂	46.23 40.37	13	5.761 4.889	2.64	0.02
Aesthetic	Pre Post ₁	43.30 47.07	13	9.776 5.880	-1.63	0.012	Pre Post ₂	43.30 39.54	13	9.776 12.367	0.79	0.44
Vertigo	Pre Post ₁	35.07 34.69	13	11.536 9.793	0.09	0.926	Pre Post ₂	35.07 39.53	13	11.536 8.705	-1.14	0.27
Catharsis	Pre Post ₁	40.00 39.61	13	7.874 8.491	0.16	0.873	Pre Post ₂	40.00 39.07	13	7.874 7.783	0.29	0.77
Ascetic	Pre Post ₁	31.46 36.76	13	8.462 7.672	-2.92	0.013	Pre Post ₂	31.46 35.69	13	8.462 9.647	-1.24	0.24

TABLE 24

Means (\bar{x}), Standard Deviation (SD), t^* value, and Statistical Significance (P) of Knowledge between Data from pre test and post test₁ and pre test and post test₂ for the Experimental group

		\bar{X}	N	SD
Knowledge	Pre	14.93	16	2.955
	Post ₁	16.18		2.880

* $t = 2.37$, $P = 0.03$

		\bar{X}	N	SD
Knowledge	Pre	14.93	16	2.955
	Post ₂	14.62		4.660

* $t = 0.38$, $P = 0.70$

To compare data from involvement in physical activity at pre test and post test₁ and pre test and post test₂, a Wilcoxon matched-paired ranks test was administered on the data. Results of this analysis reveal no significant difference on involvement dimensions between the testings. If there were an increase in involvement after post test₁, for example health and fitness, this involvement decreased at the post test₂ or vice versa, in the case of involvement for vertigo. For example, the increase for aesthetic involvement stayed exactly the same at post test₁ and post test₂. Results of this analysis are presented in Table 25.

Thus, the results relative to Question 4 indicate a significant decrease in the attitude dimensions of social experience and health and fitness, when data from the experimental group are compared at the pre test and post test₁ and pre test and post test₂. Findings indicate also a significant increase in ascetic attitude immediately after the experiment. The mean of the aesthetic attitudes dimension changed toward the increase but did not reach significance. Findings reveal also a significant increase in knowledge at post test₁, but no significant difference was found in involvement data, when data from the experimental group were compared at pre test and post test₁ and pre test and post test₂.

Question Five

Question 5 asked: "Are there any differences between the experimental group and the two control groups on attitudes, knowledge, and involvement in physical activity three months after the experiment?" An analysis of variance and a Kruskal-Wallis analysis were carried out on

TABLE 25

Means (\bar{x}), \bar{z} value, and Statistical Significance (P) of Involvement Dimensions between Data from the pre test and post test₁ and pre test and post test₂ from the Experimental group

		Pre test vs Post test ₁					Pre test vs Post test ₂					
Involvement		\bar{X}_1	N	\bar{z}	P		Involvement		\bar{X}_2	N	\bar{z}	P
Social Experience	Pre Post ₁	3.06 3.00	16	-0.14	0.88	X	Social Experience	Pre Post ₂	3.06 3.00	16	-0.18	0.85
Health & Fitness	Pre Post ₁	3.13 3.62	16	-1.40	0.16	X	Health & Fitness	Pre Post ₂	3.13 3.12	16	-0.22	0.82
Vertigo	Pre Post ₁	2.06 1.75	16	-1.11	0.26	X	Vertigo	Pre Post ₂	2.06 2.13	16 15	-0.158	0.87
Aesthetic	Pre Post ₁	2.31 2.43	16	-0.31	0.75	X	Aesthetic	Pre Post ₂	2.31 2.43	16	-0.652	0.51
Catharsis	Pre Post ₁	2.56 2.37	16	-0.71	0.47	X	Catharsis	Pre Post ₂	2.56 2.25	16	-0.840	0.40
Ascetic	Pre Post ₁	2.31 1.93	16	-1.24	0.21	X	Ascetic	Pre Post ₂	2.31 1.81	16	-1.20	0.23

the data to answer this question. The analysis of variance computed on attitudes dimension data of the three groups indicated a significant difference on the social experience dimension (F ratio = 4.36, P = 0.01), and the health and fitness dimension (F ratio = 4.898, P = 0.01) as reported in Table 26. These two dimensions have higher mean scores for the second control group than for the two other groups. There was also a significant difference between the three groups on attitudes dimension of vertigo (F ratio = 2.73, P = 0.07). On this dimension, the mean scores of the experimental group were higher than the mean scores of the other two groups of post test₂: the experimental group (\bar{x} 39.53), the first control group (\bar{x} 38.18), and the second control group (\bar{x} 31.00).

An analysis of variance was performed on the knowledge data of the three groups at the post test₂. Results indicate that there was no significant difference on knowledge (F ratio = 0.683, P = .83) between the three groups at post test₂. The mean score for the experimental group was \bar{x} 14.62, standard deviation of 4.66, for the first control group \bar{x} 14.43, standard deviation of 3.15, and for the second control group \bar{x} 15.27, standard deviation of 4.50.

A Kruskal-Wallis analysis was done on the involvement data of the three groups at post test₂. Results indicate a significant difference between the three groups on the dimension of involvement of activity of vertigo (H = 5.723, P = 0.05). This significant difference was due to the second control group which had a lower mean on involvement dimension of vertigo (\bar{x} 1.44) (See Table 22), compared to the experimental group (\bar{x} 2.13) and the first control group (\bar{x} 2.21) (See Table 19). Results of the Kruskal-Wallis analysis are reported in Table 27.

TABLE 26

Means (\bar{x}), Standard Deviation (SD), F Ratio,
and Statistical Significance (P) of Attitudes Dimensions
for the three groups at post test₂

Attitudes	Experimental		First Control		Second Control		F Ratio	P
	\bar{x}_1	SD	\bar{x}_2	SD	\bar{x}_3	SD		
Social Experience	40.46	4.03	39.82	11.27	46.59	4.57	4.36	0.01
Health & Fitness	40.31	4.89	45.00	8.77	48.17	6.68	4.89	0.01
Aesthetic	39.53	12.36	41.82	9.92	46.70	11.31	1.57	0.21
Vertigo	39.53	8.70	38.18	11.84	31.00	11.46	2.73	0.07
Catharsis	39.07	7.78	44.63	7.50	41.23	14.06	0.79	0.46
Ascetic	35.69	9.64	37.54	11.65	34.76	6.53	0.31	0.73

TABLE 27

Means (\bar{x}), Standard Deviation (SD), H value,
and Statistical Significance (P) for Involvement Dimensions
for the three groups at post test₂

Involvement	N	\bar{x}	SD	H	P
Social Experience	48	2.85	1.010	0.753	0.68
Health & Fitness	48	3.22	0.751	0.753	0.68
Vertigo	48	1.894	1.005	5.723	0.05
Aesthetic	48	2.50	1.238	0.633	0.72
Catharsis	48	2.00	1.149	1.094	0.57
Ascetic	48	2.042	0.849	0.628	0.73

Summary

Thus, the findings relative to Question 5 indicate a significant difference on attitudes dimensions of social experience and health and fitness in favor of the second control group. A significant difference of involvement of vertigo in favor of the experimental group was found. The findings indicate also no significant difference on knowledge data between the three groups. None of the hypotheses for this study are supported. Some of the possible factors influencing this fact are discussed in Chapter Six.

CHAPTER SIX

DISCUSSION

This chapter contains the major findings of the study. A discussion of the findings related to the specific questions and other factors affecting the difference or the lack of differences is presented.

The findings of this investigation showed inconsistencies in the results. There were no observable patterns in the change of attitudes toward, knowledge of, and involvement in physical activity. For example, if there was an increase in attitudes dimensions at the post test₁, the data showed a decrease at the post test₂, or vice versa. Explanations for those results could be attributed to the fact that, among adolescent populations, values change rapidly and things that seem desirable today may be less so tomorrow (Horrocks, 1976).

Question One

Findings relative to question one show a significant difference ($P = 0.00$) between the experimental group and the first control group in cigarette smoking. The experimental group had 75% non-smokers compared to 46% for the first control group. Was this difference due to age, imitation of non-smoker models, or problems with self-reporting? The following section focuses on these points.

Subjects in the experimental group were older than those in the control group. In the experimental group, 50% of the subjects were 16 years old, compared to 28% in that age group in the first control group. As an adolescent grows older, her concern for her body may take the form of increased awareness in personal health (Horrocks, 1976). There is also an increase in personal control (Horrocks and Mussman, 1973) that means that the adolescent is developing a sense that she can affect her own future. Adolescents are also highly idealistic and want to improve humanity (Horrocks and Mussman, 1973). Mercer (1979) calls this asceticism. She mentions that asceticism can take several forms such as becoming a vegetarian, rejecting parent's luxuries by dressing simply, or by becoming a member of some cult. Therefore, this asceticism phenomenon could have been operating in this study group, resulting in a higher percentage of non-smoking subjects before the experiment started.

Social learning theory may provide another explanation in the discussion of the difference in cigarette smoking between the experimental group and the first control group. According to social learning theory, individuals tend to imitate a model who shares some common characteristics. The imitation is also facilitated if the model is warm, friendly, and supportive (Bandura, 1977). In the experimental group the non-smoking behavior found among 75% of the members could have been an additional characteristic shared and reinforced by peer group models. In this group, the possibility of imitating someone who did not smoke may have been higher than in the first control group which had only 46% non-smokers.

Another explanation for the difference in cigarette smoking between the experimental group and the first control group may have something to

do with self-reporting at the time the student answered the questionnaire. How accurate is adolescent self-reporting? Many could be at least selective in what they report. They will try to put their best foot forward in self reports (Jones, et al., 1973). Self-revelation could be personally threatening because of real or imagined inferiority which may be difficult to face. Fear of the use of the results may hamper adolescents' self-reporting when an adult is gathering the information (in this study the nurse researcher). It is a matter of the adolescent protecting herself against threat as well as wanting to try to look well in the eyes of others (Horrocks, 1976).

In summary, the significant difference between the experimental group and the first control group on cigarette smoking at the pre test could at least partially be explained by age, imitation of the action of others, and by problems in self-reporting.

Question Two

Findings relative to question two revealed a significant difference ($P = 0.04$) between the mean score of the experimental group (\bar{x} 47.02) and the mean score of the first control group (\bar{x} 42.00), on attitudes dimension of social experience. An examination of the demographic variables such as age and grade seem to provide at least partial explanations for these results.

When the experimental group and the first control group were compared, no significant differences were found at the pre test. However, there were more 16-year-olds in the experimental group than in the first control group. The older subjects may have developed a

positive social experience attitude because of their experience with the physical education class the year before.

As adolescents grow older, they are increasingly concerned with social relationships and development of inter-personal skills. They become more extroverted (Ames, 1966) and their need for affiliation is high (Ahammer, 1971). At such a point physical activity may provide definition of meaningful inter-action which had some transformable value to other situations defined as meaningful to society (Rarick, 1973).

Those students in the experimental group and in the second control group might have been influenced in their attitudes by members of their peer group or by a close friend. Since adolescent attitudes are far from being fixed or unchangeable, the desire to be like others makes attitudes particularly susceptible to outside influences (Horrocks, 1976). Furthermore, they may hold such attitudes because a best friend thinks in this direction. All may change their minds suddenly.

Beside age, grade may provide some light on the discussion of the significant differences between the experimental group and the first control group in attitude of social experience. In the experimental group, 43.8% were 11th graders, compared to 28.6% for the first control group. The 11th graders may have gained a positive attitude in terms of social experience when they took a physical education class as tenth-graders. This positive attitude could have influenced their decision making regarding their class selection. For an eleventh- or twelfth-grader it is optional to take a physical education (PE) class whereas tenth-graders are required to take PE. PE classes are not very popular among adolescent girls. Furthermore, the American culture neither expects nor requires athletic ability in girls, no matter how much it

00 1010 0000 0000 0000 0000 0000 0000

may require of them in physical attraction (Horrocks, 1976). Therefore, in order to take a physical education class when it is not required, it may be assumed that one holds a positive attitude toward physical activity.

To summarize, the significant difference in attitudes dimension of social experience found between the experimental group and the control group at the pre test could have occurred because of the inter-action of age and grade.

Question Three

Findings relative to question three indicate no significant differences between the experimental group and the first control group on attitudes toward, knowledge about, and involvement in physical activity immediately after the experiment and three months after the experiment. Inter-group contamination could partially explain the results obtained immediately after the experiment. After the experiment had begun, the first control group introduced music similar to the music the experimental group was using as background for their exercise class. This addition might have affected the results of the experiment since both groups had music in their class. The groups' experience might not have been sufficiently different to influence the findings. Regarding results obtained three months after the experiment, the investigator did not have any control on the intervening variables that could have affected these results.

© 2009 Pearson Education, Inc. All rights reserved.

Question Four

Comparison of the results within the experimental group at pre test, post test₁, and post test₂ showed a significant decrease on the attitudes dimension of social experience at post test₁ ($P = 0.04$) and at post test₂ ($P = 0.00$); on dimension of health and fitness at post test₁ ($P = 0.03$) and at post test₂ ($P = 0.02$). It showed also a significant increase on the ascetic dimension at post test₁. An important increase in aesthetic attitude dimension was also observed. Regarding knowledge variable, a significant increase ($P = 0.03$) was found at post test₁ while no differences were found at post test₂. An examination of part of the experimental treatment and characteristics of adolescence seems to provide a possible explanation for these results.

Part of the "Health and Fitness Package," the dance exercise with two adolescent models, could have been anxiety and threat producing for the experimental group whose members had enrolled in a "shape up" PE class before the experiment. At the time of the enrollment into the "shape up" exercise program (described in Chapter Four), students executed simple and familiar exercises which illustrated the content of the course description, "participation in conditioning and drills and jogging in order to develop and maintain physical fitness." The "Health and Fitness Package," however, included a dance exercise program (See Chapter Four) not familiar to students. The dance exercise routines, according to the PE teacher, were new to most of the students in this experimental group. Even if the steps were simple to execute and were seen on teen-age television dance programs, this group was not familiar with the execution of the steps. Since there is a strong need to

© 2004 by The McGraw-Hill Companies

display competence and effectiveness in activity of most personal concerns in older adolescents (Horrocks, 1976), this experience could have been a threat to their competency, resulting in a significant decrease in social experience attitude. It is also possible that these students were embarrassed to "show off" their lack of skills to members of their group who acted as models. As one adolescent friend of the investigator put it, "Kids don't like to show off." According to Horrocks (1976) it is "cool" to show lack of enthusiasm in exciting situations where one might give oneself away by appearing inexperienced, childish, or lacking in sophistication.

In addition, adolescents tend to attach a great importance to the attitudes and opinions of others especially those of the same age (Horrocks, 1976). Since this dance program was taught by two adolescent peer members from the experimental group, assisted by the PE teacher, comments on student performance from the student leaders also could have been threatening. It is not known to this investigator how the models exercised their control and how they reinforced or criticized the students' new behavior. To be successful, the adolescent leader is one who exercises her control subtly, without trying to dominate the group (Horrocks, 1976). Typically the adolescent tends to resent domination (Horrocks, 1976) and might resist the persons who deviate from her expectations. The significant decrease in attitude for social experience could be the result of a threat to one's competency.

To explain the significant decrease in attitude for health and fitness, again, the dance exercise program included in the "Health and Fitness Package" could not have been seen as an effective fitness exercise, especially if the students expected to lose weight rapidly,

for example. Following an eight-week exercise period, changes in body weight were not expected. Significant losses in adipose tissues are often offset by gain in muscle mass, leaving the body weight unchanged or heavier (Parizkova, 1966). Comparison of the mean weight of the experimental group at the pre-test (\bar{x} 115.15) with the mean weight of the post test₁ (\bar{x} 119.07) showed that weight had been gained. These kinds of results could be disappointing for subjects who might want fast results and therefore could negatively influence their attitudes.

Adolescents are impatient and it is frequently difficult for them to cope with delays and to realize that a goal may be obtained slowly (Horrocks, 1976). This explanation could be applied to the results at the post test₂ although some weight loss had occurred (\bar{x} 118.08). Therefore, the significant decrease in attitude for social experience and health and fitness dimensions could be attributed to part of the "Health and Fitness Package" and to some of the characteristics of adolescent development.

Findings revealed a significant increase in attitude dimension of ascetics within the experimental group when data from the pre test were compared with data from post test₁. These findings suggested that shifts in attitudes might be influenced by a peer consensus. Perhaps that part of the "Health and Fitness Package," which included the feedback tests, was seen as valuable in helping a person attain goals. This means that one has criteria for evaluating one's performance. For example, during the experiment, students assessed their pulse rate to evaluate their cardio-respiratory fitness. In addition, they were told that at any age the slowing down of the heart rate was one of the most regular signs demonstrating the effect of physical training (Letounov,

1969). Perhaps knowing all this and being able to notice changes in their heart rate resulted in the increase in the ascetic attitude in the sense that their strenuous exercises increased significantly in value for them in and of itself.

On aesthetic dimension, data revealed a mean score of \bar{x} 43.30 at the pre test and a mean scores of \bar{x} 39.54 at the post test₂, when the experimental group was compared with itself. These findings suggested that students increased their attitudes while being exposed to the "Health and Fitness Package." However, three months after the experiment, their scores were almost similar to the pre-test scores. Changes may be temporary simply as a means of reducing a disequilibrium state. According to Keasey (1973), when equilibrium is attained, the individual tend to return to his original attitude. Moreover, adolescents change their values rapidly and what is valuable at one point in time might be less so in a short period of time. Three months might be too long a period of time between the two post tests with this age group.

Findings relative to knowledge data, within the experimental group, showed a significant increase ($P = 0.03$) at post test₁, compared to the pre test. However, results at post test₂ (\bar{x} 14.62) were almost similar to the pre test scores (\bar{x} 14.93). The same considerations stated earlier relative to aesthetic attitudes dimension could be applied here. In addition, Simon (1969) notes that the difficulty in teaching values is that they are not usually the outcome of direct verbal instructions but are implanted by non-verbal means such as the modeling process. During the experiment, the modeling process could have operated but, during the period between the post test₁ and post test₂, no special intervention and no control of intervening variables were planned for this study.

Thus, the results obtained on attitudes dimensions of social experience, health and fitness, ascetic, aesthetic, dimensions, and knowledge could be attributed to parts of the "Health and Fitness Package," characteristics of adolescent development, and to concepts of social learning theory.

Question Five

Findings relative to question five indicated a significant difference between the three groups at post test₂ on social experience attitude dimension ($P = 0.01$) and health and fitness dimension ($P = 0.01$). These two dimensions had a higher mean score in the second control group than in either of the other two groups. In addition, there was a significant difference on involvement of activity dimension of vertigo ($P = 0.05$). This difference was due to the second control group which had a lower mean score on this dimension compared to the two other groups.

The self-selection of the second control group (See Chapter Four) should be kept in mind in the discussion of the above results. The fact that these girls agreed to participate in the study demonstrates either a high interest in physical activity or an interest in aiding the investigator.

Discussion provided earlier relative to questions one and two could also be applied here. This could explain the results obtained on the attitudes dimensions of social experience and health and fitness, since the second control group had more older subjects than did either of the other two groups. In the second control group, 45.5% of the subjects

were 17 and 18 years old, 33.3% were in grade 12 and 61.1% were in grade 11.

Concerning the involvement of activity for vertigo, the second control group had a lower mean (\bar{x} 1.44) than did the experimental group (\bar{x} 2.13) or the first control group (\bar{x} 2.21). It could be possible that students from the experimental group and the first control group valued and were involved in activity because of social acceptance or social reinforcement. For the second control group, decreased interest in activity could be accounted for by the principle of increasing generality with age (Horrocks and Mussman, 1973), although it may be that activities producing vertigo do not provide the same satisfaction for a 17-18 year-old girl that they do for a 16 year-old girl. However, the data did not show what type of activity students were involved in at post test₂. Whether these activities were similar to the ones they had in the "Health and Fitness Package," or in the control class is not known. It would be interesting to find out if the activity that students practice in their leisure time is similar to that which they are involved in during PE class. Literature suggested that a given adolescent's daily activities may reveal that the activities they are involved in are far from the ones that they most prefer (Horrocks, 1976). Answers to such questions could be valuable for a researcher who wants to increase adolescents' involvement in physical activity as well as discovering how that involvement is pursued in the adult years.

Summary

Discussion of the major findings of this investigation was provided in terms of the five specific questions. Demographic variables, age, grade, characteristics of adolescent development and concepts of social learning theory, furnished the material in which to explain at least part of the results. Part of the experimental treatment, the "Health and Fitness Package, and reference to social and developmental theories helped to explain the significant differences or lack of differences resulting from this investigation through the problems encountered with the methodology. In the next chapter, a brief summary as well as the conclusions of the study will be presented.

CHAPTER SEVEN

SUMMARY AND CONCLUSIONS

The promotion of physical activity in an adolescent girls population could contribute to the lowering of the risk factors predictive of coronary heart disease in the adult population. A "Health and Fitness Package" program was designed to increase the participation in physical activity among adolescent girls, assuming that the positive attitudes, knowledge, and skills gained during this experiment will affect their further involvement. This investigation was initiated to ascertain any differences that might occur between a group of adolescent girls who experienced the "Health and Fitness Package" and two similar groups who had the standard "shape up" class. This concluding chapter provides a brief summary of the investigation as well as limitations of the study, implications, and suggestions for further research.

Summary

There is suggestive evidence from epidemiological studies and other sources that early onset and subsequent death from coronary heart disease may be delayed or lessened by an increase and continuation in habitual physical activity. The exact mechanism by which exercise decreases the manifestations of coronary heart disease is not known. Numerous, but as yet unproven, mechanisms by which protective benefits might be produced have been observed. Furthermore, various studies show that changes

resulting from habitual/regular exercises were more marked in young animals than in older animals. In order to maintain these changes or protective effects in adult life, exercises must be regular and of certain duration and intensity. Besides physiologic changes, numerous reports indicated that persons involved in regular physical activity may benefit from other life style modifications such as abstinence of cigarette smoking, voluntary reduction of food intake especially fat, and weight reduction--all factors that can contribute to the protection from coronary heart disease.

The need to begin efforts to prevent coronary artery disease in children and adolescents is demonstrated in numerous studies. The prevalence of obesity, an increase in cigarette smoking especially among adolescent girls, and a lack of physical activity, also more prevalent in adolescent girls, are among the most frequently identifiable risk factors found in the adolescent population.

The effect of exercise on adolescents has been evaluated by several authors and most of the findings support the importance of intensive exercise programs during youth, because of the benefits on the cardio-vascular system. However, to maintain these benefits which seem to protect against cardio-vascular disease, studies showed that one should maintain a regular exercise schedule in adult life. The younger an individual is when he becomes involved in regular exercise and if he continues this involvement in later life, the better he will be protected against cardio-vascular disease according to these studies.

This investigator was concerned with the fact that studies revealed a lower level of cardio-respiratory endurance among adolescent girls compared to adolescent boys. Such results are often associated with

lack of physical activity. Studies showed a decrease in physical activity among girls during adolescent years. Several reasons are given for this situation. There is more dislike of the physical education classes among girls than boys, and a disproportionately low resources for an emphasis on physical education for girls is still found in high school. However, this disproportion is slowly changing under Title IX, passage of the Educational Amendment Act passed by Congress in 1972. Because of the above reasons, chances are that further involvement in physical activity or regular exercises might be influenced by this attitude.

Adolescence seems to be the best time to influence girls to value regular exercise since value formation comes to a peak during this period. As adolescents reach for new values and new experiences, the peer group offers them the milieu wherein new skills could be mastered.

Adolescents learn most complex skills by imitating the behavior of their peers. The peer group is particularly influential as a model because members share common characteristics and adolescents identify very closely with their peers. In social learning theory, model characteristics influence the attention of the learner, especially if the model is attractive, competent, and willing to disperse rewards and praise. In addition, an action or a new skill has more chance to be modeled if it has some meaning and/or some value for the adolescent. Incentives and reinforcements act in terms of motivational function in social learning theory. Therefore, comments of encouragement from the peers on one's performance could be important motivators for this age group to take action. In adolescence, competence is highly admired

and a student's ability to reproduce the modeled activity over and over again will influence her attitude and involvement in this particular activity especially among her peer group.

Using social learning theory and adolescent growth and development as a framework, a "Health and Fitness Package" was developed by this investigator. The experiment was undertaken to evaluate whether there would be any differences in attitudes, knowledge, and involvement in physical activity between a group of adolescent girls, aged 15-18 years, who experience this "Health and Fitness Package" compared with two similar groups who had the standard "shape up" activity class.

The major hypotheses the study addressed were: the group which experiences the "Health and Fitness Package" will show a significant increase in attitudes toward, knowledge about, and involvement in physical activity immediately after the experiment, and that this significant increase will continue three months after the experiment, compared to the first control group which took the standard "shape up" class; that the group which experiences the "Health and Fitness Package" will show a significant increase in attitudes toward, knowledge about, and involvement in physical activity, compared to the second control group who took the "shape up" class three months before the experiment started.

The design used was a static-group comparison involving three groups: one experimental and two control groups. Pre test and two post test questionnaires administered by the investigator were used to evaluate the differences between the three groups and within the experimental group.

The sample consisted of forty-eight adolescent girls of ages ranging from fifteen to eighteen years. Sixteen subjects were in the

experimental group, fourteen subjects were in the first control group, and eighteen subjects were in the second control group. The experimental group and the first control group were similar on demographic variables such as: age, race, parent education, grade, and weight; they were different in cigarette smoking. When all the three groups were compared, they were similar on race, parent education, and cigarette smoking, and they were different on age, grade, and weight.

The experimental group received the "Health and Fitness Package" three times a week, for eight weeks. The "Health and Fitness Package" included: dance exercise to "disco" music, with two adolescent models; short lectures once a week on the effect of exercises on one's body, and a twice-a-week period of discussion about physical activity led by the physical education teacher. Two testing measures, physical fitness using the Canadian Home Fitness Test, and body fat measurement using Harpenden calipers were done by this investigator.

The first control group was involved in a standard "shape up" physical education class, and the second control group was involved in the same standard physical education class three months before the experiment.

Research tools were the Attitudes Toward Physical Activity Inventory, the Involvement Inventory, and the Knowledge Questionnaire. Tools used in the "Health and Fitness Package" were the Canadian Home Fitness test and the measure of body fat with the skinfold technique using the Harpenden caliper.

This investigation yielded nominal, ordinal, and interval data. The data were analyzed using a number of statistical methods appropriate

for the type of data including chi-square, t-test, Kruskal-Wallis, Analysis of Variance, Paired t-test, and Wilcoxon matched paired signed rank tests.

Major findings revealed a significant difference between the experimental group and the first control group at the pre test, on attitudes dimension of social experience and on cigarette smoking. No significant differences were found between the experimental group and the first control group on attitudes toward, knowledge about, and involvement in physical activity immediately after the experiment and three months after the experiment.

Significant negative differences were found between the experimental group and the second control group on attitudes dimensions of social experience and health and fitness, and a significant difference was found on attitudes dimension, vertigo, and involvement for activity as vertigo three months after the experience. A significant decrease in differences was found within the experimental group on attitudes dimensions as social experience and health and fitness immediately after the experiment and three months after the experiment.

Significant increase in differences was found within the experimental group on attitudes dimension as ascetic immediately after the experiment.

Significant differences were found within the experimental group on knowledge immediately after the experiment.

All of the hypotheses were rejected because of the failure of the findings to support them. Possible reasons for this failure include demographic variables such as age and grade; some characteristics of adolescent development; part of the "Health and Fitness Package;" and some problems with the methodology.

N.B.:

Page 121 is not missing. Pages are mis-numbered.

Limitations

As with any study involving human behavior, a number of major limitations were encountered. The largest of these are: sample size, research tools, and inter-group contamination.

The limitations of the sample were due to the small number of adolescent girls who volunteered and the method used in the selection of the second control group. The sample was composed of forty-eight adolescent girls. A larger number might have altered the results. The method used to select the members of the second control group differed from the one used in the selection of the experimental group and the first control group. The members of the second control group volunteered to be in the study after being asked on the phone; therefore, this group is a self-selected group. In contrast, the members from the two other groups volunteered to participate in the study after their teachers had already agreed to participate and that the experimental treatment had been randomized between the two teachers. These limitations should be considered while interpreting the findings resulting from the comparison between the three groups. These limitations influence the generalizability of the results to other groups because of the bias of selection introduced by the second control group.

The limitations with the research tools were due to the possibility of vocabulary problems and to the time when the tests were administered. Problems have been encountered with the research tools, especially with the Attitude Toward Physical Activity Inventory. Additional explanations regarding the written procedures of test administration as well as some adjective definitions were needed to enable the students to have a

common understanding of the terms before answering the scale. Was it a problem of language deficiency on the students' part or problems with this investigator for whom English was a second language or both? The problem of language deficiency could have occurred with several students for whom English was not their first language, as well as for the remaining students for whom English was their first language. It is interesting to note that only since March 1979 is a student required to successfully pass a reading and written English test in order to graduate from a high school in San Francisco. In addition, English was the second language for this investigator. Often times an accent coupled with the use of unfamiliar words is confusing to people. These problems could have added to the inconsistency of the results and limit generalizability of the findings to any other group.

The time period in which the reasearch tools were administered could be another limitation to be considered while interpreting the results of this study. The first post test was administered to the experimental group and the first control group during the week preceding school recess for the Christmas Holidays when student priorities were elsewhere. The second post test, in March, had to be administered during one of the students' free periods. Adolescents are highly volatile, and frequently have an indifference to things and events that are not related to themselves personally. Therefore, their interest in the study could have faded away by the time they reached post test₂. Thus, the time period when questionnaires were given could be another limitation and should be considered if the study is replicated.

Inter-group contamination could be an additional problem of limitation in this study. After the experiment had started, the first control

group introduced music similar to the music the experimental group was using as background for their exercise class. Since music acts as an additional stimulus which invites participants to work more energetically, this addition might have affected the results of the experiment since both groups had music in their class. Thus, the two groups might not have been different enough during the experiment which could explain the non-significant differences found between the two groups.

Implications

The implications of these research findings for nursing and other allied health professional's practice are twofold: educative and supportive. The nursing profession's responsibilities lie in assisting individuals and groups with self-care practices. The nurses' role in society implies that through education and support the individual's potential for self-care will be maximized. To provide adolescents with skills which will facilitate their decision-making regarding their health care and to encourage circumstances where these skills could be acknowledged is a primary prevention task in which nurses should be actively involved.

Self-care education strategies rest on the principle that an individual must be an active participant in his or her own care. In order to initiate and perform activities which will maintain health and well-being, one needs knowledge and skills. In this investigation, findings within the experimental group indicate a significant increase in knowledge of the value of exercise following the eight week experiment. For

example, students learned how exercises can affect their fitness and how they can measure such effects. The practice of these skills could be helpful to adolescents in the practice of self-care since it increases the control over one's action. However, besides practice, encouragement is necessary to affect the retention of these skills. Therefore, students should be encouraged verbally in their effort by teachers and peers and physically through the use of facilities provided in the gymnasium. Such facilities could include the material necessary to permit the evaluation of one's fitness as well as the knowledge related to the effect of physical activity on one's body. Title IX's implementation will improve these opportunities for women. If didactic content is video taped, it becomes more accessible. Students could use these facilities as their own needs dictated and at their own pace.

In the area of support, physical education teachers should be encouraged to design courses which develop skills which will last a life time. Course descriptions could include benefits of exercise on one's body related to personal concerns of adolescents. These kinds of courses could provide students with the motivation to become involved in physical education classes when they are not required; and could encourage them to be involved in voluntary physical activity at least twice a week. In this investigation, findings relative to the experimental group revealed that students who volunteered for the investigation were involved in physical activity once or twice a week on their own.

Suggestions for Further Research

Suggestions for further research fall under the rubric of either replication or supplementation. Replication should be considered, if at all, only after some of the study's limitations are addressed: the use of a larger sample; use of different settings; better timing for the post tests; pre testing the questionnaires on similar populations to avoid problems with wording, randomization of subjects, are some suggestions to ensure the reliability of the research findings. In addition, the research tools should be refined so that the involvement could be analyzed more in detail.

Supplemental research, that is further research to follow up the findings of this study, is necessary in order to follow up the results of this investigation. Moreover, it could permit the comparison of the effect of the Education Amendment Act passed by Congress in 1972, the passage known as Title IX. In essence, Title IX forbids sex discrimination in any educational institution receiving federal money. The prohibition applies on the athletic field as well as in the classrooms. In the long run, this amendment should produce changes in attitudes towards, knowledge about, and involvement in physical activity on school-age girl populations because of the increased emphasis and availability of women's athletics.

Supplemental research can be approached through comparative investigations. In this approach, several modifications of this study would be necessary. First, all students (girls) involved in the physical education classes for the first time need to be exposed to the

video taped lectures, evaluation of the fitness, and to the skinfold measurement technique. Second, from this population, a random sample needs to be chosen to answer the research tools. Third, the research tools need to be refined to permit the analysis of involvement more in detail. Obviously, difficulties such as obtaining a willing population, i.e., teacher, students, and the loss of subjects at post test would have to be addressed. However, the data which might evolve could validate or invalidate the findings of this study concerning adolescent girls' attitudes towards, knowledge about, and involvement in physical activity. Specific research questions to be asked might include: Is the nature of the voluntary activity of a tenth-grader significantly different from that of an older adolescent girl? Is involvement in voluntary physical activity significantly related to the class that students are involved in, i.e., tennis, volleyball, shape up?

Longitudinal studies of girls involved in athletics in high school and college comparable to the Harvard study of men done by Paffenbarger and associates (1978) could be undertaken to get data of the life styles of groups. The identification of any long range trends or changes between youth and middle age could provide longitudinal data as well as corroborative observations on the importance of timing, duration, quality, and quantity of exercise in influencing risk of heart attack.

Comparative mortality and morbidity studies on women, using methods of assessing physical activity, could also be undertaken to furnish base line data on the relationship of coronary artery disease to physical inactivity in females.

Another study could evolve from the comparison of the involvement data in girls of high school age with involvement data in women of

college age and adult age. A random sample chosen among college and adult women could be compared with a random high school sample to determine if there is any relationship between the type of physical activity and the time involved in physical activity among these three age groups. The findings from this research could be valuable in developing programs for adolescent girls which could support the new trends, e.g., more team groups, or programs which will be more related to the adolescent personal concerns.

Summary

The effect of the "Health and Fitness Package" as a significant factor to increase the attitudes toward, knowledge about, and involvement in physical activity in an adolescent girls population was not shown to be significant in this study. The limitation of the sample, and other factors, at least partially explained the results obtained. The implications of the findings for nursing practice are educative and supportive. It is through education and support that the individual's potential for self-care will be maximized.

BIBLIOGRAPHY

- Ahammer, I.M. Desirability judgements as a function of item content, instructional set, and sex: a life span developmental study. Human Development, 1971, 14, 195-207.
- Ames, L.B. Changes in Rorschach response throughout the human life span. Genetic Psychology Monographs, 1966, 74, 89-125.
- Astrand, P.-O., Eriksson, B.O., Nylander, I., Engstrom, I., Karlberg, P., Saltin, B., & Thoren, C. Girl swimmers with special reference to respiratory and circulatory adaptation and gynecological and psychiatric aspects. Acta Paediat. Scand. suppl., 1963, 147, 1-75.
- Astrand, P.-O., & Rodahl, L. Testbook of Work Physiology. New York: McGraw Hill Publishing, 1970.
- Astrand, P.-O. Health and Fitness. Ottawa: The Minister of National Health and Welfare. 1975.
- Bailey, D.A. Exercise fitness and physical education for the growing child: a concern. C.J.P.H., 1973a, 64 (Sept./Oct.), 421-430.
- _____. A self-administered home test of physical fitness. Saskatoon, Canada, 1973 (unpublished).
- Bailey, D.A., Shephard, F.J., Mirwald, R.L., & McBride, G.A. A current view of Canadian cardio-respiratory fitness. Canadian Medical Association Journal, 1974, 111, (July 6), 25-30.
- Bandura, A., & Walters, R. H. Adolescent Aggression. New York: The Ronald Press, 1959.
- Bandura, A., Ross, D., & Ross, S.A. Transmission of aggression through imitation of aggressive models. Journal of Abnormal and Social Psychology, 1961, 63(5), 575-582.
- Bandura, A. Social learning through imitation, in Jones, M.R. (ed.), Nebraska symposium on motivation, Lincoln: University Press, 1962
- Bandura, A., & Walters, R.H. Social Learning and Personality Development. New York: Holt, Rinehart & Winston, 1963.

- Bandura, A., & McDonald, F.J. Influence of social reinforcement and the behavior of models in shaping children's moral judgment. Journal of Abnormal and Social Psychology, 1963, 67(3), 274-281.
- Bandura, A., Ross, D., & Ross, S.A. Vicarious reinforcement and imitative learning. Journal of Abnormal and Social Psychology, 1963, 67(6), 601-607.
- Bandura, A., & Kupers, C.J. Transmission of Patterns of self-reinforcement through modeling. Journal of Abnormal and Social Psychology, 1964, 69(1), 1-9.
- Bandura, A. Influence of model's reinforcement contingencies on the acquisition of imitative responses. Journal of Personality and Social Psychology, 1965, 1(6), 589-595.
- Bandura, A., & Mischel, W. Modification of self-imposed delay of reward through exposure to live and symbolic models. Journal of Personality and Social Psychology, 1965, 2(5), 698-705.
- Bandura, A., & Perloff, B. Relative efficacy of self-monitored and externally imposed reinforcement systems. Journal of Personality and Social Psychology, 1967, 7(2), 111-116.
- Bandura, A. Principles of behavior modification New York: Holt, Rinehart and Winston, 1969.
- _____. Social learning theory. Morristown, New Jersey: General Learning Press, 1971.
- _____. Social learning theory. Englewood Cliffs, New Jersey: Prentice Hall, Inc., 1977.
- Barnes, C.P., and Olson, J.N. Usage patterns of non drug alternatives in adolescence. Journal of Drug Education, 1977, 7(4), 359-368.
- Bell, R.D., and Rasmussen, R.L. Exercise and the myocardial capillary-fiber rates during growth. Growth, 1974, 38, 237-244.
- Bernard, D. Les loisirs de l'enfant a l'age scolaire. Enfance, 1965, 1(3), 339-353.

- Blair, M., & Kizer, D.L. An assessment of expressed attitudes toward physical activity among high school athletes and coaches in specific sports from two geographic areas, Doctoral Dissertation University of Northern Colorado, 1971.
- Boileau, R.A., Buskirk, E.R., Horstman, D.H., Mendez, J., Nicholas, W.C. Body composition changes in obese and lean men during physical conditioning, Med. Sci. Sports, 1971, 3(4), 183-189.
- Boyer, J.L., & Kasch, F.W. Exercise therapy in hypertensive men. J.A.M.A., 1970, 211(10), 1668-1671.
- Breslow, L., & Buell, P. Mortality from coronary heart disease and physical activity of work in California. Journal of Chronic Dis., 1960, 11 (April), 421-444.
- Brittain, C.V. Adolescent choices and parent-peer cross-pressure. American Sociological Review, 1963, 28, 385-391.
- Califano, J.A., Jr. To smoke or not to smoke: a really free choice for our young people. World Smoking and Health, Fall 1978, 3(3), 47-48.
- Campbell, D.T., & Stanley, J.C. Experimental and quasi-experimental designs for research. Chicago: Rand McNally and Company, 1963.
- Chapman, J.M., & Massey, F.J. The interrelationship of serum cholesterol hypertension, body weight and risk of coronary disease. Journal of Chronic Dis., 1964, 17, 933-949.
- Clausen, J.P. Circulatory adjustments to dynamic exercise and effect of physical training in normal subjects and in patients with coronary artery disease. Prog. Cardiovas. Dis., 1976, 18(6), 459-495.
- Codini, M., Yipintsoi, T., & Scheur, J. Cardiac responses to moderate training in rats. Journal of Appl. Physiol., 1977, 42, 262-266.
- Cohen, M.V., Yipintsoi, T. Malhotra, A., & Scheur, Jr. Effect of exercise on coronary collateral function. Amer. J. Cardiol., 1977, 39, 262.

- Cumming, G.R. Current levels of fitness. Canadian Medical Association Journal, 1967, 96 (March 25), 868-877.
- Currens, J.H., & White, P.D. Half a century of running, New England Journal of Medicine, 1961, 265:2, 988-993.
- Dempsey, J.A. Anthropometrical observations on obese and non obese young men undergoing a program of vigorous physical exercises. Res. Quart., 1964, 35(3), 275-287.
- DiGirolamo, M., & Schalant, R.D. Etiology of coronary atherosclerosis, in J. Wallis Hurst, R. Bruce Logan, C. Schalant, Nanette Koss Wenger (eds.), The Heart (3rd ed.). New York: McGraw-Hill Books, Co., 1977, 1103-1120.
- Dobel, W.J., & Eriksson, B.O. Physical training maximal oxygen uptake and dimensions of the oxygen transporting and metabolizing organs in boys 11-13 years of age. Acta Paediatr. Scand., 1972, 61, 653-660.
- Drinkwater, B.L. Physiological responses of women to exercise in Wilmore J.H. (ed.), Exercise and Sports Science Reviews, Vol. 1. New York: Academic Press, 1973.
- Drinkwater, B.L., & Horvath, S.M. Responses of young female track athletes to exercise. Med. Sci. Sports, 1971, 3(2), 56-62.
- Durbeck, D.C., Heinzelmann, F., Schacter, J., Haskell, W.L., Payne, G., Moxley, R., Nemiroff, M., Limoncelli, D., Arnoldi, L., & Fox, III, S.M. The NASA-USPHS health evaluation and enhancement program. Amer. J. Cardiol., 1972, 30, 784-790.
- Edwards, D.A.W. Estimation of the proportion of fat in the body of measurement to skinfold thickness. Amer. Journal of Clin. Nutr., 1956, 4(1), 35-36.
- Eklom, B. Physical training in normal boys, in adolescence. Acta Paediatr. Scand. suppl., 1971, 217, 60-62.
- Farquhar, J.W. The American way of life needs not to be hazardous to your health. Stanford, California: Stanford Alumni Association, 1978.
- Feinleib, M., Kannel, W.B., Garrison, R.J., McNamara, P.N., & Costelli, W. The Framingham Offspring Study. Design and preliminary data. Preventive Medicine, 1975, 4, 518-525.

- Fourth Report of the Director of the National Heart, Lung and Blood Institute (U.S. Department of Health, Education and Welfare Publication No. (NIH) 77-1170, DHEW, National Institute of Health, 1977.
- Fox III, S.M., Naughton, J.P., & Haskell, W.L. Physical activity and the prevention of coronary heart disease. Ann. Clin. Research, 1971, 3, 404-432.
- Fox III, S.M. Physical activity and coronary heart disease, in Chung, E.K. (ed.) Controversy in Cardiology, the practical approach, New York: Springer-Verlag, 1976, 201-219.
- Francis, J.E. Attitudes toward physical activity of physical education teachers and their grade twelve male students, M.S. Thesis Physical Education, University of Wisconsin, 1973.
- Franklin, B.A. Motivating and educating adults to exercise. J.O.P.E.R., 1978 (June), 13-17.
- Friedman, M., & Rosenman, R.H. Type A behavior and your heart. New York: Alfred Knopf, 1974.
- Froelicher, V.F., & Oberman, A. Analysis of epidemiologic studies of physical inactivity as risk factor for coronary artery disease. Progress in Cardiovascular Disease, 1972, 15(1), (July-August), 41-65.
- Froelicher, V.F. Exercise and the prevention of coronary atherosclerotic heart disease, in Wenger, N.K. (ed.), Exercise and the Heart. Philadelphia: F.A. Davis Company, 1978, 13-23.
- Ghisholm, D.M., Collis, M.L., Kulak, L.L., Davenport, W., & Gruber, N. Physical activity readiness. B.C. Medical Journal, 17(11), 1975, 375-378.
- Gilliam, T.B., Katch, V.L., Thorland, W., & Weltman, A. Prevalence of coronary heart disease risk factors in active children 7 to 12 years of age. Med. Sc. Sports, 1977, 9(1), 21-25.
- Goode, R.C., Firstbrook, J.B., & Shephard, R.J. Effects of exercise and a cholesterol-free diet on human serum lipids. Canadian Journal of Physiol. Pharmacol., 1966, 44, 575-580.
- Goode, R.C. The physical fitness of our school children. Education Canada, 1976, (Winter), 27-31.

- Hames, C.G., Heyden, S., Cassel, J.C., Bartel, A., & Tyroler, H.A. Prevalence versus incidence of ischemic heart disease in relation to physical activity--Evans County, Georgia Study. Presented at conference on Cardiovascular Disease Epidemiology, San Diego CA., March 1971.
- Hamilton, P., & Andrew, G.M. Influence of growth and athletic training on heart and lung functions. Europ. J. Appl. Physiol., 1976, 36, 27-38.
- Heinzelmann, F., & Bagley, R.W. Response to physical activity programs and their effects on health behavior. Public Health Reports, 1970, 85(10), 905-911.
- Holloszy, J.O., Skinner, J.S., Toro, G., & Cureton, T.K. Effects of a six months program of endurance exercise on the serum lipids of middle-aged men. Amer. J. Cardiol., 1964, 14, 753-760.
- Horrocks, J.E., & Mussman, M.C. Developmental trends in wishes, confidence and the sense of personal control from childhood to middle maturity. Journal of Psychology, 1973, 84, 241-252.
- Horrocks, J.E. Psychology of adolescence (4th ed.). Boston: Houghton Mifflin Company, 1976.
- J Eugene McAteer High School Accreditation Report Form A to the Western Association of Schools and Colleges, 1977.
- Jokl, E. Physical activity and body composition: Fitness and Fatness. Annals of N.Y. Academy Sci., 1963, 110, 778-794.
- Jones, R.A., Sensenig, J., & Haley, J.V. Self conception: extraction of structures from free-response protocols. Proceedings of the 81st Annual Convention of the American Psychological Association, 1973, 81, 231-232.
- Kahn, H.A. The relationship of reported coronary heart disease mortality to physical activity of work. Amer. J. Public Health, 1963, 53(7), 1058-1067.
- Kannel, W.B. Habitual level of physical activity and risk of coronary heart disease. The Framingham Study. Canadian Medical Association Journal, 1967, 96 (March 25), 811-812.

- Kannel, W.B., & Dawber, T.R. Contributors to coronary risk implications for prevention and public health: The Framingham Study. Heart & Lung, 1972, 1(6), 797-809.
- Keasey, C.B. Experimentally induced changes in moral opinions and reasoning. Journal of Personality and Social Psychology, 1973, 26, 30-38.
- Kenyon, G.S. A conceptual model for characterizing physical activity. Res. Quart., 1968, 39, 96-105(a).
- _____. Six scales for assessing attitudes toward physical activity. Res. Quart., 1968, 39, 566-574(b).
- _____. Values held for physical activity by selected urban secondary school students in Canada, Australia, England, and the United States. Washington, D.C.: United States Office of Education, 1968(c).
- Konopka, G. Formation of values in the developing person. American Journal of Orthopsychiatry, 1973, 43(1), 86-96.
- Kramer, J.D., & Lurie, P.R. Maximal exercise tests in children. Amer. J. Dis. Child., 1964, 108(3) (Sept.), 283-297.
- Lalonde, M. The untold epidemic: heart attacks and strokes. Canadian Journal Public Health, 1977, 68, 277-281.
- Lauer, R.M., Connor, W.E., Leaverton, P.E., Reiter, M.A., & Clarke, W.R. Coronary heart disease risk factors in school children: The Muscantine study. The Journal of Pediatrics, 1975, 86(5), 697-706.
- Leon, A.S., & Bloor, C.M. The effect of complete and partial deconditioning on exercise-induced cardiovascular changes in the rat. Adv. Cardiol., 1976, 18, 81-92.
- Letounov, S. The importance of physical education and sport as preventive measures for healthy and sick persons. Journal Sports Med., 1969, 9, 142-151.
- Maccoby, N., & Farquhar, J.W. Communication for health: unselling heart disease. Journal of Communication, 1975, 25(3), 114-126.

- Maccoby, N., Farquhar, M.W., Wood, P.D., & Alexander, J. Reducing the risk of cardiovascular disease: effects of a community-based campaign on knowledge and behavior. Journal of Community Health, 1977, 3(2), 100-114.
- Mahoney, M.J., & Thoresen, C.E. Self control: power to the person. Monterey, California: Book/Cole, 1974.
- McDonough, J.R., Hames, C.G., Stulb, S.C., & Garrison, G.E. Coronary heart disease among negroes and whites in Evans County, Georgia. Journal Chronic Dis., 1965, 18, 443-468.
- McMullen, B. Attitudes toward physical activity of high school girls with older athletic siblings. M.S. Thesis, Department of Health, Physical Education and Recreation, Kansas State University, 1975.
- Mercer, R. Perspectives on adolescent health care. New York: J.B. Lippincott, Co., 1979.
- Miller, N.E., & Dollard, J. Social learning and imitation. New Haven: Yale University Press, 1941.
- Milvy, P., Forbes, W.F., & Brown, K.S. A critical review of epidemiological studies of physical activity. Annals of N.Y. Academy of Science, 1977, 301 (Oct.), 519-549.
- Mischel, W. Introduction to personality. New York: Holt, Rinehart & Winston, 1971.
- Mitrani, Y., Karplus, H., & Brunner, D. Coronary atherosclerosis in cases of traumatic death in Brunner, D. (ed.), Physical Activity and Aging Medicine and Sports, Vol. IV. Baltimore: University Press, 1970.
- Montoye, H.J. Summary of research on the relationship of exercise to heart disease. Journal Sports Med. Phys. Fitness, 1962, 2, 35-43.
- Moody, D.L., Kollias, J., Buskirk, E.R. The effect of a moderate exercise program on body weight and skinfold thickness in overweight college women. Med. Sci. Sports, 1969, 1(2), 75-80.
- Morris, J.N., Heady, J.A., & Raffle, P.A.B. Physique of London busmen. Epidemiology of uniforms. Lancet, 1956, (Sept 15), 569-570.

- Morris, J.M., Hedy, J.A., Raffle, P.A.B., Roberts, C.G., & Parks, J.W. Coronary heart disease and physical activity of work. Lancet, 1953, (Nov. 21, 28) 1053-1057, 1111-1120.
- Morris, J.N., Kagan, A., Pattison, D.C., & Gardner, M.J. Incidence and prediction of ischaemic heart disease in London busmen. Lancet, 1966 (Sept. 10), 553-559.
- Morris, J.N., Chave, S.P.W., Adam, C., Sirey, E., Epstein, L., & Sheehan, D.J. Vigorous exercise in leisure-time and the incidence of coronary heart disease. Lancet, 1973 (Feb. 17), 333-339.
- Morris, J.N., & Crawford, M.D. Coronary heart disease and physical activity of work. Brit. Med. J., 1958 (Dec. 20), 1485-1496.
- Muss, R.E. The implications of social learning theory for an understanding of adolescent development. Adolescence, 1976, 11(44), (Spring), 61-85.
- Naughton, J., Shanbour, K., Armstrong, R., McCoy, J. & Lategola, M.T. Cardiovascular responses to exercises following myocardial infarction. Arch. Intern. Med., 1966, 117 (April), 541-545.
- Paffenbarger, Jr., R.S., Wing, A.L., & Hyde, R.T. Physical activity as an index of heart attack risk in college alumni. Amer. J. Epidemiol., 1978, 108, 161-175.
- Paffenbarger, Jr., R.S., Hale, W., & Brand, R., et al. Work-energy level, personal characteristics and fatal heart attack: a birth-cohort effect. Amer. J. Epidemiol., 1977, 105(3), 200-213.
- Paffenbarger, Jr., R.S., Laughlin, M.E., Gima, A.S., & Black, R.A. Work activity of longshoremen as related to death from coronary heart disease and stroke. New England Journal of Medicine, 1970, 282(20), 1109-1114.
- Paffenbarger, Jr., R.S., Notkin, J., Krueger, D.E., Wolf, P.A., Thorne, M.C., LeBauer, E.J., & Williams, J.L. Chronic disease in former college students. II. Methods of study and observations on mortality from coronary heart disease. Amer J. Public Health, 1966, 56(6), 962-971.
- Paffenbarger, Jr., R.S., & Wing, A.L. Characteristics in youth predisposing to fatal stroke in later years. The Lancet, 1967, (April 8), 753-754.

- Parizkova, J. Impact of age, diet and exercise on men's body composition. Annals N.Y. Academy Sci., 1963, 110, 661-672.
- Parizkova, J. Nutrition and its relation to body composition in exercise. Proceedings Nut. Soc., 1966, 25, 93-99.
- Phelps, H.R., & Horrocks, J.E. Factors influencing informal groups of adolescents. Child Development, 1958, 29(1), 69-86.
- Polednak, A.P., & Damon, A. College athletics longevity and cause of death. Human Biol., 1970, 42, 28-46.
- Pollock, N.J. The quantification of endurance training programs in Wilmore, J.H. (ed.), Exercise and Sports Sciences Reviews. New York: Academic Press, Vol. 1, 1973.
- Pomeroy, W.C., & White, P.D. Coronary heart disease in former football players. J.A.M.A., 1958, 167(6), 711-714.
- Poole, G.W. Guidelines and rationale for individual physical fitness development. Physiotherapy Canada, 1977, 29(3) (July), 148-156.
- Pressey, S.L., Robinson, F.P., & Horrocks, J.E. Psychology in education. New York: Harper & Row, 1959.
- Rarick, G.L. Competitive sports in childhood and early adolescence in Rarick, G.L. (ed.), Physical activity, human growth and development. New York: Academic Press, Chapter 14, 1973, 364-386.
- Reiff, G.G., & Hunsicker, P.A. Youth fitness: 1975. AAHPER update, 1976, (June), 3.
- Rose, G. Physical activity and coronary heart disease. Proceedings of Royal Soc. Med., 1969, 62 (Nov.), 1183-1187.
- Rose, G., Prineas, R.J., & Mitchell, J.R.A. Myocardial infarction and the intrinsic calibre of coronary arteries. Brit. Heart J., 1967, 29, 548-552.
- Rosenman, R.H. The influence of different exercise patterns on the incidence of coronary heart disease in the western collaborative group study, in Brunner, D. (ed.), Physical Activity and Aging, Medicine and Sports, Vol. IV. Baltimore: University Park Press, 1970.

- Schutz, R.W., & Wood, T.M. Physical fitness and attitude, knowledge and involvement in physical activity in the British Columbia population. A pilot study, 1974, unpublished.
- Sears, R.R. A theoretical framework for personality and social behavior. The American Sociologist, 1951, 6, 476-483.
- Sears, R.R., Maccoby, E.R., & Levin, H. Patterns of child rearing. Evanston, Ill: Row Peterson and Co., 1957.
- Shanoff, H.M., Little, A., Murphy, E.A., & Rykert, H.E. Studies of male survivors of myocardial infarction due to "essential" atherosclerosis. 1. Characteristics of the patients. Canadian Medical Association Journal, 1961, 84 (March 11), 519-530.
- Shephard, R.J. World standards of cardiorespiratory performances. A.M.A. Arch. Env. Health, 1966, 13, 665-672.
- Shephard, R.J., Bailey, D.A., & Mirwald, R.L. Development of the Canadian Home Fitness Test. Canadian Medical Association Journal, 1976, 114, (April 17), 675-679.
- Shephard, R.J., Allen, C., Bar-Or, O., Davis, C.T.M., Degre, S., Hedman, R., Ishii, K., Kaneko, M., LaCour, J.R., di Prampero, P.E., & Seliger, V. The working capacity of Toronto school children Part I. Canadian Medical Association Journal, 1969, 100 (March 22, 29, 560-566; Part II, 1969, 100 (April 19), 705-714.
- Siegel, S. Nonparametric statistics for the behavioral sciences. New York: McGraw-Hill, 1956.
- Simon, S.B. Promoting the search for values. Educational opportunity forum, 1969, 1, 75-84.
- Skinner, J.S., Benson, H., McDonough, J.R., & Hames, C.G. Social status, physical activity and coronary proneness. Journal Chron. Dis., 1966, 19, 773-783.
- Spain, D.M., & Bradess, V.A. Occupational physical activity and the degree of coronary atherosclerosis in "normal" men. Circulation, 1960, 22, 239.

- Stamler, J., Kjelsberg, M., & Hall, Y. Epidemiologic studies on cardiovascular-renal diseases. 1. Analysis of mortality by age-race-sex-occupation. Journal Chronic Dis., 1960, 12(4), 440-455.
- Stamler, J., Lindberg, H.A., Berkson, D.M., Shaffer, A., Miller, W., & Poindexter, A. Prevalence and incidence of coronary heart disease in strata of the labor force of a Chicago industrial corporation. Journal Chronic Dis., 1960, 11(4), 405-420.
- Stim, R. Disco is going strong. California Living Magazine, April 8, 1979.
- Strobel, E., & Bird, M. How we teach it. J.O.P.E.R., 1978 (June), 67-68.
- Stuart, R.B., & Davis, B. Slim chance in a fat world. Champaign, Ill: Research Press, 1976.
- Taylor, H.L. Klepetar, E., Keys, A., Parlin, W., Blackburn, H., & Puchner, T. Death rates among physically active and sedentary employees of the railroad industry. Amer J. Public Health, 1962, 52(10), 1697-1707.
- Taylor, H.L., Blackburn, H., Brozek, J., Parlin, R.W., & Puchner, T. Railroad employees in the United States. Acta Med. Scand. Suppl., 1966, 460, 55-115.
- Taylor, H.L. Occupational factors in the study of coronary heart disease and physical activity. Canadian Medical Association Journal, 1967, 96, (March 25), 825-831.
- Taylor, H.L., Blackburn, H., Puchner, T., Vasquez, C.L., Parlin, R.W., & Keys, A. Coronary heart disease in selected occupations of American railroads in relation to physical activity. Circulation, 1969, 40(4), Suppl. No. 111, 202.
- Vital Statistics. Major causes of death for each sex and age group. Statistics Canada, Catalogue No. 84-202. Ottawa: 1976.
- Wilhelmsen, L., Tibblin, G., Aurell, M., Bjure, J., Ekström-Jodal, B., & Grimby, G. Physical activity, physical fitness and risk of myocardial infarction. Adv. Cardiol., 1976, 18, 217-230.

- Wilmore, J.H., & Behnke, A.R. An anthropometric estimation of body density and lean body weight in young men. Journal Appl. Physiol., 1969, 27(1), 25-31.
- Wilmore, J.H., & McNamara, J.J. Prevalence of coronary heart disease risk factors in boys 8 to 12 years of age. Journal Pediatrics, 1974, 84 (April), 527.
- Wilmore, J.H., & Behnke, A.R. An anthropometric estimation of body density and lean body weight in young women. Amer. J. Clin. Nutr., 1970, 23(3), 267-274.
- Wilmore, J.H. The female athlete. The Journal of School Health, 1977 (April), 227-233.
- Wilmore, J.H., Royce, J., Girondola, R.N., Katch, F.I., & Katch, V.L. Body composition changes with a 10-week program of jogging. Med. Sci. Sports, 1970, 2, 113-117.
- Wood, P., & Haskell, W. Plasma lipoprotein distribution in male and female runners. Annals N.Y. Academy of Sciences, Vol. 301, 748-763, 1977.
- Zukel, W.J., Lewis, R.J., Enterline, P.E., Painter, R.C., Ralston, L.S., Fawcett, R.F., Meredith, A.P., & Peterson, B. A short-term study of the epidemiology of coronary heart disease. Amer. J. Pub. Health, 1959, 49(12), 1630-1639.

FIGURES

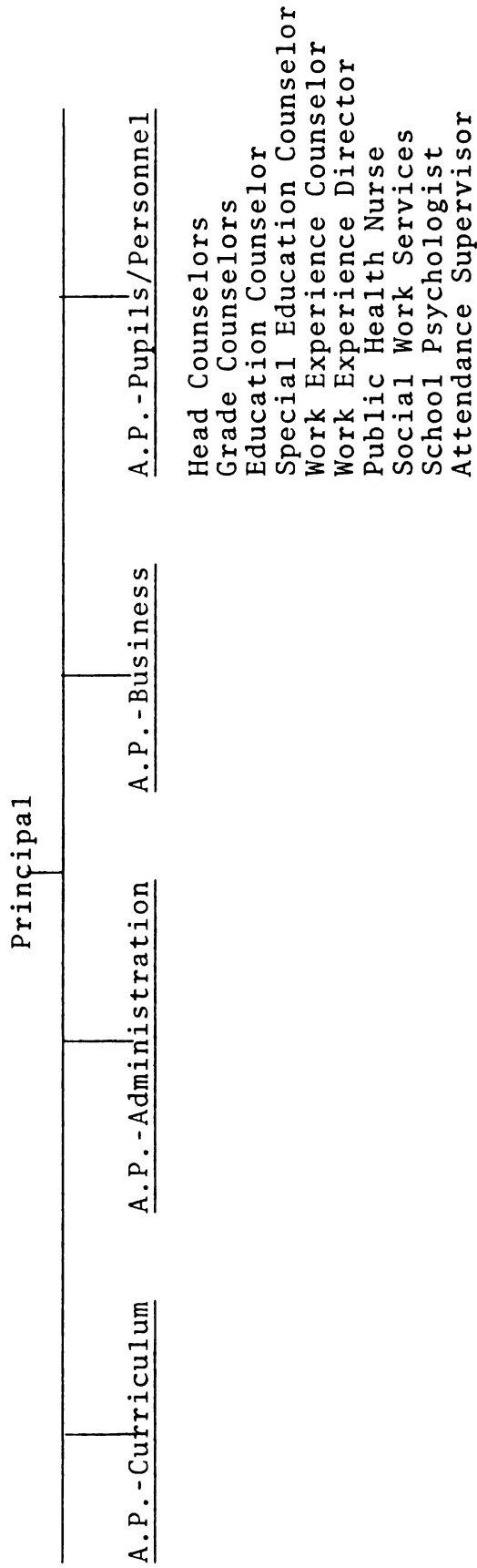
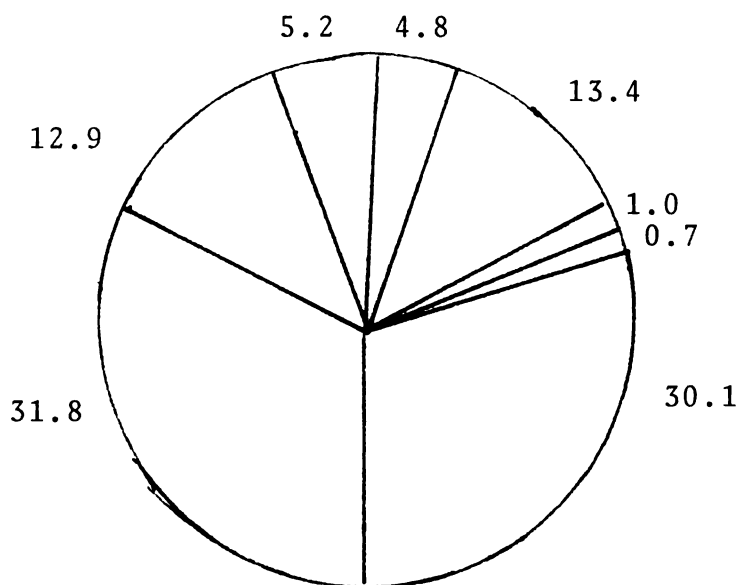


Figure 1

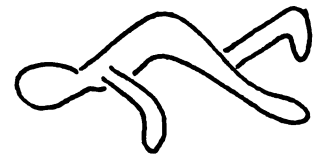
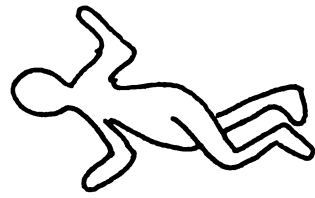
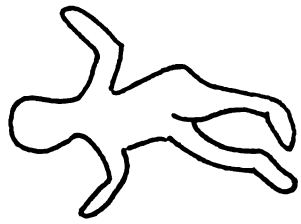
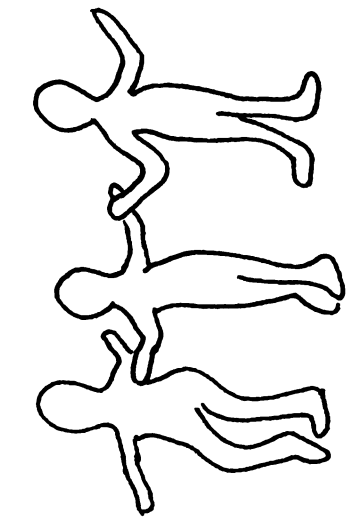
Organizational Structure of a San Francisco High School



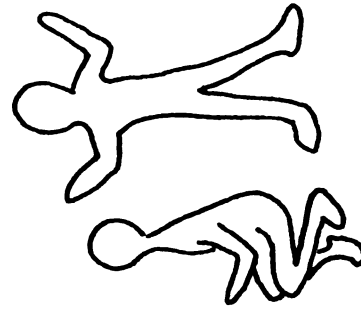
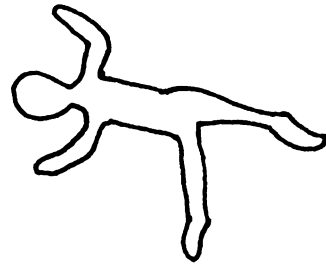
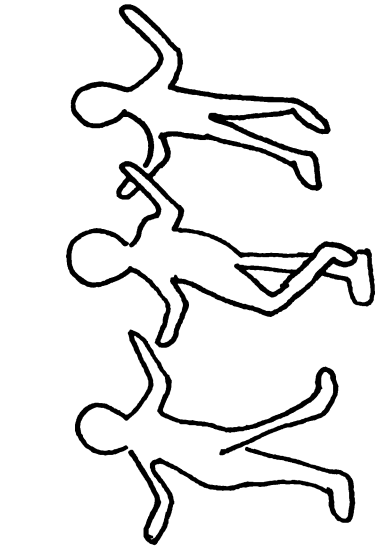
White	31.8% - 674	Japanese	1.0% - 22
Spanish Speaking	12.9% - 273	American Indian	0.7% - 15
Black	30.1% - 637	Filipino	5.2% - 111
Chinese	13.4% - 284	Other Non White	4.8% - 101

Total Population: 2118; boys = 1179; girls = 939

Figure 2
Population of a San Francisco
High School



Models for exercises number two.



Models for exercises number four

Figure 3

Models for Exercises for the "Health Hustle" Program

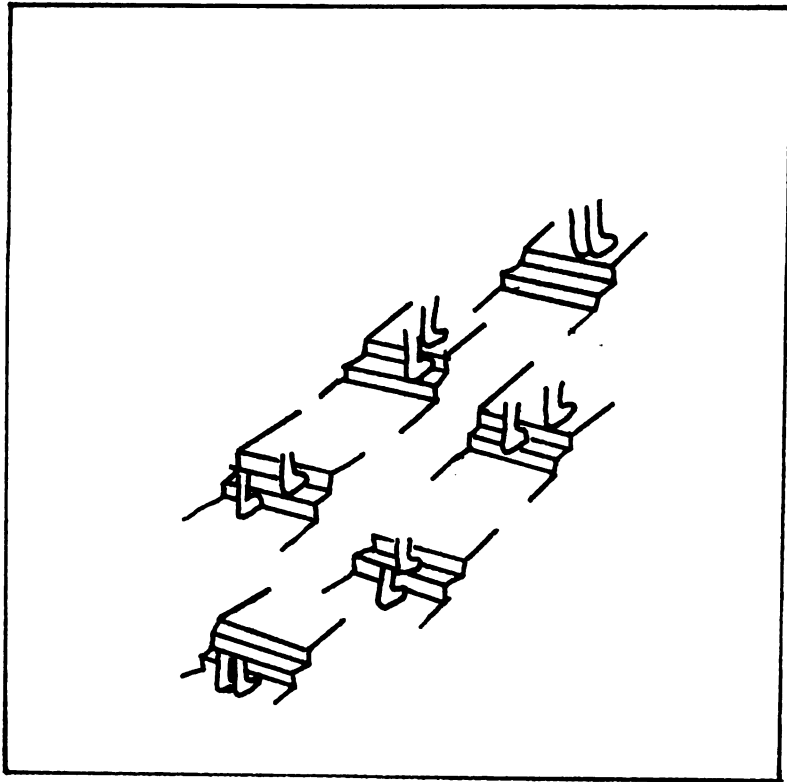


Figure 4

Stepping Technique of Canadian Home Fitness Test

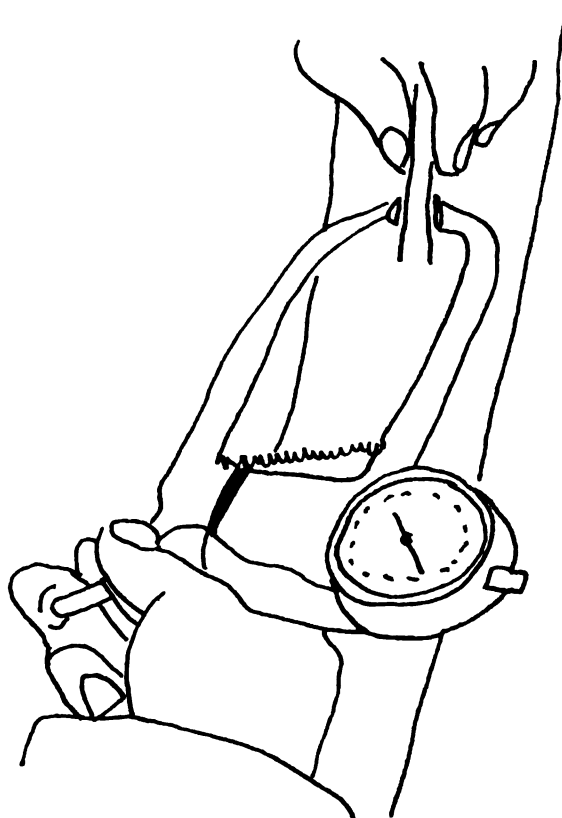


Figure 5
Technique for Measurement of the Skinfold
Fat at the Triceps Muscle

Hello:

This card is to remind you that I need your participation in answering the questionnaire concerning attitudes, knowledge, and involvement in physical activity. This is the last, but not the least part of the study you were involved in before Christmas. Will you please get in touch with me, in one of your free periods? Between March 12th and March 15th. Between 8:15 a.m. and 3:00 p.m. In the Dean's office
NB. Please, bring this card with you.

Thank you for your cooperation.

Fernande Hebert-Martin
(Telephone Number)

San Francisco, Ca.
February 23, 1979

Figure 6

First Post Card Mailed to Subjects of
the Experimental and the First Control Group

Hello:

This 2nd card is to remind you that I need your participation in answering the questionnaire concerning attitudes, knowledge, and involvement in physical activity. This is the last, but not the least part of the study you were involved in before Christmas. Will you please get in touch with me, in one of your free periods? Between March 12th and March 17th. Between 8:15 a.m. and 3:00 p.m. In the Dean's office NB. Please, bring this card with you.

Thank you for your cooperation.

Fernande Hebert-Martin
(Telephone Number)

San Francisco, CA.
March 8, 1979

Figure 7

Second Post Card Mailed to Subjects of
the Experimental and the First Control Group

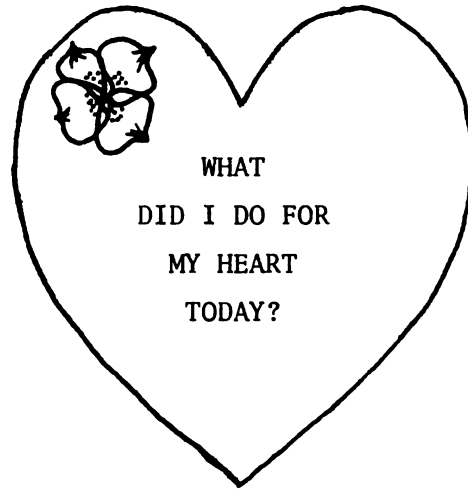


Figure 8

Heart Shaped Out of "Paper Mache"

APPENDIX

PLEASE NOTE:

Copyrighted materials in this document have not been filmed at the request of the author. They are available for consultation, however, in the author's university library.

These consist of pages:

152-180

**University
Microfilms
International**

300 N. ZEEB RD., ANN ARBOR, MI 48106 (313) 761-4700

APPENDIX A

Last Four Digits
Of Your Phone No.: _____

Date: _____

Age: _____

Physical Activity Readiness Questionnaire*

(PAR-Q)

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

YES ()

Has your doctor ever said you have heart trouble?

Do you frequently suffer from pains in your heart or chest?

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

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

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?

If there is a good physical reason not mentioned here, why you should not follow an activity program even if you wanted to?

Is there any chance that you might be pregnant?

Thank you very much for your cooperation in completing this questionnaire.

*Reference: PAR-Q Validation Report
British Columbia Department of Health
June 1975 (Modified Version)
Ghisholm, et al.

APPENDIX B

Consent Form to Participate in Research

(Experimental Group)

Ms. Fernande Hebert-Martin is a doctoral student in nursing at the University of California, San Francisco. She has explained the experiment to me. She can be reached at (phone number) if I have any further questions.

I understand that the purpose of the experiment is to find out if there is any difference in teaching methods in two physical education classes. I understand that I will be in the experimental group with different teaching methods. I understand that I will answer 3 questionnaires concerning attitudes, knowledge about, and involvement in physical activity three (3) times within five (5) months. This test may take about half an hour to complete each time.

I understand that the questionnaires will be coded to help keep it anonymous. Ms. Hebert-Martin will keep the code to herself. There is no risk involved as part of this test, unless I get anxious or embarrassed about a question.

I also understand that my physical fitness will be tested with a step test and a skinfold measurement will be taken on back of my right arm (tricep). These testings will occur three (3) times during an 8-week period and will last about 30 minutes each time. I will also attend a 5-minute teaching once a week and a 10-minute group discussion twice a week prior to the exercises to music which will last 30 minutes.

There is no risk involved as part of this testing, except feeling warm and short of breath after the step test. Also, a few people experience a slight bruise at the site of the skinfold measurement (tricep or back of the arm). Should this occur, the bruise will disappear in a few days.

There will be no benefit to me, unless it is found that the type of teaching in the group I am in is better than the other group.

My participation is voluntary and I may decline to enter into this experience, or may withdraw from it at any time without harming my status as a student.

I know that my parents will be asked to give their consent for my participation in this experience only after I have given mine. If they do not consent, I understand that I cannot participate.

I consent to participate in this experiment.

Date: _____ Signature: _____ Age: _____

APPENDIX C

Consent Form to Participate in Research
(Control Groups)

Ms. Fernande Hebert-Martin is a doctoral student in nursing at the University of California, San Francisco. She has explained the experiment to me. She can be reached at (phone number) if I have any further questions.

I understand that the purpose of the experiment is to find out if there is any difference in teaching methods in two physical education classes. I understand that I will be in the regular P.E. class and have some additional questionnaires. I understand that I will answer 1-3 questionnaires concerning attitudes, knowledge about, and involvement in physical activity one (1) to three (3) times within five (5) months. This test may take about half an hour to complete each time.

I understand that the questionnaire will be coded to help keep it anonymous. Ms. Hebert-Martin will keep the code herself. There is no risk involved as part of this test, unless I get anxious or embarrassed about a question.

There will be no benefit to me, unless it is found that the type of teaching in the group I am in is better than the other group.

My participation is voluntary and I may decline to enter into this experience, or may withdraw from it at any time without harming my status as a student.

I know that my parents will be asked to give their consent for my participation in this experience only after I have given mine. If they do not consent, I understand that I cannot participate.

I give my consent to participate in this experiment.

Date: _____ Signature: _____ Age: _____

APPENDIX D

Consent Form to Participate in Research

(Parents of Experimental Group)

Ms. Fernande Hebert-Martin is a doctoral student in nursing at the University of California, San Francisco. She has explained the experiment to my daughter. She can be reached at (phone number) if I have any further questions.

I understand that the purpose of the experiment is to find out if there is any difference in teaching methods in two physical education classes. I understand that my daughter will be in the experimental group with different teaching methods. I understand that my daughter will answer 5 questionnaires concerning attitudes, knowledge about, and involvement in physical activity three (3) times within five (5) months. These tests may take half an hour to complete each time.

I understand that her physical fitness will be tested with a step test and a skinfold measurement will be taken on the back of her right arm (tricep). These testings will occur three (3) times during an 8-week period and will last about 30 minutes each time. My daughter will also attend a 5-minute teaching once a week and a 10-minute group discussion twice a week prior to the exercise to music, which will last 30 minutes.

There is no risk involved as part of this testing, except feeling warm and short of breath after the step test. Also, a few people experience a slight bruise at the site of the skinfold measurement (tricep or back of the arm). Should this occur, the bruise will disappear in a few days.

There will be no benefit to my daughter unless it is found that the type of teaching in the group she is in is better than the other group.

Her participation is voluntary and either of us may decline to enter into this experience, or may withdraw from it at any time without harming her status as a student.

I know that she has been asked for permission. I consent to my daughter's participation in this experiment.

Date: _____ Signature: _____

APPENDIX E

Consent Form to Participate in Research
(Parents of Control Groups)

Ms. Fernande Hebert-Martin is a doctoral student in nursing at the University of California, San Francisco. She has explained the experiment to my daughter. She can be reached at (phone number) if I have any further questions.

I understand that the purpose of the experiment is to find out if there is any difference in teaching methods in two physical activity classes. I understand that she will be in the regular P.E. class and have some additional questionnaires. I understand that my daughter will answer 1-3 questionnaires concerning attitudes, knowledge about, and involvement in physical activity one (1) to three (3) times within five (5) months; this test may take half an hour to complete each time.

I understand that the questionnaire will be coded to help keep it anonymous. Ms. Hebert-Martin will keep the code herself. There is no risk involved as part of this test, unless my daughter gets anxious or embarrassed about a question.

There will be no benefit to my daughter unless it is found that the type of teaching in the group she is in is better than the other group.

Her participation is voluntary and either of us may decline to enter into this experiment, or may withdraw from it without harming her status as a student.

I know that she has been asked for permission. I consent to my daughter's participation in this experiment.

Date: _____ Signature: _____

APPENDIX F

Principal's Cover Letter

Dear Parents,

This year a few McAteer students are being given the opportunity to participate in a study being conducted by Fernande Hebert-Martin under the auspices of the University of California, San Francisco campus.

The objective of the study is to evaluate the relative effectiveness of two different methods of teaching a physical activity. The study is part of Ms. Hebert-Martin's doctoral program and is being conducted in cooperation with two of our teachers of physical education, Olga Abad and Barbara Goldberg.

I have reviewed the study proposal with Ms. Hebert-Martin and with Ms. Abad and Ms. Goldberg. I believe the study is timely and important and have approved our participation provided the students obtain parent permission as required by the University.

The attached University of California - required consent forms are for your information and signature. If you approve your daughter's participation, please have your daughter return the signed consent forms to Ms. Abad or to Ms. Goldberg within two school days.

Sincerely,

APPENDIX G

Attitudes, Knowledge and Involvement in
Physical Activity Inventory

This is a 30-minute test consisting of three (3) questionnaires. Do not spend too much time on any one question. Mark all answers on the question sheet. Mark only one answer for each question. Instructions are located on a title page preceding each questionnaire. Read the instructions carefully before beginning the questionnaire. THANK YOU!

PLEASE COMPLETE THE FOLLOWING INFORMATION SHEET
BEFORE TURNING THE PAGE

Last Four Digits of Your Phone Number: _____

Age: _____ Sex: _____ Female Race: _____

Grade: _____

Height (in inches): _____ Weight (in lbs.): _____

Cigarette Smoking: None ___ 1 to 6 ___ 6 to 20 ___ 1 pack or ___
a day a day more a day

Parents' Education:

Father: Primary ___ Secondary ___ College ___ University ___

Mother: Primary ___ Secondary ___ College ___ University ___

ATTITUDE TOWARD PHYSICAL ACTIVITY INVENTORY

The purpose of this inventory is to measure the meaning for you of certain concepts of physical activity by judging them against a series of descriptive scales. In taking this test, please make your judgements on the basis of what these things mean to you. On each page of the booklet you will find a different idea or concept to be judged and beneath it a set of scales. You are to rate the concept on each of these scales in the order in which they are given.

Here is how you are to use these scales:

If you feel that the concept in the box at the top of the page, for example "REFEREE", is very closely related to one end of the scale, you should place your check mark as follows:

REFEREE															
fair	X	:	_	:	_	:	_	:	_	:	_	:	_	X	unfair
	1		2		3		4		5		6		7		
or															
fair	_	:	_	:	_	:	_	:	_	:	_	:	_	X	unfair
	1		2		3		4		5		6		7		

If you feel that the concept is quite closely related to one or the other end of the scale (but not extremely), you should place your check mark as follows:

fair	_	:	X	:	_	:	_	:	_	:	_	:	_	X	unfair
	1		2		3		4		5		6		7		
or															
fair	_	:	_	:	_	:	_	:	_	:	X	:	_	X	unfair
	1		2		3		4		5		6		7		

If the concept seems only slightly related to one side as opposed to the other side (but is not neutral), then you should check as follows:

fair	_	:	_	:	X	:	_	:	_	:	_	:	_	X	unfair
	1		2		3		4		5		6		7		
or															
fair	_	:	_	:	_	:	_	:	_	:	X	:	_	X	unfair
	1		2		3		4		5		6		7		

Instructions (continued)

The direction toward which you check, of course, depends upon which of the two ends of the scale seem most characteristic of the thing you are judging. If you consider the concept to be neutral on the scale (that is, both sides of the scale seem equally associated with the concept), or if the scale makes no sense (that is, it is unrelated to the concept), then you should place your check mark in the middle space:

safe : : : X : : : dangerous
 1 2 3 4 5 6 7

IMPORTANT:

1. Place your check mark in the middle of spaces; not on the boundaries:

 THIS NOT THIS

 : : : X : : : X :

2. Be sure you check every scale for every concept - do not omit any.
3. Never put more than one check mark on a single scale.
4. The numbers under each scale are merely to assist in analysis of the data by computers. You do not need to pay any attention to them.

Sometimes you may feel as though you've had the same item before on the test. This will not be the case, so do not look back and forth through the items. Do not try to remember how you checked similar items earlier in the test. Make each item a separate and independent judgement. Work at a fairly high speed through the test. Do not worry or puzzle over individual items. It is your first impressions, the immediate "feelings" about the items, that we want. On the other hand, please do not be careless because we want your true impressions.

Kenyon, G.S. Six Scale for Assessing Attitude Toward Physical Activity. Research Quarterly, 1968, 39 (3), p. 566-574.

Using the Scales Below, Express on the Answer Sheet
What the Concept in the Box Means to You

PHYSICAL ACTIVITY AS A SOCIAL EXPERIENCE

Sports, games and other forms of physical recreation whose primary purpose is to provide opportunities for social participation; that is, to meet new people and continue personal friendships.

As you proceed, always be thinking about the idea or concept in the box.

1. good ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ bad
2. worthless ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ worthwhile
3. pleasant ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ unpleasant
4. sour ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ sweet
5. nice ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ awful
6. sad ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ happy
7. clean ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ dirty
8. relaxed ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ tense

Using the Scales Below, Express on the Answer Sheet
What the Concept in the Box Means to You

PHYSICAL ACTIVITY FOR HEALTH AND FITNESS

Participating in physical activity primarily to im-
prove one's health and physical fitness.

As you proceed, always be thinking about the idea or
concept in the box.

1. good $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ bad
2. worthless $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ worthwhile
3. pleasant $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ unpleasant
4. sour $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ sweet
5. nice $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ awful
6. sad $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ happy
7. clean $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ dirty
8. relaxed $\frac{\quad}{1} : \frac{\quad}{2} : \frac{\quad}{3} : \frac{\quad}{4} : \frac{\quad}{5} : \frac{\quad}{6} : \frac{\quad}{7}$ tense

Using the Scales Below, Express on the Answer Sheet
What the Concept in the Box Means to You

PHYSICAL ACTIVITY AS THE BEAUTY IN HUMAN MOVEMENT

Physical activities which are thought of as possessing
beauty or certain artistic qualities such as ballet,
gymnastics or figure skating.

As you proceed, always be thinking about the idea or
concept in the box.

1. good ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ bad
2. worthless ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ worthwhile
3. pleasant ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ unpleasant
4. sour ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ sweet
5. nice ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ awful
6. sad ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ happy
7. clean ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ dirty
8. relaxed ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ tense

Using the Scales Below, Express on the Answer Sheet
What the Concept in the Box Means to You

PHYSICAL ACTIVITY AS A THRILL BUT
INVOLVING SOME RISK

Physical activities providing, at some risk to the participant, thrills and excitement through speed, acceleration, sudden change of direction, and exposure to dangerous situations.

As you proceed, always be thinking about the idea or concept in the box.

1. good ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ bad

2. worthless ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ worthwhile

3. pleasant ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ unpleasant

4. sour ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ sweet

5. nice ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ awful

6. sad ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ happy

7. clean ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ dirty

8. relaxed ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ tense

Using the Scales Below, Express on the Answer Sheet
What the Concept in the Box Means to You

PHYSICAL ACTIVITY FOR THE RELEASE OF TENSION

The participation (or watching others participate)
in physical activities to get away from the problems
of modern living; to provide a release from "pent up
emotions."

As you proceed, always be thinking about the idea or
concept in the box.

1. good ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ bad
2. worthless ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ worthwhile
3. pleasant ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ unpleasant
4. sour ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ sweet
5. nice ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ awful
6. sad ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ happy
7. clean ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ dirty
8. relaxed ₁ : ₂ : ₃ : ₄ : ₅ : ₆ : ₇ tense

Using the Scales Below, Express on the Answer Sheet
What the Concept in the Box Means to You

PHYSICAL ACTIVITY AS PROLONGED AND
STRENUOUS TRAINING

Physical activities which require long periods of
strenuous and often painful training; which involve
stiff competition and demands that the individual
give up a number of pleasures for a period of time.

As you proceed, always be thinking about the idea or
concept in the box.

1. good 1 : 2 : 3 : 4 : 5 : 6 : 7 bad
2. worthless 1 : 2 : 3 : 4 : 5 : 6 : 7 worthwhile
3. pleasant 1 : 2 : 3 : 4 : 5 : 6 : 7 unpleasant
4. sour 1 : 2 : 3 : 4 : 5 : 6 : 7 sweet
5. nice 1 : 2 : 3 : 4 : 5 : 6 : 7 awful
6. sad 1 : 2 : 3 : 4 : 5 : 6 : 7 happy
7. clean 1 : 2 : 3 : 4 : 5 : 6 : 7 dirty
8. relaxed 1 : 2 : 3 : 4 : 5 : 6 : 7 tense

APPENDIX H

Degree of Involvement in Sport and
Physical Activity Questionnaire

Last Four Digits of Your Phone Number: _____

Age: _____ Sex: _____ Female Race: _____

Grade: _____

Instructions

The purpose of this inventory is to find out about your various interests and activities. If you look at the questions now, you will see that boxes [] or spaces (___) are given for your answers. For each question, write in the answer or mark the box that would be best for you.

Sample Question:

	3 to 5 times per week	at least once per week	once or twice per month	less often or never
On the average, how often do you eat carrots?	[]	[✓]	[]	[]

The example shows how you would answer if, on the average, you eat carrots at least once each week.

Answer each question after reading it carefully. Choose the answer that is nearest to describing your interests or activities.

Schutz, R.W., Wood, T.M. Physical fitness and attitudes, knowledge and involvement in physical activity in the British Columbia population, 1974, (unpublished).

1. Interest in Physical Activity. We have classified physical activity into six types. They will be familiar to you from a previous inventory. They are as follows:
- a) PHYSICAL ACTIVITY AS SOCIAL EXPERIENCE. Sports, games, and other forms of recreation whose primary purpose is to provide opportunities for social participation: that is, to meet new people and continue personal friendships. Example: Bicycle riding, running, dancing, tennis, volleyball, etc.
 - b) PHYSICAL ACTIVITY FOR HEALTH AND FITNESS. Participants in physical activity primarily to improve one's health and physical fitness. Example: Running, dancing, jogging, going up and down stairs, etc.
 - c) PHYSICAL ACTIVITY AS A THRILL BUT INVOLVING SOME RISK. Physical activities providing, at some risk to the participant, thrills and excitement through speed, acceleration, sudden change of direction, and exposure to dangerous situations. Example: Skiing, diving, mountain climbing, etc.
 - d) PHYSICAL ACTIVITY AS THE BEAUTY IN HUMAN MOVEMENT. Physical activities which are thought of as possessing beauty or certain artistic qualities, such as ballet, gymnastics, or figure skating, dancing, etc.
 - e) PHYSICAL ACTIVITY FOR THE RELEASE OF TENSION. The participation (or watching others participate) in physical activities to get away from the problems of modern living; to provide release from "pent-up emotions." Example: Running, dancing, swimming, soccer, basketball, etc.
 - f) PHYSICAL ACTIVITY AS PROLONGED AND STRENUOUS TRAINING. Physical activities which require long periods of strenuous and often painful training, which involve stiff competition and demand that the individual give up a number of pleasures for a period of time. Example: Basketball, volleyball, ballet, swimming, etc.

How often do you actually take part in physical activities that are best described by one or more of the following categories (when in season)? Mark one box in each row.

	3 to 5 times per week	at least once per week	once or twice per month	less often or never
a) PHYSICAL ACTIVITY AS A SOCIAL EXPERIENCE	[]	[]	[]	[]
b) PHYSICAL ACTIVITY FOR HEALTH AND FITNESS	[]	[]	[]	[]
c) PHYSICAL ACTIVITY AS A THRILL INVOLVING SOME RISK	[]	[]	[]	[]
d) PHYSICAL ACTIVITY AS THE BEAUTY IN HUMAN MOVEMENT	[]	[]	[]	[]
e) PHYSICAL ACTIVITY FOR THE RELEASE OF TENSION	[]	[]	[]	[]
f) PHYSICAL ACTIVITY AS PROLONGED AND STRENUOUS TRAINING	[]	[]	[]	[]

2. How often do you watch each of the following types of physical activities on television?

	3 to 5 times per week	at least once per week	once or twice per month	less often or never
a) Teen dance program	[]	[]	[]	[]
b) Exercise and physical fitness programs	[]	[]	[]	[]
c) Special sports events showing dangerous and thrilling sports	[]	[]	[]	[]
d) Programs showing the beauty of human movement (gymnastics, fancy diving, etc.)	[]	[]	[]	[]
e) College or professional sports	[]	[]	[]	[]

3. How often do you read about sports and physical activity in the newspaper? [] [] [] []

4. How often do you read about sports and physical activity in magazines or books? [] [] [] []

5. To how many clubs or organizations (outside of school) sponsoring sports or physical activity do you belong? two or more one none
[] [] []

6. Is there a television set in your home? yes no
[] []

7. On the average, how many hours do you watch television each week? (For example, if you watch 2 hours each day, then you watch 2 x 7 or 14 hours each week.)

a) In summer _____
(number of hours)

b) In winter _____
(number of hours)

8. On the average, how many hours do you watch sports on television each week?

a) In summer _____
(number of hours)

b) In winter _____
(number of hours)

9. In what sport or physical activity do you like to participate in the most? (Consider all types of sports from swimming to field hockey to dancing). Write in the sport you like to play the most. _____

10. In what sport or physical activity does you father (or guardian) like to participate in the most? _____
11. If you had the chance, name the sport in which you would like to participate in most of all (even though you may never have played it before). _____
12. What is your favorite sport to attend as a spectator? _____
13. What young woman movie star would you like to be like? Describe. _____

14. In what sport or physical activity does your mother (or guardian) like to participate in the most? _____
15. In what sport or physical activity do your older siblings like to participate in the most? _____
16. In what sport or physical activity does your best girl friend like to participate in the most? _____
17. In what sport or physical activity does your best boy friend like to participate in the most? _____
18. Do you have any particular equipment that you use to do physical activity, for example, bicycle, running shoes, tennis racquet, bathing suit, roller skates, etc. Please list. _____

19. Do you have a paper route? _____
20. Are you on a sport team in your high school or community? _____

21. Why do you take Physical Education classes? _____

22. What is your preferred activity after school? _____

APPENDIX I

Physical Activity and Health Questionnaire

Last Four Digits of Your Phone Number: _____

The following questions are designed to monitor your knowledge of health benefits of physical activity. The questionnaire consists of sixteen (16) true and false questions followed by fourteen (14) multiple choice questions.

Each true and false question is preceded by two (2) choices: true (T) and false (F). CIRCLE the correct response.

Sample Question:

- T F 1. Flowers grow as well in darkness as they do in sunlight.

Simply choose the best or most appropriate answer for the multiple choice questions and mark your answer in the space provided to the right of the question.

Sample Question:

1. Which of the following best describes the conditions under which flowers grow?

- a) darkness
b) sunlight
c) none of the above

ANSWER b

- T F 1. Regular exercise can help prevent heart disease.
- T F 2. At rest, a fit person's heart generally beats faster than an unfit person's heart.
- T F 3. Light exercise over long periods of time is a good way to develop muscular strength.
- T F 4. Exercise generally results in a stronger pumping ability of the heart.
- T F 5. Jogging is beneficial to health primarily because it relaxes the muscles.
- T F 6. Regular exercise can increase the size and strength of the heart.
- T F 7. Physical activity is one of many factors which act to retard both the physical and mental effects of aging.
- T F 8. Exercise which improves muscle tone, and increases strength, endurance, and flexibility is the most effective way to ensure good posture.
- T F 9. Strenuous physical exercise and hard manual work weaken one's heart and may cause heart disease.
- T F 10. Deep breathing exercises, such as those practiced in Yoga, are a good substitute for daily jogging.
- T F 11. Regular physical activity will improve sexual vigor.

- T F 12. Exercising in cold weather has few, if any, bad effects on the respiratory tract.
- T F 13. Vibrating machines, such as those found in most weight reducing salons, are a good method of taking off weight.
- T F 14. Yoga exercises result in significant gains in strength and endurance.
- T F 15. To lose weight one must burn up more calories through exercise than are taken in by eating.
- T F 16. Strenuous activity during the course of a cold will aid in "sweating out" the illness.
17. Which of the following is generally considered by experts to be the foundation of physical fitness?
- cardiovascular endurance
 - flexibility
 - muscular strength
 - none of the above
- ANSWER ____
18. Which statement best describes the effect of regular exercise upon respiration?
- increased number of breaths per minute and increased depth of breathing
 - decreased number of breaths per minute and decreased depth of breathing
 - decreased number of breaths per minute and increased depth of breathing
 - no training effect exists
- ANSWER ____
19. Which of the following best describes the conditions necessary before improvement in the working efficiency of the heart is realized?
- exercise of a long enough duration
 - exercise performed with an all-out effort
 - exercise which is strenuous enough
 - both a and c
 - none of the above
- ANSWER ____
20. Of the following, which is the primary source of energy for the human body?
- protein
 - carbohydrate
 - fat
 - oils
- ANSWER ____
21. Which of the following would contribute most to increasing overall muscular strength and endurance?
- basketball
 - swimming
 - dodgeball
 - square dancing
- ANSWER ____

22. In lifting, why is it more important to start from a stoop than from a bend at the waist?
- a) to avoid straining the muscles of the back
 - b) to avoid overstretching the leg muscles
 - c) to keep from losing one's balance and falling
 - d) to conserve energy
- ANSWER _____
23. Clothing of loosely woven material should be worn for exercise in hot weather in order to:
- a) absorb perspiration
 - b) reflect the rays of the sun
 - c) permit ventilation
 - d) absorb heat
- ANSWER _____
24. The best exercise for increasing flexibility is:
- a) stretching
 - b) lifting weights
 - c) jogging and running
 - d) daily swimming
25. During hard work, perspiration helps to:
- a) regulate body temperature
 - b) rid the body of excess water
 - c) keep the body active for a long period of time
 - d) keep the body warm
- ANSWER _____
26. Which of the following represents the best statement about fatigue?
- a) fatigue is a matter of the mind over matter
 - b) fatigue can be physical, mental, emotional and intellectual
 - c) fatigue is the inadequacy of the body to meet work requirements
 - d) fatigue is the inability of the body to release heat
- ANSWER _____
27. Why is the rate of breathing greater during exercise than when sitting quietly?
- a) more blood is moved through the lungs
 - b) more oxygen is required by the muscles
 - c) more blood accumulates in the muscles
 - d) the chest muscles are stimulated to work harder
- ANSWER _____
28. Which statement best summarizes the effect on performance of eating a meal just before exercise?
- a) exercise before meals is never harmful
 - b) exercise before meals may act as an aid to digestion
 - c) eating before mild exercise is not harmful
 - d) eating before competing in athletics is not harmful
- ANSWER _____
29. A person becomes fatigued as a result of exercise because:
- a) exercise is painful
 - b) his temperature rises
 - c) his muscles get stiff
 - d) waste products accumulate
- ANSWER _____

30. Strenuous exercise after meals sometimes causes nausea because the:
- a) acidity in the digestive organs is increased
 - b) oxygen used by muscles for exercise deprives the digestive system of food
 - c) increased fluid content of the body causes digestive upset
 - d) reduced blood supply to the digestive tract interferes with the digestive processes

ANSWER _____

Schutz, R.W., Wood, T.M. Physical fitness and attitude, knowledge and involvement in physical activity in the British Columbia population. A pilot study, 1974, (unpublished)

APPENDIX J

"Health Hustle" Program

- | | |
|-----------------------------|--|
| 1. Shame 6:35 | Rotate head, left, then right
Repeat four times. |
| Nobody Knows 4:31 | Rotate shoulders, forward, then
back.
Repeat twice. |
| Warm Up | Shake shoulders, right 1, 2.
Left 1, 2.
Right left right left.
Repeat twice. |
| Cool Down | Trunk turning, left right
Arm loose, 1, 2, 1, 2.
Repeat 6 times.
Bouncing on the spot, (two feet)
1, 2, 3, 4, 5, 6.
Bounce around twice, right
Bounce around twice left.
Bounce forward, 1, 2.
Bounce backward 1, 2.
Bounce left side 1, 2.
Bounce right side 1, 2.
Bounce right side, forward, left,
backward.
Repeat four times.
Walk on the spot around one way
swinging arm up high in front and
rear, snap fingers, bounce with
knees.
Repeat 4 times.
Repeat other way, 4 times.
Walk the same way, but around the
room. |
| 2. Boogie oogie, oogie 5:37 | 1. Start with right foot: Step,
together, step together, tap. |
| Distant 4:38 | 2. Left foot: Step, together, step,
together. |
| World Spin 3:42 | 3. Shuffle, shuffle, shuffle, tap.
4. Left knee up, right knee, left
knee, tap.
5. Bounce forward, backward,
forward and turn.
6. Repeat. |
| 3. At the discotheque 17:30 | 1. Start with right foot for woman,
left for men, tap 1, 2, 3
(same foot).
2. Left foot for woman, right
foot man, kick 1, 2, 3 (same foot).
3. Repeat once.
4. Partners facing each other,
hands in hands, do steps, go
on the right side, tap 1, 2, 3.
5. Open hands, turn left for kick
1, 2, 3.
6. Repeat once.
7. Open, partners arms around each
others waist, on the right,
tap 1, 2, 3.
8. Turn change arms, kick 1, 2, 3.
9. Cross hands (partners facing
each other) her left hand on
top of her right hand, hold his
right hand which is on top of
the left hand. |

3. At the discotheque
(continued)
4. I Love the Nightlife, 5:37
City Rhythm, 3:38
Melodie, 7:55
10. Tap, he goes under.
11. Kick, he comes back.
12. Tap, she goes under.
13. Kick, she comes back.
14. Repeat.
15. He spins her once and catches her with his right hand.
16. Then spins her four times and on the fifth time, she bends backward on his right knee.
1. Start with right foot, step, cross, step, hop.
2. Left foot, turn, step, hop.
3. Kick with a step hop (with right leg-twice).
4. Jump to feet apart
5. Cross foot, do a complete turn.
6. Bear down, reach up, arms up, V shape.
7. Travolta hips (twist) while the right arm goes up and down on the left side (picking apple).
8. Bear down, reach up, arms up, V shape.
9. Travolta hips, repeat using the left arm.
10. "Pump air in bike," while you do short steps to the right 1, 2, 3, 4, and to the left 1, 2, 3, 4.
11. Move heels and toes of both feet simultaneously, start heels to the right side, 1, 2, 3, tap, then go to the left side, 1, 2, 3, tap.
12. Starting with right foot, walk backward, six counts (Disco walk, accent on hips) and arms push away, then two counts forward.
13. Repeat once.
14. Repeat but this time, six counts forward and two counts backward.
15. Repeat once.
16. Start over.

Records Used for the Health Hustle Program

Shame Nobody Knows	Evelyn "Champagne" King PD-11213 RCA Victor Records 1977.
Boogie oogie, oogie Distant World Spin	A Taste of Honey. ST 11754 Capitol 1978.
At the Discotheque	Lipstique TA 4701 Tom n' Jerry Records 1977.
I Love the Nightlife City Rhythm	Alicia Bridges 78 NP 3652 21 41044 Polydor Incorporated 1978.
Melodies	Various Artists Saturday Night Disco DSR - 9508 DeLite Records 1978.

APPENDIX K

Benefit of Exercises on One's Body

1. Relationship between exercises and cardiac fitness

- Exercises keep your heart strong and healthy
- Exercises make the heart more efficient
- Exercises improve the pumping capacity of the heart
- Exercises provide heart protection

Demonstration: Pulse Count

- At Rest
- After three minutes of exercise
- After three minutes of rest

2. Relationship between exercise and cardio respiratory endurance

- Exercises should be performed on a regular basis from three to five days a week
- Exercise should be hard enough to raise the pulse rate within the target heart rate zone
- Exercise should last 12-15 minutes to improve and maintain a sufficient level of physical fitness
- Type of exercises: aerobic, anaerobic
- Exercise develops aerobic capacity

Demonstration: Pulse Count

- Resting heart rate
- Heart rate during exercise
- Heart rate immediately after exercise
- Heart rate after three minutes
- Heart rate after five minutes

3. Relationship between exercise and lung capacity

- With exercise the diaphragm, abdomen, and thorax become more efficient
- Exercise improves the capacity of the lungs
- Exercise means more oxygen intake

Demonstration: - Illustration of the alveoli with "grapes"
- Count breathing4. Relationships between exercise and endurance, strength, and flexibility

- Stretching exercises increase flexibility or mobility of joints
- Heavy weights with few repetitions develop strength
- Light loads with a greater number of repetitions develop muscular endurance

Demonstration and illustration: - Warm-up and cool-down exercises

5. Relationship between exercise and attractive, slender, feminine figure

- Sustained and regular exercise improves one's posture
- Accent on stretching and muscle strengthening exercises

Demonstration: - Exercising of upper body, trunk, lower back, legs

6. Relationship between exercise and nutrition and weight reduction

- Exercise burns up calories and helps to keep your weight down
- Exercise, and cut down on:
 - sugar
 - high calories and junk food
 - cholesterol
 - saturated fat
- and increase consumption of complex carbohydrates:
 - vegetables
 - fruits
 - rice, potatoes, and grains
- will benefit your weight and your heart

Illustration:

- How you can burn up 100 calories (Types of exercise)
- Localization of the "fat storage area" in the body
- Fat measurement (Skinfold)

7. Relationship between exercise and mental health, "joie de vivre", tension, stress

- People who exercise tend to reduce their anxiety level (worry) and tension
- People who exercise tend to have more concentration and a longer span of attention; they are able to accomplish more
- People who exercise, especially running, will experience lightness and springiness (feel like a bird)

Illustration:

- Ask students how they experience stress
- What do they do to relieve tension, stress, and anxiety

8. Relationship between exercise, clothing, and other considerations

- What type of clothing should be worn when exercising
- How important is proper footwear
- Exercise and environmental considerations
- Exercise and injury prevention

Illustration: - Type of clothing, shoes

APPENDIX L

Procedures for Canadian Home
Fitness Test AdministrationEquipment:

A double 8-inch step, recorded cadences with instructions, score sheet, pencils.

Performance:

Choose the appropriate stepping cadence range corresponding to criterion heart frequency limits by age and sex groupings. The subjects begin the test by facing the step with both feet on the floor. When the stepping cadence begins the subjects step up onto the first 8-inch high step with one foot on the first beat, onto the top step with the opposite foot on the second beat, and bring both feet together on the top step on the third beat (standing erect, legs straight). The subjects step down to the first step with one foot on the fourth beat, step down to the floor with the opposite foot on the fifth beat and bring both feet together on the sixth beat. This sequence represents one cycle of stepping, a pattern which is followed for an initial three-minute period of exercise. At the three-minute mark, subjects, or in this case the teachers or the investigator, have five minutes to locate subject's radial pulse. At the three-second and five-second mark (3:05), a ten-second pulse taking period occurs after which the subjects have 5 seconds to record their pulse and get ready to start stepping again, at a faster cadence. If the heart frequency for this age group exceeds or equals 30, the test is terminated immediately.

1. Standardized pulse taking procedure:

Pulse taker places back of subjects' wrist in the palm of her hand, then with fingers facing radially, wraps her fingers around subjects' wrist such that the pads of the four fingers are located above the radial pulse.

2. Recorders should be placed where all subjects can hear the cadences and commands clearly.

3. Subjects fill out the Par-Questionnaire. The investigator shows each subject the proper stepping procedure individually by stepping with the subject at a slow cadence. The test is explained, and subjects listen to the cadence to which they will be stepping. Subjects are reminded that they can terminate at any time they wish.

APPENDIX M

Skinfold Measurement Procedure

1. Firmly grasp fold of skin vertically at the tricep, midway between the shoulder and the elbow on the back of the right arm. The arm must be extended and relaxed. Grasp the fold between the left thumb and forefinger and lift up.
2. Place the contact surface of the caliper 1 cm from the finger.
3. Release the pressure of the fingers very slightly so that the greater pressure is exerted by the caliper.
4. Release the scissor grip (right hand) and support the weight of the caliper in the right hand.
5. When the needle stops, take the reading to the nearest 10th of a millimeter (be careful of jaw face slippage on the skin). Compare the reading on the caliper to the appropriate value on the tricep fat chart.



