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EXAMINING CORONARY HEART DISEASE RISK FACTORS AND ITS RELATIONSHIP WITH PHYSICAL ACTIVITY IN A SELF-REPORTED SURVEY

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EXAMINING CORONARY HEART DISEASE RISK FACTORS AND ITS RELATIONSHIP WITH PHYSICAL ACTIVITY IN A SELF-REPORTED SURVEY

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This study uses 'Healthstyles,' a self reported survey of 3,719 respondents above the age of 18, to look at exercise behavior in people at risk for CHD. Married or higher earning individuals were more likely to show sufficient exercise levels. Individuals with high blood pressure, high blood cholesterol, diabetes, obesity or family history of heart disease reported lesser levels of sufficient exercise than those without these conditions. People with CHD risk factor reported lower scores on questions that dealt with attitude and opinions about exercise behavior, and this was significantly correlated with lower levels of sufficient exercise. This supports the 'positive attributes of the behavior' aspect of the social-cognitive theory of exercise. The attitude questions used, although not specific, could be included in a self-reported survey for the purpose of qualitatively and quantitatively assessing exercise intervention; albeit more studies are required to validate this claim.

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CHAPTER I

INTRODUCTION

Despite the proven benefits of sufficient physical activity, the Centers for Disease Control and Prevention (CDC) reported that more than 60% of American adults do not get sufficient physical activity to provide health benefits. In 2000, more than 28% of adults reported no leisure-time physical activity. Women were 20% more likely than men to report no leisure-time physical activity, and blacks were 36% and Hispanics 63% more likely than whites to report no physical activity (CDC, 2003a).

Not getting an adequate amount of exercise is associated with needing more medication, visiting a physician more often, and being hospitalized more often (CDC, 2003c). The direct medical cost associated with physical inactivity was $29 billion in 1987 and nearly $76.6 billion in 2000.

Insufficient physical activity is not limited to adults. More than a third of young people in grades 9–12 do not engage in regular vigorous physical activity. Daily participation in high school physical education classes dropped from 42% in 1991 to 29% in 1999 (CDC, 2003c). On the other hand, modest, regular physical activity substantially reduces the risk of dying of coronary heart disease (the nation's leading cause of death) and decreases the risk for colon cancer, diabetes, and high blood pressure. Physical activity also helps to control weight; contributes to healthy bones, muscles, and joints; helps to relieve the pain of arthritis; and reduces symptoms of anxiety and depression. (CDC, 2003a)

About 950,000 Americans die of cardiovascular disease each year. About 61 million Americans (almost one-fourth of the population) live with cardiovascular disease. Coronary heart disease (CHD) is a leading cause of premature, permanent disability in the U.S. workforce (CDC, 2003d). Despite the decline in cardiovascular disease morbidity after the 1960s; strokes, myocardial infarction, high blood pressure and angina still remain the major cause of morbidity in the United States (CDC, 2003d).

Numerous studies have established the relationship between lack of physical activity and Coronary Heart Disease (CHD). The other risk factors for CHD include age, previous coronary event (e.g. myocardial infarction (MI) or angina), high blood pressure, high blood cholesterol, diabetes, overweight (Body Mass Index {BMI} >25&<30), obesity (BMI >30) and a family history of heart disease (Jousilahti, Tuomilehto, Vartiainen, Pekkanen, & Puska, 1996; Wilson, Castelli, & Kannel, 1987; William, 1977b; William, 1976a). Although physical activity may transiently increase the chance of an acute coronary event in a person with CHD, especially if they are not regularly exercising (Mittleman et al., 1993; Siscovick, Weiss, Fletcher, & Lasky, 1984; Willich et al., 1993), it has a beneficial cardiovascular effect on those who exercise regularly (Berlin & Colditz, 1990; Blair et al., 1989; Powell, Thompson, Caspersen, & Kendrick, 1987).

Self reported surveys such as the National Health Interview Survey (NHIS) and Behavioral Risk Factor Surveillance System (BRFSS), have carried out studies on physical activity. Although representative of the entire United States adult population, they do not generally look at attitudes that predict exercise behavior among high-risk individuals. Recently national studies have begun implementing questionnaires that deal with theories of

exercise behavior, but reliability and validity of these instruments used in predicting exercise patterns has not been established (Fridinger, Macera, & Cordell, 2002).

The NHIS and BRFSS define 'Regular Sustained' physical activity as any type of intensity of activity that occurs 5 times or more per week and 30 minutes or more per occasion. 'Regular Vigorous' physical activity is defined as rhythmic contraction of large muscle groups, performed at 50 % or more of estimated age and sex-specific maximum cardio-respiratory capacity, 3 or more times per week and for at least 20 minutes per occasion (USDHHS, 1990).

The Centers for Disease Control and Prevention has stated that "physical activity need not be strenuous to be beneficial; people of all ages benefit from moderate physical activity, such as 30 minutes of brisk walking five or more times a week" (CDC, 2003b).

Purpose of the Study

This study attempts to look at exercise behavior and attitudes in people at risk of CHD. The data used is the Healthstyles self-reported survey was obtained from the CDC. The purpose of the study is to quantify the percentage of people with a CHD risk factor that exercise sufficiently and also to look at the attitudes that compliment the level of physical activity in the entire sample.

Research Question

What is the level of exercise and attitudes in individuals with CHD risk factors, and how do they differ from people without corresponding risk factors?

Research Hypothesis

1. People with CHD risk factors exercise less than people without CHD risk factors.
2. People in all CHD risk factor groups who have positive attitudes towards physical activity will exercise more.

Literature Review

Studies by Berlin and Colditz (1990), Blair (1989) and Powell et al. (1987), demonstrated the inverse relationship of physical activity and risk for CHD. As quoted in the Miller (1997); "Powell et al. reported that the median relative risk of coronary artery disease associated with physical inactivity was 1.9, similar to the relative risk that has been reported for other modifiable risk factors" (Page 221; Miller, Balady, & Fletcher, 1997). This indicates that living a physically inactive life-style is associated with twice the risk of developing CHD.

Savage et al. (2003) showed that 60 – 90 minutes of moderate exercise (50-60% VO2), 5-7 times a week (on the Cardiac Rehabilitation program) among 15 overweight individuals (average BMI 31.0 kg/m^2) over a period of 4 months; reduced total body fat, increased overall exercise tolerance and improved lipid profile. Thus reducing some of the risk factors for CHD (Savage, Brochu, Poehlman, & Ades, 2003).

LaMonte et al. (2000) studied CHD risk factors using a self-reported survey in 3232 and 1128 middle aged men and women respectively (age 31-55) and noted that enhanced levels of cardiovascular fitness may confer resistance to elevation of CHD risk factors (LaMonte et al., 2000).

During 1986-2000, the Behavioral Risk Factor Surveillance System (BRFSS) included questions that measured leisure-time physical activity (primarily exercise or sports-related activities). Previous guidelines for appropriate physical activity to increase cardio-respiratory fitness included participating in vigorous-intensity activity (i.e., ≥20 minutes per day, ≥3 days per week) (USDHHS, 1986). BRFSS questions used to measure this level of activity were developed a decade before CDC and the American College of Sports Medicine concluded that health-related benefits could accrue from a minimum of 30 minutes of moderate-intensity activity on most days of the week (Pate et al., 1995). Various household and transportation-related physical activities and some leisure-time activities, therefore, can also be important to take into consideration for moderate exercise (Ainsworth et al., 1993).

Simpson et al. (2003) used the BRFSS to study walking trends among U.S. adults from 1987 to 2000, and noted an increase percentage of adults in all socio-demographic groups who engaged in regular physical activity (Simpson et al., 2003).

Nelson et al. (2003), compared the BRFSS and the NHIS in 14 items including smoking, height, weight, BMI, diabetes, hypertension, immunization, no health insurance, cost as a barrier to health care and health status. They found that though numbers in the subgroups varied, 13 of the 14 items displayed similar estimates on the national surveys (Nelson, Powell-Griner, Town, & Kovar, 2003).

Based on studies by LaCroix (1993) and Guralnik (1993) that used a 65-year-old age cut for measuring physical activity effects in age groups, this study uses a binomial age divide, i.e., less than 65 years and equal to or more than 65 year (LaCroix, Guralnik, Berkman, Wallace, Satterfield, 1993; Guralnik et al., 1993).

Social Cognitive Theory (SCT) has been shown to be a predictor of physical activity. Petosa et al. tested the SCT in predicting vigorous physical activity among college students (n=350) for 4 weeks and found that exercise role identity, self-regulation, outcome expectancy value, social support, self-efficacy, and positive exercise experience accounted for 27% of the variance in days of vigorous physical activity. This finding supports the use of SCT in understanding factors associated with vigorous physical activity rates among college students (Petosa, Suminski, Hortz, 2003). Dzewaltowski (1994) used Bandura's Social Cognitive Theory as a framework to study the determinants of physical activity. He provides an overview of Social Cognitive Theory assumptions and stresses the importance of self-efficacy along with the other key cognitive processes which provide an example where a cognitive-behavioral relationship is identified (Dzewaltowski, 1994).

In a prospective study of adherence to a private fitness club with structured modeling, Smith and Biddle (1999) showed that attitudinal and social normative components of the Theory of Reasoned Action accounted for 13.1% of the variance in adherence to physical activity over a period of four months, and qualitative data provided evidence that participants had a positive experience on the exercise intervention. This supported the role of social cognitive factors in the adherence process and confirming some components, i.e., social support, self-efficacy and positive experience in predicting physical activity (Smith, Biddle, 1999).

Several studies have utilized data from the Healthstyles survey, namely Dutta-Bergman's study that examines consumer evaluation of sources of health information on the World Wide Web. The researchers compared the demographic, attitudinal, and cognitive differences between individuals that most trust a particular source of information, and

individuals that do not trust the specific source of health information (Dutta-Bergman, 2003). A study by Li et al. described public perceptions on breastfeeding constraints in 2,369 US adults who participated in the 2000 Healthstyles (Li, Fridinger, Grummer-Strawn, 2002)

CHAPTER II

METHOD

Survey Development and Data

Data were obtained from the Centers for Disease Control and Prevention (CDC) and come from the 2001 American Healthstyles mail panel self-reported survey conducted by Porter Novelli, a leading national social marketing and public relations firm. This survey has been conducted annually since 1995. The 2001 survey contains subsections on Attitudes & Opinions, Health Opinions, Personal Health, Diabetes, Health Behavior and Health Risks. Also included are sections on seeking health information, knowledge of health organizations, women's health, and a section for "Parent's only". In 2001 the 'Healthstyles' survey was administered to 5605 respondents who completed a previously sent DDB Needham 'Lifestyles' panel survey, with an additional supplemental mailing to low income & minority groups (n=420). There were 3719 total respondents for the Healthstyles survey, with a response rate of 66.3%. The results are post-stratified and weighted to the US Census benchmarks on age, race, sex, income & family size. A subset of the data for this study was requested from the CDC, which included demographics, attitude questions and exercise behaviors.

The validity and reliability of the Healthstyles survey has never been determined; however, in a comparison of results using the Healthstyles and Behavioral Risk Factor Surveillance System (BRFSS) survey instrument, results were comparable between the two with similar items from 1995 – 2001 with respect to arthritis, asthma, diabetes, high blood

pressure levels, obesity and health status self-rating. Based on these findings, Pollard (2002) states, "to the extent that results for the above items can be shown to be valid in comparison with results from an accepted national probability sample survey, it provides indirect support for the validity of the results of other items on the survey" (Page 2; Pollard, 2002).

Design

The survey items from the question set analyzed for this study are listed in Appendix A. A binomial division of the concept 'Physical Activity,' i.e., Sufficient and Insufficient, was used to better understand the amount of exercise distribution and for ease of analysis.

I. Dependent Variable

a. 'Sufficient' Exercise: Moderate Activities $\geq$ 5 days/week & $\geq$ 30 minutes/day'

OR

Vigorous Activities $\geq$ 3 days/week & $\geq$ 20 minutes/day'.

b. 'Insufficient' Exercise: Less than 'sufficient' exercise

II. Independent Variable

The Demographic Variables used:

Variables	Scale / Measurement
Age	Ordinal
Respective Ages	Binomial
Categorical (<65 = 0, ≥ 65 = 1)	
Gender	
Categorical (Female=0, male=1)	Binomial
Race	
Respective groups (Whites, Blacks, Hispanic white, Hispanic Black, Native American Indians, Pacific Islanders, Far East Orientals and Asian Indians)	Categorical
Categorical (Others=0, Non Hispanic whites=1)	Binomial
Income (in thousands of dollars)	Ordinal
Marriage Status	
Categorical (Unmarried=0, Married=1)	Binomial
Education (in years)	Ordinal
Employment	
Categorical (Unemployed=0, Employed=1)	Binomial

For CHD Risk Factor analysis, all questions found dealing specifically with particular risk factors were used. The questions used are enumerated below: (Without risk factor = 0, With risk factor = 1)

III. Independent Variables

a. Previous Coronary Heart Disease (CHD)

- Has the Doctor or Nurse told you of previous Myocardial Infarction or
- Has the Doctor or Nurse told you of previous Angina

b. High Blood Pressure (HBP)

- Has the Doctor or Nurse told you that you had HBP or

- Are you taking medication for HBP or
- Reported Disease suffered from HBP

c. High Blood Cholesterol

- Reported Disease suffered from High Blood Cholesterol

d. High Blood Glucose

- Reported Disease suffered from Diabetes

e. Smoking

- Number of cigarettes smoked (average per day), recoded to cigarettes smoked or not.

f. Age

- Binomial variable (<65 years = 0, > 65 year = 1)

g. Family History

- If Biological father, mother, brother or sister had heart disease

h. Body Mass Index

- Over-weight BMI > 25 & < 30
- Obese BMI >30

Attitude Questions used were:

Q1. Living life in the best possible health is important to me

Q2. I feel pleased with myself if I exercise regularly

Q3. I enjoy getting regular exercise

These were scaled using likert measurement from 1 to 5; 1- Strongly disagree, 2- Moderately disagree, 3- Neither agree nor disagree, 4- Moderately agree, 5- Strongly agree.

Analysis of Data

All analyses were conducted using the Statistical Package for Social Sciences (SPSS) (SPSS 11.0 from SPSS Corporation).

Demographic Analysis

A cross-tabulation on SPSS between physical activity levels and demographics variables was performed. A Pearson's Chi-square was used to compare the difference in physical activity between the binomial demographic variables mentioned earlier. This showed statistical significance ($p < .05$) in all except education levels. Although statistically significant, low correlations, i.e., $r < 0.2$, and high standard error led to the conclusion of negligible relevance. Doughnut graphs (Figure I) display the graphical representation, useful for visual comparison of exercise levels in marriage status and annual income. A correlation and logistic regression between these demographic variables and the binomial physical activity variable was done to check for predication.

Risk Factor Analysis

Prevalence of CHD and individual CHD risk factors were calculated along with level of physical activity among different demographic groups. A Chi-square comparison between people with and without individual risk factors was carried out and noted for significance for those groups that showed a correlation of $r > 0.2$ and a standard error less than the mean. An Odds Ratio (OR) between the relevant risk factors and binomial physical activity variable was then calculated. Doughnut graphs (Figure II) display a graphic representation for better comparison of these results. A logistic regression analysis was also conducted individually

between all the risk factor variables and physical activity to look for prediction for the level of sufficient physical activity.

Attitude Analysis

Attitudes expressed toward physical activity on the questionnaire were analyzed for correlation and prediction of levels of sufficient physical activity. Three attitude questions showed the highest correlation to physical activity, hence were used to predict physical activity in the general population. The three questions are: "Living Life in the Best Possible Health is Important to Me," "I Feel Pleased with Myself when I Exercise Regularly," "I Enjoy Getting Regular Exercise". These questions were chosen because they closely resembled the positive exercise experience used as a component of the Social Cognitive Theory (Petosa, Suminski, Hortz, 2003). A doughnut graph is used to provide graphical representation of the differences in response to these attitude questions by exercise levels. Also included are regression slopes predicting exercise for each question. Finally, these three questions were used to analyze attitudes in individuals with specific CHD risk factors. Correlation and logistic regression analysis were also conducted for each risk factor in predicting sufficient exercise levels.

CHAPTER III

RESULTS

Relationship of Demographic Measures to Physical Activity

Table 1 shows the demographic breakdown of the respondent population. This is done specifically in the trinomial fashion to provide an overall understanding of the exercise trends in the population. The total number of people responding to the survey was 3719. The majority were female (61.9%), other demographics included; adults $\geq$ 65 (13.6%), whites (76.8%), employed (70.1%), earning more than $75,000 per year (26.3%), married (71.8%) and individuals attended or graduated from college (52.2%) (Table 1). Among those older than 65, only 31.9% exercised adequately and 17% did not exercise at all. Married individuals reported a higher proportion of adequate exercise 38.7% (χ^2 (4) = 15.487, P=.000) and Odds Ratio (OR)=1.36. The analysis of annual household income showed that those in the higher income bracket reported greater amounts of sufficient exercise (χ^2 (4) = 20.487, P=.000), OR=1.39. Those reporting a household income of more than $75,000 had the highest percentage of adequate exercise (42.6%), which differed significantly from the other groups (χ^2 (4) = 22.566, P=.000), OR=1.44. The regression analysis results (Table 2) show that being married and having a household income of more than $35,000 is a weak predictor of sufficient physical activity (B = .137 and .031 respectively).

Relationships of CHD Risk Factors with Physical Activity

Table 3 shows CHD risk factors with the level of exercise. Cigarette smokers made up 20.4% of the population. Of those who smoked, 33.4% exercised sufficiently and this

value did not differ statistically from non-smokers. Among adults, 64.1% were overweight and 29.4% were obese. Among the overweight (64.1%) and obese (29.4%) adults, 38.7% and 25.6%, respectively, exercised sufficiently. Obese individuals exercised significantly less than the non obese subjects (χ^2 (4) = 73.052, P=.000), OR =0.50. Only 23.2% of the Diabetics (10.6%) exercised sufficiently which significantly deferred from non diabetics (χ^2 (4) = 29.867, P=.000), OR =.51. Among people with previous CHD (i.e. myocardial infarction (MI) or angina), only 30.8% exercised sufficiently. Only 28.4% of those with high blood pressure (HBP) exercised sufficiently (χ^2 (4) = 30.731, P=.000), OR =.64. Among people reporting high blood cholesterol (21%), only 29.3% exercised sufficiently, significant at χ^2 (4) = 17.730, P=.000 & OR =.69. Almost one half of the individuals reported a family history of heart disease (45.8%). Of these, 33.4% were noted sufficient exercise levels χ^2 (4) = 7.670, P=.006, OR =.83.

All the risk factors, except number of cigarettes smoked and previous CHD had a statistically significant correlation with amount of physical activity at (p = 0.01); yet all had a variance of .00 except BMI, which was negatively correlated with levels of sufficient exercise (r= -0.169, P=.000) (Table 4). A logistic regression was only significant for predication for diabetes *B*= -.517 (P=.000, CI 0.459-0.774) and BMI (*B*=.056 P=.000, CI 0.934-0.957) (Table 4), hence predicting insufficient physical activity was only suggested using diabetes and BMI as independent measures.

Relationship of Attitudes Expressed Towards Physical Activity

Attitude towards physical activity in the general population were based on the three questions noted earlier. The items showed significant differences in their responses in

comparison to exercise amounts using analysis of variance (Table 5). The correlation values for the questions with sufficient exercise levels were: "Living life in the best possible health is important to me (Q1)" r=.148, "I feel pleased with myself if I exercise regularly (Q2)" r =.256 and "I enjoyed getting regular exercise (Q3)" r =.396 (Table 5). Figure III provides a graphic representation of the exercise levels in the general population of the survey in conjunction with the responses for these questions.

Predictive usefulness using these three questions in individuals with specific CHD risk factors was only found to be significant in individuals with high blood pressure; Q1 B= -.090 (p=.385), Q2 B= .313 (p=.000) and Q3 B= .675 (p=.000) (Table 6). Although the above results obtained for Q1 are not significant, a correlation can be suggested with an r = .145, also the regression slope using all three questions for HBP shows a straight line with a high constant B value (-4.363), thus the combined effect of the logistic regression using all three question in the HBP population to predict sufficient exercise levels is significant.

CHAPTER IV

DISCUSSION

In conclusion, individuals who were married reported 1.36 times higher sufficient physical activity levels than single individuals. People earning more than $35,000 annually reported 1.39 times higher sufficient physical activity than those earning less. And those earning more than $75,000 annually, exercised 1.44 times more than those earning less.

Individuals who had HBP reported .64 times less sufficient exercise levels than those with normal blood pressure. Individuals with high blood cholesterol reported .69 times less sufficient exercise levels than those with normal blood cholesterol. Individuals with diabetes reported .51 times less sufficient exercise levels than those with normal blood sugar. There was no statistically significant difference between sufficient exercise levels in smokers and nonsmokers. Obese (BMI>30) individuals reported 0.50 times less sufficient exercise levels than lesser weight groups. Individuals with family history of heart disease reported 0.83 times less sufficient exercise levels than those without family history of heart disease.

In the general population, likert answers to the following questions "Living life in the best possible health is important to me," "I feel pleased with myself if I exercise regularly," and "I enjoy getting regular exercise" can possibly be used to predict the level of sufficient exercise answered on a self reported survey. But when considering individuals with specific risk factors, these same questions, however, only predict exercise behavior in individuals with high blood pressure.

Individuals ages 65 and older represented 13.6% of the survey respondents, comparable to the national study by the Center for Disease Control and Prevention (CDC) for

the year 2000. Cigarette smokers accounted for 20.4% of the survey respondents and similar to the 2000 national estimates of 25.7% in males and 21.0% in females (NCHS, 2000a). These study results showed that 64.1% of respondents were overweight and 29.4% were obese, again similar with the national estimates of 64% and 30%, respectively (NCHS, 2000b). Taken together, these findings show that the Healthstyles survey was representative of the US population and help to confirm the study by Pollard (2002). The only exception was diabetes, which was reported by 10.6% of the healthstyles survey respondents in contrast to the 5.9% on a national survey (NCHS, 2000c).

Most importantly, people reporting specific CHD risk factors such as high blood pressure, high blood cholesterol, diabetes, obesity and a family history of heart disease exercised less than those not having those CHD risk factors, thus supporting the first research hypothesis. This finding indicates a need to improve the health promotion physical activity intervention efforts among CHD high risk groups of people.

Some attitudes expressed in this survey have shown to be useful predictors for amount of physical activity performed, thus supporting the second research hypothesis. Although not specific, these attitudes could be used to predict and 'follow-up' exercise intervention programs, albeit more research is required to confirm this. The social-cognitive theory (Bandura, 1986) proposes that behavior change is affected by environmental influences, personal factors and 'attributes of the behavior' itself (Bandura, 1977b). This study lends support to the 'attributes of the behavior' affecting one's decision to exercise (i.e., amount of exercise is directly proportional to whether the individual enjoys exercising or associates it with a form of well-being and pleasure).

Statistical analysis was done using the 11th version of SPSS. Significance was calculated at the 95% confidence interval at $p \leq .05$. Because of the large sample size and large variance, the calculated outcomes with standard errors of more than half of the mean were not considered as significant. Also due to large sample size, significant correlation values were considered at $r \geq .14$.

Limitation of the Study

There are limitations of using self-reported surveys, e.g., recall bias and respondent bias. The 'attitude and opinion' questions that were asked in the year 2001 were not similar to the ones asked in previous years, thus a comparative study using earlier years surveys was not possible and bringing into question the reliability of the attitude analysis. Since the survey questionnaire was not specifically targeted towards cardiovascular risk factors, the validity of the questions used to predict physical activity in specific CHD risk factor groups cannot be established with only one year's survey. The 3 questions used to define 'attitude towards exercise' concept was limiting. Finally, since this is a cross-sectional analysis, cause and effect cannot be determined, such as whether lower levels of physical activity are caused by elevated CHD risk factors or expressed with specific attitudes.

Recommendations for further research

This research can be a useful tool for health planners, health care providers, public health specialists, government agencies and universities, and for the average individual who is at risk for CHD. For the health providers, it is sufficient cause enough to screen for sufficient physical activity in the middle and older age population and advise on changing lifestyle to include more exercise. For public health specialists, this study helps understand

the need to develop intervention strategies directed towards specific population groups and network with the health providers to recruit CHD high risk individuals. Agencies and universities need to conduct studies to look at cost effectiveness of implementing exercise programs. Also, the results obtained from this study should be validated by similar studies done using the Healthstyles data from subsequent years.

CHAPTER V

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Table 1

Cross-tabulated demographic characteristics of adults with the amount of physical activity from the 2001 Healthstyles survey

Characteristic	Total (%)	Exercise% None	Insufficient	Sufficient
N	3719	456	1793	1314
Weighted%	100	12.3	48.2	35.3
Gender(n)	3563			
Male	38.1	11.4	46.8	41.8
Female	61.9	13.7	52.5	33.8
Age(n)	3563			
18-24	2.7	14.7	44.2	41.1
25-34	14.1	12.3	54.5	33.2
35-44	33.2	10.0	50.3	39.8
45-54	25.2	12.5	51.6	36.0
55-64	11.2	17.0	43.0	40.0
Above65	13.6	17.0	51.1	31.9
Race(n)	3563			
White	76.8	11.9	49.7	38.4
Black	10.7	18.4	53.2	28.4
Asian/Pacific	2.9	10.7	51.5	37.9
Other	0.9	9.4	50.0	40.6
Hispanic	8.7	14.8	51.8	33.4
Household income	3563			
<20,000	18.1	19.9	48.9	31.2
20,000-49,999	34.9	13.9	51.2	34.9
50,000-74,999	20.7	8.7	53.5	37.9
≥75,000	26.3	9.7	47.6	42.6
Marriage				
Married	71.8	11.0	50.4	38.7
Unmarried	28.2	17.4	50.2	32.3
Employment Status	3545			
Employed	70.1	11.7	51.4	36.9
Un-Employed.	29.9	16.2	49.9	33.9
Education Level	3508			
Low-Middle School.	15.2	8.8	50.1	41.1
High School Attend/Grad	32.6	17.4	48.3	34.3
College Attend/Grad	52.2	11.1	51.6	37.3

Table 2

Associations of Physical Activity with marriage status and annual household income

Variable		Physical Activity		χ^2	P value and OR	r	B	SE B
		Insufficient	Sufficient					
Marriage Status	Unmarried	728(67.7%)	325(32.3%)	15.487	P=.000, OR=1.36	.065	.137	.086
	Married	1631(61.3%)	989(38.7%)					
Household income	<$35,000	950(68.8%)	430(31.2%)	20.487	P=.000, OR=1.39	.075	.031	.007
	≥$35,000	1409(61.4%)	884(38.6%)					

Table 3

Associations of Physical Activity with Coronary Heart Disease Risk Factors

	Physical Acitivity		Chi - Square	Level of Significance and OR
	Insufficient	Sufficient	(pearson)	
High Blood Pressure				
Normal Bp	1673(62%)	1042(38%)	30.731	P=.000 OR = .64
High Bp	686(71.6%)	272(28.4%)		
High Blood Cholesterol				
Normal Cholesterol	1814(63%)	1088(38%)	17.730	P=.000 OR = .69
High Cholesterol	545(70.7%)	226(29.3%)		
Diabetes				
W/o Diabetes	2061(63%)	1224(37%)	29.867	P=.000 OR = .51
With Diabetes	298(76.8%)	90(23.2%)		
BMI				
Normal	688(57%)	527(43%)	73.052	P=.000 OR =.44
Obese (≥30)	740(74.4%)	254(25.6%)		
Age				
< 65	1995(63%)	1160(37%)	9.590	P = .002 OR = 0.73
≥ 65	364(68.1%)	154(31.9%)		
Family History of CHD				
No Family History	1238(62%)	752(38%)	7.670	P = .006 OR = 0.83
Family History	1121(66.6%)	562(33.4%)		

Table 4

Using Body Metabolic Index and Diabetes in the population to predict sufficient physical activity level using Logistic Regression

		r	B	SE B	Sig.	Odds Ratio	95.0% C.I.for EXP(B)	
							Lower	Upper
Step 1								
	Diabetes	-.090	-.517	.133	.000	.596	.459	.774
	BMI	-.169	-.056	.006	.000	.946	.934	.957

The regression the equation predicts 64.0 % of the observed physical activity, i.e., more than 50% hence can be considered to make a prediction model.

Table 5

The relationship between the three attitude questions with the amount of Physical Activity using analysis of variance and logistic regression of the responses to the following questions:

Q1. Living life in the best possible health is important to me

Q1. I feel pleased with myself if I exercise regularly

Q3. I enjoy getting regular exercise

Attitude Items	F	P value	r	B	SE B	OR	95% CI Lower	95% CI Higher
Living life in the best possible health is important to me	20.031	.000	.148	.099	.053	.906	.817	1.005
I feel pleased with myself if I exercise regularly	62.693	.000	.256	.188	.054	1.207	1.086	1.341
I enjoy getting regular exercise	165.092	.000	.396	.715	.045	2.045	1.872	2.233

Table 6

Chi-Square and Logistic Regression predicting physical activity in individuals with high blood pressure

Variable	Chi-Square	r	B	SE B	Sig.	Odds Ratio	95% CI Lower	95% CI Higher
Step 1								
Q1	31.119	.145	-.090	.104	.385	.914	.746	1.120
Q2	93.632	.286	.313	.106	.000	1.368	1.111	1.683
Q3	176.786	.401	.675	.089	.000	1.963	1.649	2.338
Constant			-4.363	.512	.000	.013		

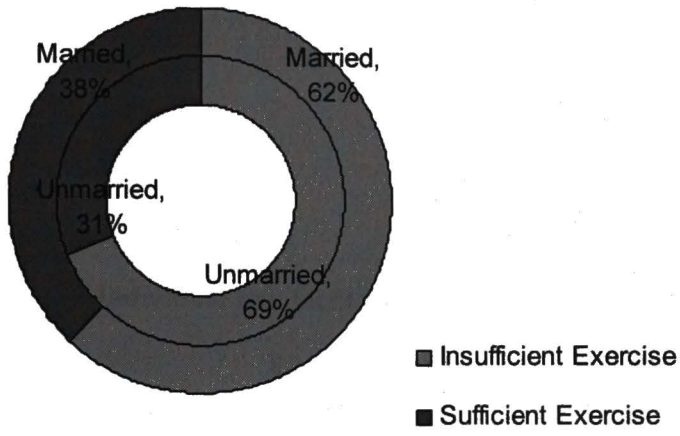
Figure I

Distribution of physical activity among the descriptive variables

A. Marriage Status

B. Annual Household Income

A. Marraige and Exercise



B. Annual Household Income and Exercise

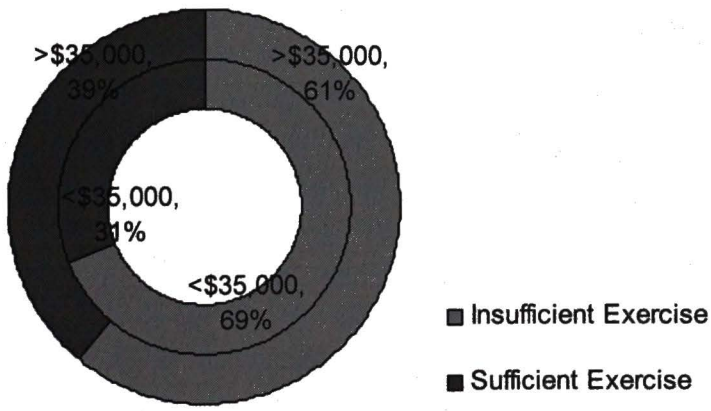


Figure II

Individual risk factors comparison with adequacy of physical activity

A. Blood Pressure and Exercise

B. Blood Cholesterol and Exercise

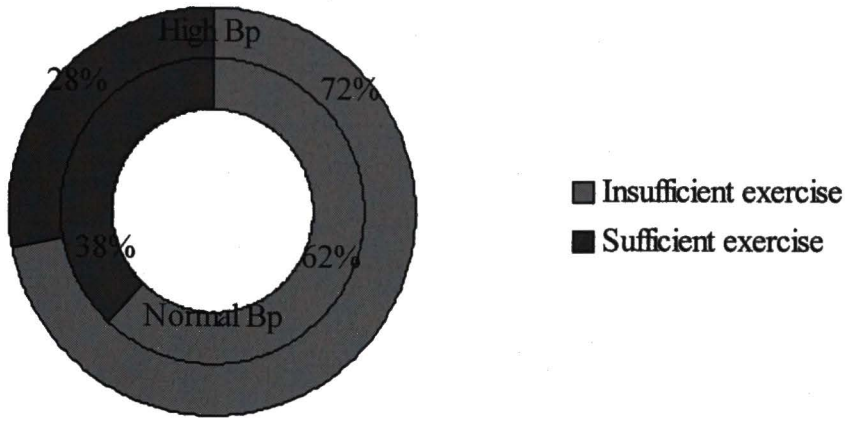
C. Diabetes and Exercise

D. BMI and Exercise

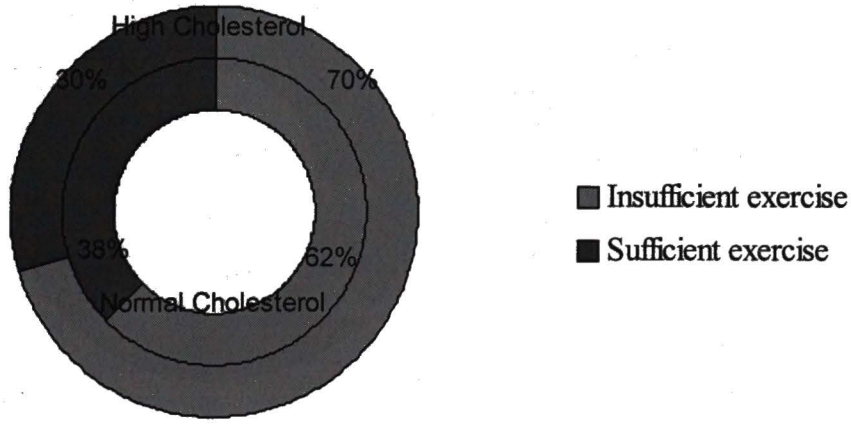
E. Age and Exercise

F. Family History and CHD and Exercise

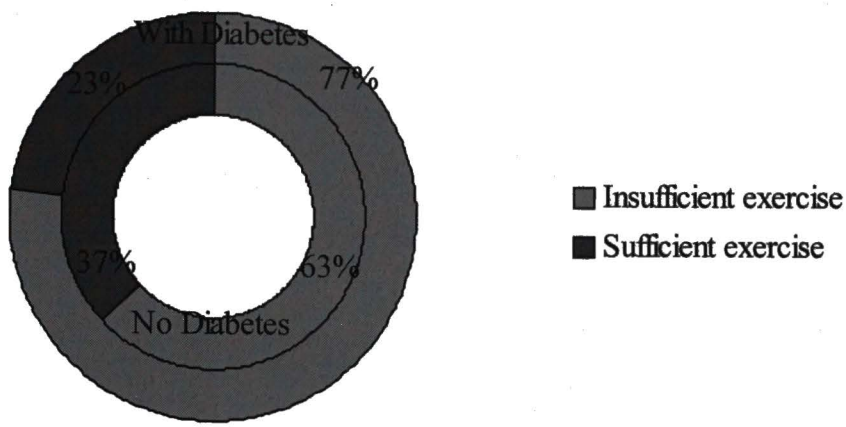
A. Blood Pressure and Exercise



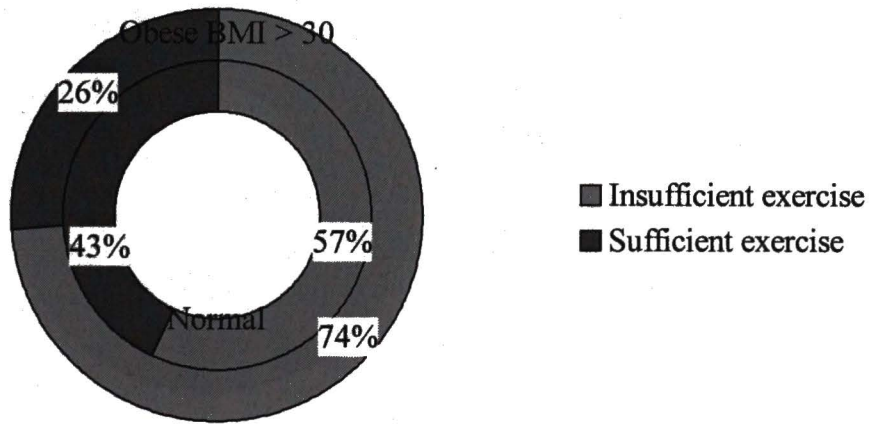
B. Blood Cholesterol and Exercise



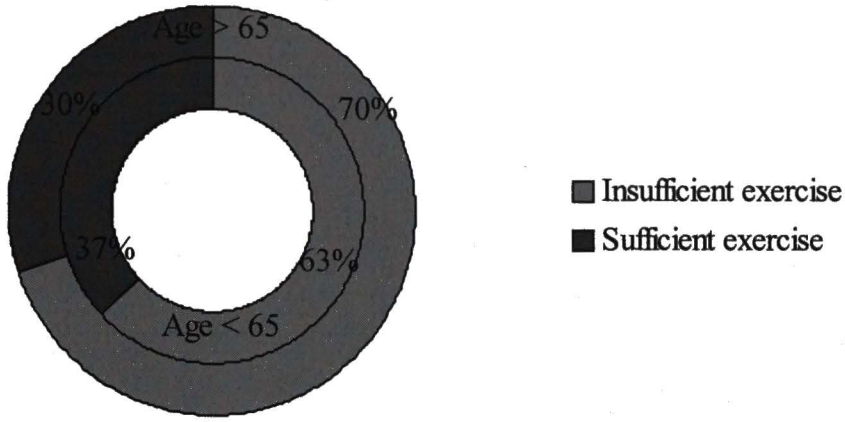
C. Diabetes and Exercise



D. BMI and Exercise



E. Age and Exercise



F. Family History of CHD and Exercise

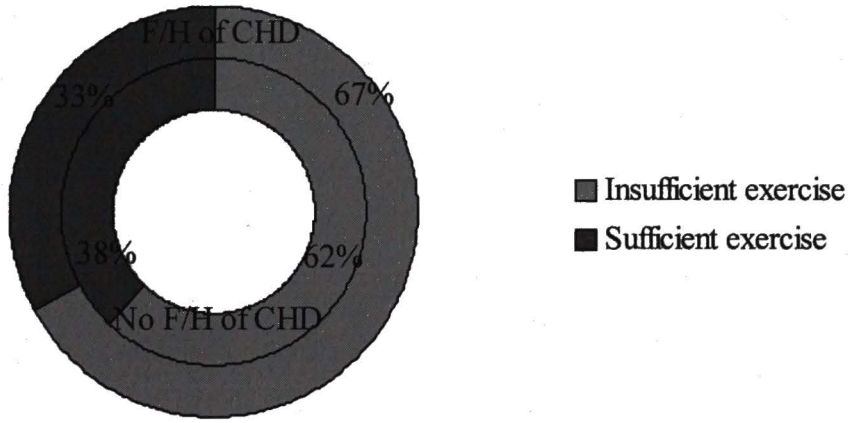


Figure III

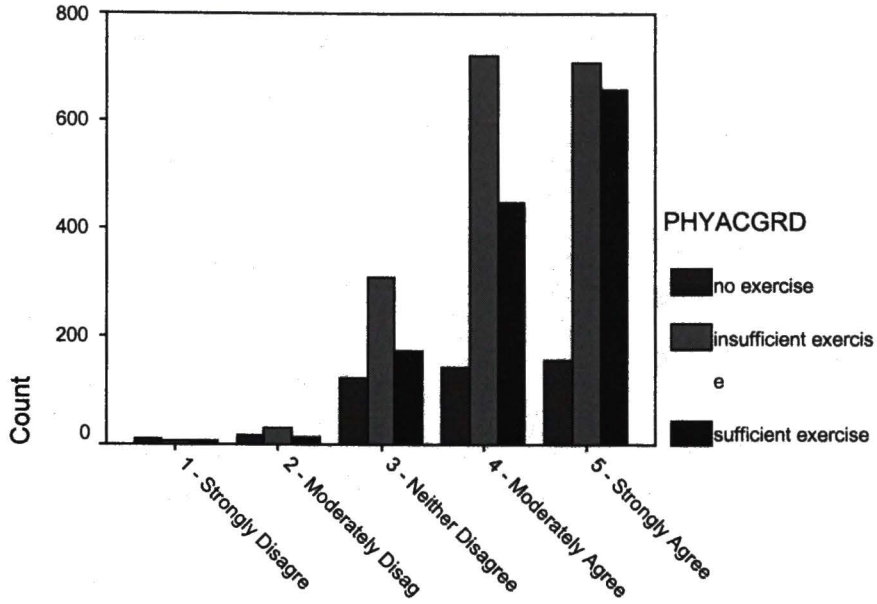
Comparison of attitude questions for the amount of physical activity and regression curve for the entire population of the survey

A. "Living life in the best possible health is important to me"

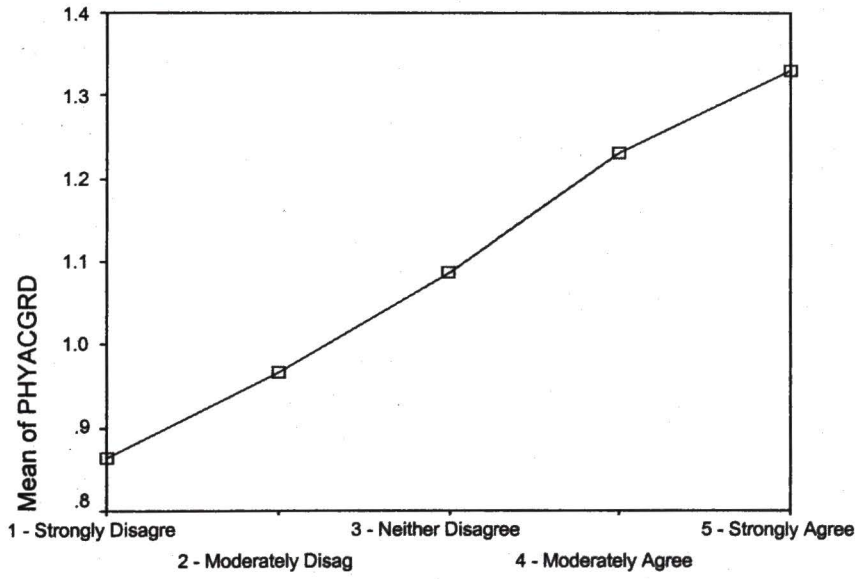
B. "I feel pleased with myself if I exercise regularly"

C. "I enjoy getting regular exercise"

A.

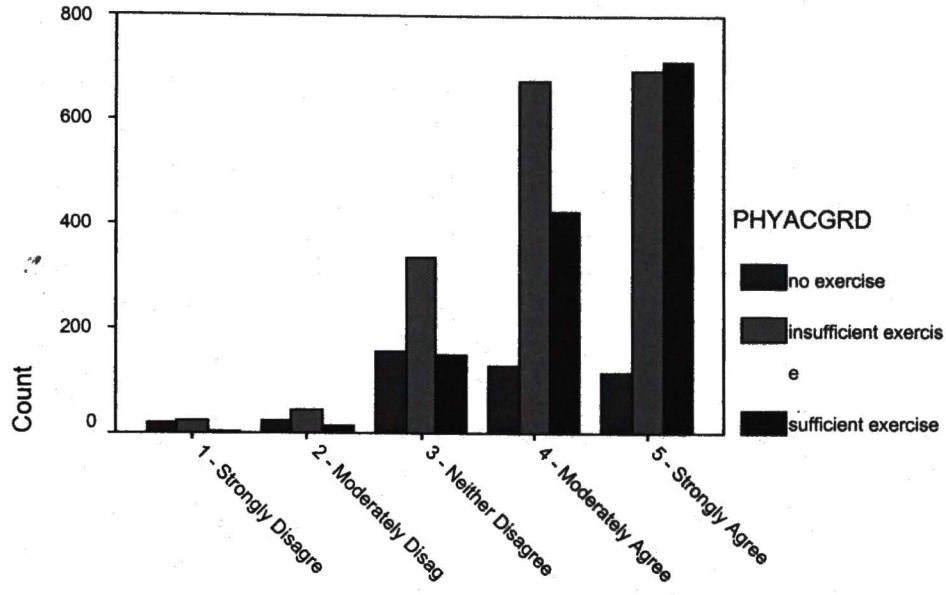


Q1 Living Life In The Best Possible Health is important to me

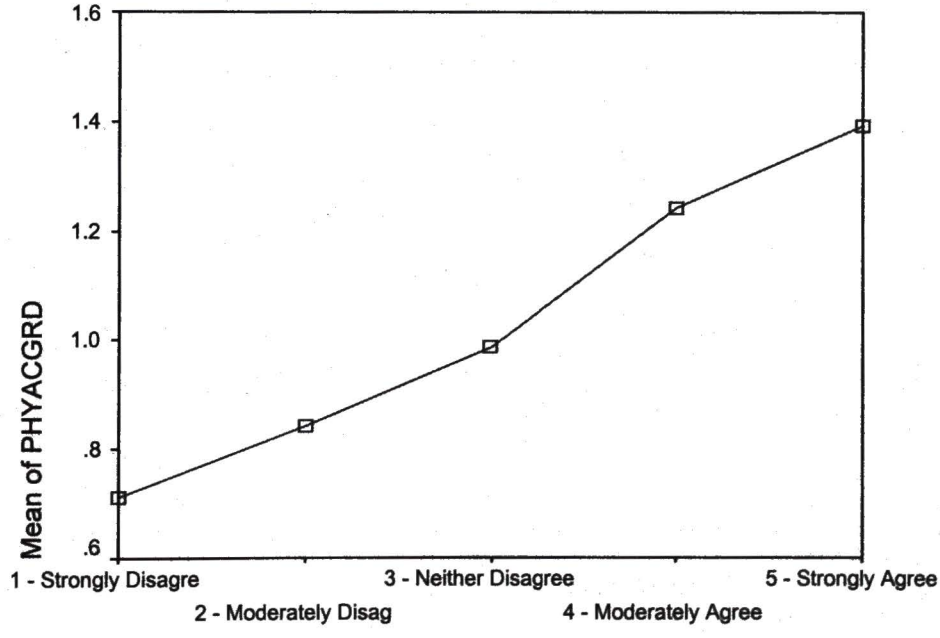


Q1 Living Life In The Best Possible Health is important to me

B.

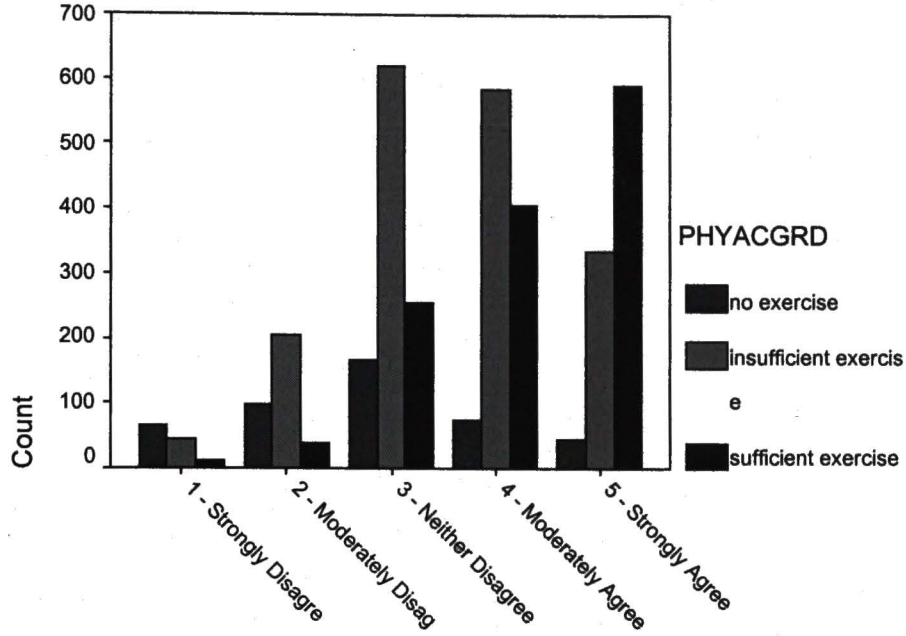


Q1 Feel Pleased With Myself If I Exercise regularly

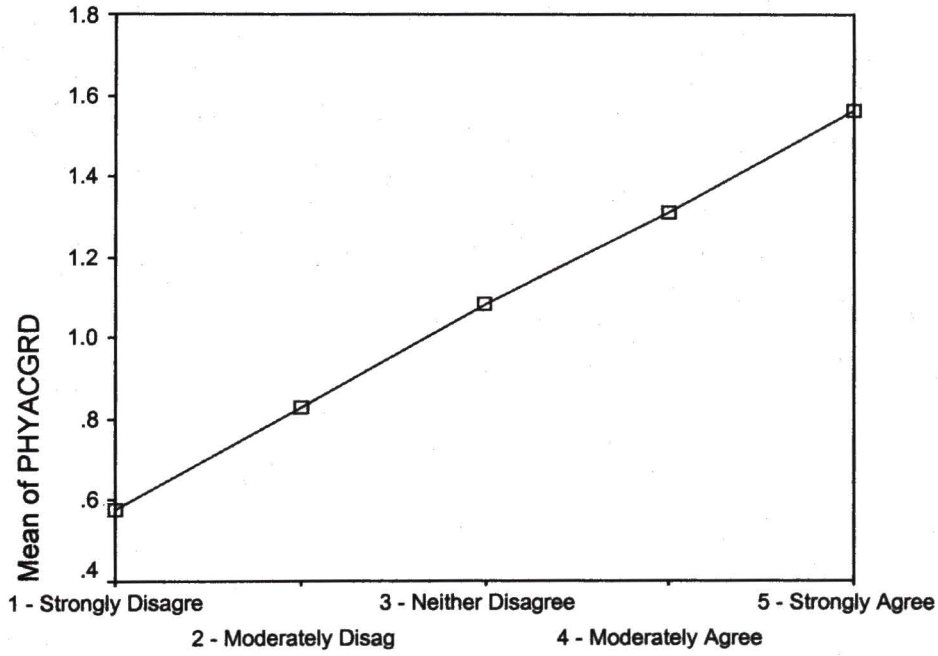


Q1 Feel Pleased With Myself If I Exercise regularly

c.



Q1 I Enjoy Getting Regular Exercise



Q1 I Enjoy Getting Regular Exercise

APPENDIX A

Demographics –

Age, Sex, House hold Income, Race, Employment Status, Marriage Status, Education Level

Section I – Attitudes and Opinions

50. I enjoy getting regular exercise.
64. Protecting health and safety is important to me.
68. I feel pleased with myself if I exercise regularly.
71. Living life in the best possible health is very important to me

Section III – Your Health

*B1. High blood pressure***
*B2. High Cholesterol***
*B6. Diabetes***
*24. Has a doctor or nurse told you that you had a heart attack or MI?***
28. Has your doc/nurse ever told you that you had angina or CAD?
34. Have you ever been told by a doc/nurse that you have high blood pressure?
35. Are you currently taking medicine for your high blood pressure?
*39. Are you now limited in any way in any of your usual activities because of arthritis or joint symptoms?**

Section V – Health Behavior

*39-40. How many cigarettes do you smoke a day?***
44-51. What is the average number of minutes you spent on these activities

Moderate Activities: fast walking, cycling for pleasure, dancing and yard work that caused some increase in breathing and heart rate	*Moderate Days*	*Moderate Minutes*
Vigorous Activities: running, aerobics, fast bicycling, competitive sports and yard work that caused large increases in breathing and heart rate	*Vigorous Days*	*Vigorous Minutes*

Section VI – Health Risks

*37. Has your biological mother ever had heart disease?***
*39. Has your biological father ever had heart disease?***
*41,43. Have your biological brothers or sisters ever had heart disease?***

** Additional risk factors for CAD e.g. diabetes, high cholesterol, hypertension and family history.
* Potential confounding factors.