

# Cardiovascular Fitness Program: Factors Associated with Participation and Adherence

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## Synopsis .....

*Despite the proliferation in the last 10 to 15 years of cardiovascular fitness programs, little is known about*

*who uses them. Who joins such a program and who adheres after enrollment were examined in this study.*

*The first issue was addressed by comparing clients who came to the Coronary Detection and Intervention Center of the 92nd Street YM-YWHA in New York City to obtain a CHD risk assessment with those who, after being evaluated for coronary heart disease, enrolled in the center's fitness program. Joiners were found to be in poorer physical condition than nonjoiners. In addition, they were more concerned about their health and more likely to see improved health as being beneficial to other areas of their lives.*

*The issue of adherence was investigated by comparing the joiners who attended less than 50 percent of the exercise sessions with those who attended 50 percent or more of the sessions. Those who adhered to the program were found to be more fit than those who did not adhere. These results, in conjunction with those of other researchers, have several useful implications for the administration of cardiovascular fitness programs.*

CARDIOVASCULAR DISEASE CONTINUES TO BE the leading cause of mortality in the United States, accounting for approximately 54 percent of all deaths (1). On the basis of epidemiologic as well as clinical evidence (2,3), medical authorities have recommended regular physical activity as a prophylactic against coronary heart disease (CHD) (4). Probably as a consequence of such a recommendation, exercise programs for adults have been initiated throughout the United States (5). Indeed, over the last 10 to 15 years, there has been an impressive growth in the availability of cardiovascular fitness programs geared to persons without a history of myocardial infarction who are at risk of developing CHD, or are in poor physical condition, or both. Since 1973, for instance, the National Council of the YMCAs has trained more than 4,000 instructors in its cardiovascular fitness program, "The Y's Way to Physical Fitness." Bill Zuti, Associate Director for Health Enhancement, the National Council of the YMCAs, estimated in September 1983 that around 95 percent, or about 2,100 YMCAs throughout the country, have established some type of adult fitness program.

Despite the proliferation of fitness programs, relatively little is known about those who join these programs (6) and those who adhere to the exercise regimens after enrollment (7). Exercise researchers have referred

to the first issue as that of participation (8) or adoption (6) and the second issue as that of adherence (9) or compliance (10). We had the opportunity of investigating both issues at the 92nd Street YM-YWHA's Coronary Detection and Intervention Center (CDIC) in New York City.

## Background

The 92d Street Y is a well-known cultural center on the Upper East Side of Manhattan. While maintaining its identity as a Jewish education and cultural institution, the Y provides a wide range of services to people looking for recreational and social outlets. Among its activities are major concerts, lectures on religious and secular topics, classes on subjects ranging from childbearing to the theatre, and a full range of athletic and physical fitness programs.

In 1975, the Y, with the assistance of a grant from the New York Heart Association, established the Coronary Detection and Intervention Center. The CDIC offers essentially two services: a CHD risk assessment, including a maximum exercise EKG, and a structured exercise program designed to increase coronary fitness and reduce the risk factors for coronary disease. The fee for the

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assessment is \$210 and for the exercise program, \$305.

Approximately two-thirds of all CDIC clients come only for the risk assessment. The remaining one-third, after being assessed, enroll in the exercise program. In 1979, for instance, the year when we conducted our study, 161 men and 54 women, free of a medical history of myocardial infarction, used the services of the CDIC. Of these 215 people, 154 (72 percent) had a risk assessment and a maximum exercise EKG, and 61 (28 percent) enrolled in the fitness program. Of the 61 program participants, 75 percent were men and 25 percent were women. The exercise program is structured to meet the health and fitness needs of the individual client. At the outset of the program, the exercise director meets with each client and, on the basis of that person's medical history and general aerobic status, develops an exercise regimen specifically for that client. Generally, however, the regimens are composed of the conventional aerobic-fitness activities, such as jogging, bicycle riding, situps and, for some persons, swimming. Each client signs up for a 24-week period and is expected to exercise at the CDIC three times a week for a total of 72 sessions.

The exercise regimens are carried out in one of two locations. Those clients with particularly limited capacity who require close supervision exercise in a large, carpeted room near the offices of the CDIC's medical staff, which consists of a full-time nurse and a part-time physician. Other clients exercise in the Y's main gym under the general supervision of the CDIC's staff of exercise instructors.

As a standard operating procedure that was instituted for the purposes of service, evaluation, and research, various types of information are collected on all clients. In addition to filling out a CHD Risk Assessment Questionnaire, taking a stress test, and having blood chemistries performed, all clients complete the Cornell Medical Index and a health attitude questionnaire as well as answer a series of questions about sociodemographics. Clients who enroll in the exercise program also complete a general interview schedule containing questions on

leisure time activity and habits, life satisfaction, familial relationships, attitudes about their jobs, the source of referral, and expectations about the exercise program. Last, attendance records are kept for each enrollee in the exercise program.

## **Methodology**

To identify which types of people tend to enroll in an adult fitness program, we compared two natural subgroups of CDIC clients: the nonjoiners—the 154 persons who used the center for a risk assessment and a maximum exercise EKG—with the joiners, the 61 persons who enrolled in the fitness program. Specifically, joiners and nonjoiners were compared in terms of six categories of variables: (a) sociodemographic characteristics, (b) physical characteristics, (c) fitness, (d) CHD risk factors, (e) self-assessed health, and (f) general health attitudes and behavior.

Differences between joiners and nonjoiners were analyzed first for statistical significance using chi-square or Student's *t*-test, depending on the scale of measurement of the variable in question. Those independent variables found to be significant on a univariate level were then simultaneously analyzed, employing a multiple logistic regression. This multivariate technique allowed for a determination of the unique and relative contribution of each independent variable in differentiating joiners and nonjoiners.

To determine the types of people who adhere to an exercise regime, we compared joiners who attended less than 50 percent of the exercise sessions (the non-compliers) with joiners who attended 50 percent or more of the sessions (the compliers). Compliers and non-compliers were compared in terms of the six categories of variables previously mentioned and also in terms of their responses to the general interview schedule. Our analytic strategy again entailed using univariate and then multivariate techniques.

## **Results**

In tables 1 and 2 we present those variables that, using univariate techniques, were found to differentiate significantly joiners and nonjoiners. Joiners, on the average, were 4 years older than nonjoiners. They were more likely to be retired or working part time. Graduate-level degrees (master's or doctorate level) had been earned by 41 percent of the joiners but only 19 percent of the nonjoiners. Fifteen percent of the joiners, but only 3 percent of the nonjoiners, were nonwhite, that is, black, Hispanic, or oriental.

There were also significant differences with regard to fitness variables. Joiners had a 10 percent lower max-

Table 1. Univariate analyses of significant differences in physiologic variables between joiners and nonjoiners

Variable	Joiners			Nonjoiners			Differences		
	Number of persons	Mean	SD	Number of persons	Mean	SD	d.f.	t	P value
Maximum oxygen consumption (VO <sub>2</sub> ml. per kg. min.)	61	34	± 8.2	154	38	± 9.0	213;	3.05	.003
Total minutes on maximum exercise EKG protocol	60	9.6	± 2.4	154	11.4	± 5.8	210;	3.32	.001
Maximum heart rate (beats per min.)	61	167	± 20.5	154	174	± 18.4	213;	2.43	.016
Triglyceride level (mg. per dl.)	54	175	± 86.6	57	135	± 50.3	84;	2.93	.004
Glucose level (mg. per dl.)	54	99	± 40.9	57	85	± 23.2	83;	2.15	.034
Age (years)	54	54.7	± 9.0	150	50.7	± 11.8	121;	2.59	.011

Table 2. Univariate analyses of significant differences in questionnaire responses between joiners and nonjoiners

Responded yes to—	Joiners		Nonjoiners		Differences	
	Number of persons	Percent	Number of persons	Percent	Chi-square <sup>1</sup>	P value
Nonwhite	52	15	140	3	8.1	.004
Have a heart condition	59	34	150	19	5.55	.01
Participate in physical activity	56	18	149	44	12.1	.000
Have high blood pressure	58	36	148	22	4.1	.041
Worry about health	45	82	92	55	9.4	.002
Believe health increases activity	40	93	91	65	10.8	.004
Employed full time	52	73	108	89	8.1	.011
Have graduate degree	49	41	107	19	8.6	.003

<sup>1</sup> Chi-square values were calculated for 1 degree of freedom.

imum oxygen consumption per minute, as assessed by  $\dot{V}O_2$  which is widely accepted as the best criterion of cardiorespiratory endurance capacity. Joiners also spent fewer minutes on the exercise EKG protocol than did the nonjoiners. In addition, during exercise testing, joiners exhibited a lower maximum heart rate.

Joiners and nonjoiners also differed in their responses to the CHD Risk Assessment Questionnaire (table 2). In answering "Do you know of any heart condition?" 34 percent of the joiners, but only 19 percent of the nonjoiners, replied yes. Thirty-six percent of the joiners, but only 22 percent of the nonjoiners, said that they had been told that they had high blood pressure. When asked, "Do you participate in regular physical activity for recreation?" only 18 percent of the joiners, but 44 percent of the nonjoiners, said yes.

Results from the blood chemistry analyses demonstrated that the two groups did not differ significantly in cholesterol but had different glucose and triglyceride levels. On the average, joiners had a glucose count of 99 and a triglyceride count of 175. The respective figures for nonjoiners were 85 and 135.

Finally, joiners and nonjoiners differed in their health attitudes, as expressed in their responses to two of four questions that probed their health beliefs. In response to

"Do you ever find yourself worrying about your health?" 82 percent of the joiners, but only 55 percent of the nonjoiners, responded yes. When asked, "Would improving your health status enable you to increase your activities to any extent?" 93 percent of the joiners, but only 65 percent of the nonjoiners, answered affirmatively.

All but two of these variables were entered, in a stepwise manner, into a multiple logistic regression. Triglycerides and glucose had to be excluded from the analysis because of missing data for these variables for a substantial number of nonjoiners. The logistic regression indicated that only three variables were able to differentiate joiners from nonjoiners when other variables were controlled. The three variables, in order of explanatory importance, were total number of minutes on the maximum exercise EKG protocol, worry or concern about health, and the belief that improved health would lead to increased activity (table 3).

Attendance data were available for 54 program participants. Of these 15, or 28 percent, were compliers and 39, or 72 percent, were noncompliers. The univariate analyses indicated that compliers and noncompliers differed in two ways (table 4). Compliers had a 24 percent greater maximum oxygen consumption, as measured by  $\dot{V}O_2$ .

Table 3. Stepwise multiple logistic regression with participation as the dependent variable

Variable	Beta	Standard error	Chi-square	P	R
Intercept	-6.565	1.919	11.69	.000	
Total minutes on maximum exercise					
EKG protocol	0.366	0.121	9.10	.002	.100
Worry about health	1.318	0.626	4.42	.035	.051
Health increases activity	1.475	0.738	3.99	.045	.046

Table 4. Univariate analyses of differences between compliers and noncompliers

Variable	Compliers			Noncompliers			Differences		
	Number of persons	Mean	SD	Number of persons	Mean	SD	d.f.	t test	P value
Maximum oxygen consumption (VO <sub>2</sub> , ml. per kg. min.)	15	40	±6.1	39	32.6	±8.2	52	-3.31	.002
Total minutes on maximum exercise EKG protocol	15	11	±1.8	38	9.0	±2.4	51	-3.08	.003

Table 5. Stepwise multiple logistic regression with compliance as the dependent variable

Variable	Beta	Standard error	Chi-square	P	R
Intercept	-7.583	2.490	9.28	.002	. . .
Maximum oxygen consumption (VO <sub>2</sub> , ml. per kg. min.)	.179	.064	7.28	.005	.305

They were also able to spend a greater amount of time on the maximum exercise EKG protocol. When these variables were simultaneously analyzed, it was found that only maximum oxygen consumption differentiated compliers from noncompliers (table 5).

## Discussion

Heinzelmann and Bagley have pointed out that, in evaluating a preventive health program, one must look at more than the impact of the program on people's health attitudes and behavior (11). One must also investigate factors that influence people's response to that program, that is, what motivates people to join the program and what factors affect adherence to the program.

Relatively little research has been conducted on people's response to or use of cardiovascular fitness programs. Heinzelmann and Bagley, for instance, investigated a group of sedentary 45- to 49-year-old men who had volunteered to participate in a physical activity program as part of a multi-university research study (11). Subjects were provided with a list of reasons for participating and asked to rank these reasons in terms of importance. The two reasons men listed as the most

influential were the desire to feel better and healthier and concern about lessening the chance of a heart attack.

Durbeck and coworkers compared 348 National Aeronautics and Space Administration (NASA) employees who had agreed to participate in an exercise program with a random sample of NASA employees who were eligible for the program but refused participation (8). They found a marked difference in the health beliefs and attitudes of these two groups. This difference "included thoughts and feelings about physical activity in terms of need, benefits and the perceived determinants of health control."

Mann and coworkers, studying why people joined a 6-month program of calisthenics and walk-jog-run activities, found that the major reason given for participation was a "concern for health" (12). Teraslinna and coworkers found, among the program volunteers that they investigated, that participation was motivated by a desire to improve health, mental working capacity, and physical fitness (13).

We also found that joiners and nonjoiners had different health attitudes. Joiners tended to worry about their health more and tended to see improved health as being beneficial to other areas of their life.

Kasl and Cobb (14), Rosenstock (15), and Becker (16) have elaborated a model to explain why people use preventive health services. The model states that a person will engage in a particular preventive health behavior to the degree that (a) he perceives himself as being susceptible to the particular condition, (b) he perceives the condition as serious, (c) he perceives the benefits of that health action, and (d) he perceives few barriers to taking that action. Although we did not set out to test this model, our findings, in conjunction with those of others, would suggest that the model has relevance for explaining participation in fitness programs. People who join such programs apparently are worried about their health and very likely perceive themselves as being susceptible to coronary heart disease. In addition, they also believe that exercising will improve their health.

In addition to health beliefs, our study suggests that level of physical fitness impacts on participation. We found that the joiners were in poorer shape as evidenced by the total number of minutes spent on the maximum exercise EKG stress test. Teraslinna and coworkers observed that executives who volunteered for a cardiovascular fitness program were younger, lived or worked closer to where the exercise program was being conducted, and also had a lower predicted maximal oxygen uptake than executives who did not volunteer for the program (13).

Why should level of fitness affect participation? One explanation lies in a possible connection between health status and health beliefs. Perhaps people in poor physical condition perceive themselves to be more susceptible to CHD. Taylor and coworkers, for instance, found that men who have coronary-prone characteristics are more likely to perceive themselves as vulnerable to heart attack than men without such characteristics. These data are from the Cooperative Pilot Study of Physical Activity and Coronary Heart Disease by the University of Minnesota, University of Wisconsin, and Penn State University, supported by a 1968 Public Health Service contract.

Level of physical fitness also affected adherence, but in a direction opposite to that in which it affected participation. While poor fitness had a positive effect on participation, it had a negative effect on adherence: non-compliers had a lower maximum oxygen uptake than compliers. Massie and Shephard, in their study of apparently healthy, sedentary, middle-aged businessmen, also found that noncompliers or dropouts tended to be in poorer condition than compliers (17). More specifically, they observed that dropouts were heavier, had a greater percentage of body fat, and were more likely to be smokers than participants who completed the exercise program.

Interestingly, health beliefs were not found to affect adherence significantly. Compliers and noncompliers did

not differ in their response to the four attitudinal questions we asked regarding health and exercising. Heinzelmann and Bagley similarly found health beliefs to be an important determinant of participation but not of adherence to a cardiovascular fitness program (11). Other researchers, studying other kinds of health-related exercise programs and physical activities, have also found attitudes to be a determining factor in participation but not in compliance (6, 18).

Factors found by other researchers to influence compliance with fitness programs are organization and leadership of the program (11); social aspects of the program, such as the sense of camaraderie and support that it provides (11); the attitude of significant others, such as one's wife (11); physical problems developed as a result of participating in the program (8); and the flexibility of the program in adjusting to such problems (8).

## Conclusions

Our findings, and those of other researchers, suggest several implications useful for the administration of cardiovascular fitness programs. First, such programs should incorporate in their recruitment procedures a strong educational component aimed at influencing potential participants' knowledge and attitudes about the need for exercising and the benefits that may be derived from it.

Second, immediately after enrollment, program participants with poor levels of fitness, as measured by the results of an exercise EKG test, and program participants who are overweight or smokers, or both, should be identified. These participants should be given special support and encouragement to increase their level of adherence. In addition, their significant others, such as wives, husbands, and children, should be recruited into the effort to increase adherence.

Third, to increase the adherence of those at risk of noncompliance as well as others, the program should offer its participants strong leadership as well as a sense of belonging and camaraderie.

Fourth, participants should be given an exercise regimen that allows them to get into shape gradually and thus avoid injury. Should injury occur, a participant's regimen should be adjusted to allow some sort of meaningful continuation in the program while the injury is healing.

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