

## IMPACT OF PHYSICAL DISABILITY ON VOCATIONAL ACTIVITY: WORK STATUS FOLLOWING MYOCARDIAL INFARCTION

Stanley Fisher<sup>1</sup>

*From the Department of Educational Psychology, School of Education,  
University of Connecticut, Storrs, Connecticut, USA*

**ABSTRACT.** The objectives of this longitudinal study were to determine the proportion of individuals who return to work following myocardial infarction, and to compare those who return to work with those who do not return to work on a number of medical and social characteristics. The 172 subjects were all the males in the Framingham Heart Study who developed myocardial infarction within the 14 year period since this epidemiological study was initiated. Work Status was determined by comparing the employment history of the patient before (Pre MI) and after he developed myocardial infarction (Post MI). Based on this investigation it was found that 81% of the MIs return to work following MI. Using the chi-square technique it was found that the return to work group was significantly younger than the non working group. There did not appear to be any significant relationship between the working or the non working group, and education, functional class, history of angina pectoris, history of congestive heart failure, recognized or unrecognized MI, the neurocirculatory asthenia. Future studies on return to work should include psychological factors which may distinguish between "slow" and "rapid" return to work groups.

The individual's psychological reaction to the restrictions imposed upon him by heart disease is reflected in part by his decisions to retire, return to his former job or seek new employment. Over the past 30 years numerous retrospective studies have been made of the work status of individuals following heart disease.

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In 1940, Master & Dack (16) studied 415 male and female patients and found that 59% returned to employment after their first myocardial infarction.

In 1944, Kresky & Goldwater (12) reported on the vocational behavior of 2 081 patients who in 1941 were attending ten cardiac clinics. The report revealed that 47% of the 1 019 males in this sample were working at the time of the study.

In another study of 580 adult cardiac patients seen in 1949 the staff of the New York Work Classification Unit found that 45% of the 308 males were employed fulltime, and 8% were employed part time (8). Clark (3) studied 314 cardiacs seen at the Boston Work Classification Unit between 1952 to 1957 and found that 185 were employable and of these 63% resumed work. In 1956 Crain & Missal (4) reviewed the medical records in their industrial plant and found that 82% returned to work after MI.

In England, Papp & Smith studied 200 patients seen both in hospital and in private practice and found that 33% who had a severe MI returned to work; while 65% who had MI of less severity returned to work (18). In Norway, Lund-Johansen investigated both an urban and rural population involved in cardiac rehabilitation and found that 83% returned to work (14). Biörck & Wedelin in Sweden found that 80% returned to work (2).

Based on a questionnaire sent to former hospitalized patients Kellerman (11) and his group in Israel found in 1968 that 80% of the men who had a diagnosis of acute myocardial infarction returned to work. They report that all the patients who returned to work did so within 1

Table I. *Work status male MI's Framingham*

	N	Total (%)
1. Returned to same work	93	54.0
2. Died—no evaluation following MI	34	19.8
3. Retired after MI	18	10.4
4. Not enough vocational history to determine work status	9	5.2
5. New job following MI	7	4.1
6. Unemployed following MI	6	3.4
7. Retired before and after MI	5	2.9
Total	172	99.8

*N* = 172.

year, 13% 1 month after diagnosis of MI, 52% within 2 months, and 83% within 5 months.

Weinblatt et al. (10) found that of men surviving the MI by 3 months, 3 out of 10 return to work in 3 months, and nine out of 10 by 18 months after MI. By the end of the 18th month observation period 6% of the survivors had again left the labor force after their initial return.

Existing estimates of the proportion of individuals who return to work are difficult to interpret since they are based almost exclusively on a retrospective analysis. In addition, Sharland (19) and Weinblatt (20) noted a number of problems arising from the selectivity of case material in studying the ability of cardiacs to return to work.

The patients involved in work status studies have been private, clinic, hospitalized patients or work evaluation unit patients. All patients had a diagnosis of myocardial infarction.

Studies limited to cases of diagnosed myocardial infarction present only one aspect of the work status problem, since myocardial infarction is frequently undetected when acute symptoms are absent. It therefore appears worthwhile to study the work status and characteristics of individuals prior to the advent of myocardial infarction and to evaluate these findings in reference to return to work after the advent of both recognized and unrecognized myocardial infarction.

The purposes of this study are to:

1. determine the proportion of individuals who return to work, and those who did not return to work following myocardial infarction;
2. compare those who return to work and those who did not return to work on the following factors: age, education, history of neurocirculatory

asthenia, unrecognized MI, functional class, history of congestive heart failure and history of angina pectoris.

## MATERIAL AND METHODS

To determine those factors associated with the development of heart disease a continuing epidemiological study was established in Framingham, Massachusetts. Since 1949, "The Framingham Heart Study" has been investigating a population of 5 127 males and females aged 30-62 who were initially free of heart disease. These individuals were seen for biennial examinations when a variety of information was collected including a work history of each individual (6). Although followed for a longer average period the data for this report was based on the 14th year follow-up of the Framingham Heart Study for which complete information was available in February 1969.

For the purposes of this study the subjects were all the males in the Framingham Heart Study who developed myocardial infarction. There was a total of 172 such individuals.

The employment histories of the 172 MI subjects were reviewed to determine their "Pre-MI" and "Post-MI" work status. Pre-MI work status was the recorded employment activities obtained in the biennial examination preceding myocardial infarction. Post-MI work status was the employment data obtained in the biennial examination following myocardial infarction. Work status was established by comparing the Pre-MI work status with the Post-MI work status.

In addition to work status the following information was obtained from the Framingham records on each of the subjects: 1) age; 2) education; 3) history of neurocirculatory asthenia; 4) unrecognized MI; 5) functional class; 6) history of congestive heart failure; 7) history of angina pectoris.

The chi-square technique was used to analyze each of the above factors with reference to return to work behavior. Significance was set at the 0.01 level of significance.

## RESULTS

Of the 172 male MI subjects reported in Table I, 34 died between examinations, and there was insufficient employment data available to determine the work status of an additional 9 subjects. Those 5 who were retired from work prior to and after MI were eliminated from the sample because these were apparently not influenced by the disability. It is interesting to note that none of the subjects who retired before MI returned to work after MI for the period under investigation.

Table II shows the remaining 124 subjects that make up that group which can be considered as



working (return to same job or changed jobs following MI) and non-working (unemployed or retired after MI). Approximately 81% returned to work and 19% did not return to work following myocardial infarction. If we eliminate the group that retired after MI we find that 94% of the subjects return to either their same job or found a new job and 6% consider themselves unemployed.

Analyses were also made to test the contribution of certain sociological and medical factors to return to work. These factors were viewed as some of the components which would determine whether or not an individual would return to work. Included here was the individual's: 1) age at the time of MI; 2) years of education completed; 3) diagnosis of neurocirculatory asthenia; 4) recognized and unrecognized MI; 5) American heart association classification; 6) history of congestive heart failure; and 7) history of angina pectoris.

Chi-square tests were performed on each of these factors and their relationship to return to work. The findings are as follows:

1. *Age.* As shown in Table III the average age of the working group was 51 years and the average age for the non-working group is close to 60 years at the time of their MI. A significant relationship was found between age and return to work. Advancing age may be one of the major reasons why an individual does not return to work following myocardial infarction.

2. *Education.* The average number of years of education completed by the working MI group was 11.2 years, and for the non-working group 8.6 years. Although there is a 2.6 years difference in favor of the working group, this difference was not a significant one. As the data re-

Table II. Return to work following myocardial infarction

Work status	N	Total (%)
Returned to same work	93	75.00
Changed to other work	7	5.64
Working—Total	100	80.64
Unemployed	6	4.84
Retired	18	14.51
Not working—Total	24	19.35

N=124.

Table III. Comparison between working and non-working group

		Working	Non-working
1. Age (at time of MI) <sup>a</sup> N=124	Under 50	38	2
	51-65	57	18
	Over 66	5	4
	Average	51.07	59.72
2. Education (years) N=123	Under 4	6	1
	5-8	24	7
	9-12	39	9
	13-16	22	7
	17+	9	0
Average	11.20	8.64	
3. Neuro-circulatory asthenia	Yes	10	4
	No	90	20
4. Recognized MI	Recognized	76	16
	Unrecognized	19	4
	Neither recognized or unrecognized	5	4
5. AHA functional class	1	28	8
	2	68	13
	3	4	3
	4	0	0
6. History of congestive heart failure	Yes	12	7
	No	88	17
7. History of angina	Yes	45	14
	No	55	10

<sup>a</sup> Significant at 0.01 level of significance.

veals, the greatest majority of MI's (93%) who return to work, return to their former work. Only 7% change to other work. Higher education would play a more important role if the majority of individuals with MI were seeking jobs that demanded more years of schooling.

3. *Neurocirculatory asthenia (NCA)* was at one time referred to as "soldiers heart" because of its association with emotional stress due to participation in military activities. MacIver (15), Miles & Cobb, (17) Wheeler et al. (22) perceive NCA as evidence of anxiety due to psychological problems. However, the medical team (no psychiatrist included) at Framingham determined the diagnosis of NCA based on the following criteria: (9).<sup>1</sup>

<sup>1</sup> (a) "The subject must have a 'respiratory' complaint, e.g., sighing respiration, inability to get a deep or satisfactory breath, smothering and choking, or complaint of dyspnea." (b) "The subject must have one or more symptoms from two of the following three symptom groups: Group 1: palpitation, chest pain, chest discomfort. Group 2: nervousness, dizziness, faintness, discomfort in crowds. Group 3: undue fatigability or tiredness, or limitation of activities."

On the basis of this study there was no significant difference between the working MI and non-working MI group based on a history of NCA. This does not preclude the possibility that NCA may be a factor in delaying a return to work during the one year period following the diagnosis of MI.

4. *Recognized and unrecognized MI.* In a 12 year follow-up in the Framingham Study, Kannel et al. (10) compare these myocardial infarctions which were silent or unrecognized with those who were recognized, and found that 26% were unrecognized. Previous studies on return to work have only included those patients with recognized heart disease. Some consider the unrecognized MI to be a milder form of MI, and the recognized to be a more severe form of this disorder (13). When the non-working and working MI groups were compared as to the severity of their disorder based on recognized and unrecognized MI no significant relationship was found. This finding suggests the work status of individuals with MI is based on factors other than severity of their heart disease.

5. Functional capacity as recorded by the Framingham team based on the American Heart Association classification (5) as follows:

Class 1: Patients with cardiac disease but without resulting limitations of physical activity. Ordinary physical activity does not cause undue fatigue, palpitation, dyspnea or anginal pain.

Class 2: Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Ordinary physical activity results in fatigue, palpitation, dyspnea or anginal pain.

Class 3: Patients with cardiac disease resulting in slight limitation of physical activity. They are comfortable at rest. Less than ordinary activity causes fatigue, palpitation, dyspnea or anginal pain.

Class 4: Patients with cardiac disease resulting in inability to carry on any physical activity without discomfort. Symptoms of cardiac insufficiency or of the anginal syndrome are present even at rest. If any physical activity is undertaken discomfort is increased.

No significant relationship was found between functional class and return to work. It is interesting to note that no subject received a IV classification.

6. *Congestive heart failure.* As with the other measures of severity of illness in this study no significant relationship between congestive heart failure and employment was found. Clarke (3) in his work classification unit study found that "a history of congestive failure and the use of mercurial diuretics tend to decrease employability but are not bars to it".

7. *Angina pectoris.* This data reveals that there is no significant difference between the working and non-working groups as to a history of angina pectoris. Bakker & Levenson (1) report however that "the anxiety of both patient and doctor aroused by angina pectoris resulted in much delay in the rehabilitation of patients". The anxiety delay found by these investigators may be one of the factors that separate the "slow" and "rapid" returnees within the 1 year period following a diagnosis of MI.

## DISCUSSION

Previous studies of the proportion of individuals who return to work following MI have usually included subjects with "recognized MI" obtained from hospital, clinic, private practice and cardiac work evaluation units. These studies have usually excluded the unrecognized MI which represent over 25% (10) of the MI population. In addition, the technique of determining change in work status on the basis of employment data obtained from patients a long time after the onset of MI is of questionable validity (21). The varied findings reported in these earlier studies range from as low as 45% to a high of 89% return to work following MI. This study, as the epidemiological medical study at Framingham, Mass (6) is predicated on the belief that an understanding of the impact of disability on the psychological adjustment of an individual will be facilitated by a careful recording of the medical, social, psychological, and vocational characteristics of individuals before the disability develops and analysis of the differences of these variable after disability.

The subjects used in this investigation were those individuals found to have both recognized and unrecognized MI in the Framingham Heart Study. Employment histories were obtained at Framingham just prior to MI (Pre-MI) and shortly following MI (Post-MI). Based on this data it was found that 81% of MI's return to



work following MI. The date of return to work following MI can be assigned as having occurred at the mid-point between the Pre-MI and Post-MI period, on the average of 1 year. Weinblatt et al. (20) found that 9 out of 10 MI's return to work by 18 months. Kellerman and his associates (9) report that all the subjects who returned to work in his study did so within 1 year, with 13% returning in 1 month after diagnosis of MI, 52% within 2 months, and 83% within 5 months. These findings as well as the current data suggest that programs directed to the vocational rehabilitation of individuals with MI should be directed to those who will not return to work within 1 year following a diagnosis of MI.

It appears clear from the present study that the best predictor of return to work is age. Individuals who return to their former work and seek new work were more likely to be younger than those who were unemployed or retired. There does not appear to be any relationship between return to work and education. Severity of illness as measured by functional class, history of angina pectoris, history of congestive heart failure, recognized or unrecognized MI and neurocirculatory asthenia was not found to be significantly related to return to work.

The results of this return to work study suggests, as did the Gelfand et al. (7) study on the vocational adjustment of cardiac patients that the factors which differentiate the groups do not lie so much in the medical aspects "but can be seen only in the social and psychiatric data". Future studies on return to work should include psychological factors which may distinguish between the "rapid" (3 months or less) and "slow" (4 months or more) return to work groups. Such information would be most helpful to those concerned with the vocational rehabilitation of the cardiac.

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### REFERENCES

1. Baker, C. B. & Levenson, R. M.: Determinants of angina pectoris. *Psychosomatic Med* 29: 621, 1967.

2. Björck, G. & Wedelin, E. M.: The return to work of patients with myocardial infarction. *Acta Med Scand* 175: 215, 1964.
3. Clark, R. J.: Work classification unit in Boston. *In Work and the Heart* (ed. F. F. Rosenbaum & E. L. Belknap). Hoeber-Harper, New York, 1959.
4. Crain, R. B. & Missal, M. E.: The industrial employee with myocardial infarction and his ability to return to work. Follow-up Report, *New York Journal of Medicine* 56: 2238, 1956.
5. Criteria Committee of the New York Heart Association: The classification of patients with diseases of the heart. American Heart Association, 1955.
6. Dawber, T. R., Moore, F. E. & Mann, G.: Coronary heart disease in the Framingham study. *AJPH* 47: 6, pp. 4-23, 1957.
7. Gelfand, D.: Factors relating to unsuccessful vocational adjustment of cardiac patients. Pennsylvania Office of Vocational Rehabilitation, 1960.
8. Goldwater, L.: An occupational analysis of 580 cardiac clinic patients. *Circulation* 3: 89, 1951.
9. Kannel, W. B., Dawber, T. R. & Cohen, M. E.: The electro-cardiogram in neurocirculatory asthenia (anxiety, neurosis or neuroasthenia): A study of 203 neurocirculatory asthenia patients and 757 healthy controls in the Framingham study. *Annals of Int Med* 49: 6, 1958.
10. Kannel, W. B., Castelli, W. P. & McNamara, P. M.: The coronary profile: twelve year follow-up in the Framingham study. *Jr of Occ Med* 9: 12, 1967.
11. Kellerman, J. J., Modan, B., Levy, M., Feldman, S. & Kariv, I.: Return to work after myocardial infarction. *Geriatrics* 23: 151, 1968.
12. Kresky, B. & Goldwater, L. J.: Occupational potentialities of cardiac patients. *AM Heart J* 27: 623, 1944.
13. Lew, E. A.: Survivorship after myocardial infarction. *AJPH* 57: 118, 1967.
14. Lund-Johansen, P.: The work and rehabilitation of patients with coronary heart disease from an urban and rural population of Norway. *Acta Med Scand* 177: 59, 1965.
15. MacIver, J.: Psychiatric aspects of cardiovascular diseases in industry. *In The Heart in Industry* (ed. L. J. Warshaw), Hoeber-Harper, New York, 1960.
16. Master, A. M. & Dack, S.: Rehabilitation following acute coronary occlusion. *JAMA* 115: 828, 1940.
17. Miles, H. H. W. & Cobb, S. S.: Neurocirculatory asthenia, anxiety and neurosis. *New England J Med* 254: 711, 1951.
18. Papp, C. & Smith, S. K.: Prognosis and treatment of cardiac infarction: survey of 200 patients. *British M J I*: 1471, 1951.
19. Sharland, D. E.: Ability of men to return to work after cardiac infarction. *British M J II*: 718, 1964.
20. Weinblatt, E., Shapiro, S., Frank, C. W. & Sager, R. V.: Return to work and work status following first myocardial infarction. *AJPH* 56: 169, 1966.

21. Weiss, D. J., Davis, R. V., England, G. & Loequist, L. H.: Validity of work histories obtained by interviews. University of Minnesota Press, 1961.
22. Wheeler, E. D., White, P. D., Reed, E. W. & Cohen, M. E. Neurocirculatory asthenia. *JAMA* 142: 878, 1950.

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*Address for reprints:*  
Stanley Fisher, M.D.  
204 Scott Drive  
Manchester, Connecticut 06040, USA