

EMOTIONAL REACTIVITY AND DEBILITATING BELIEFS DURING HOSPITALIZATION PREDICT FUTURE ADJUSTMENT TO FIRST MYOCARDIAL INFARCTION IN MEN

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ABSTRACT. Research efforts are being made to identify personality and cognitive variables predictive of poor adjustment following myocardial infarction. Sixty-two male patients were examined after a first and uncomplicated myocardial infarction to determine whether dispositional emotional reactivity and debilitating beliefs measured during hospitalization can predict work engagement, social activities involvement, and ambulation/independence six months later. A structural model with direct paths between emotional reactivity, debilitating beliefs, and the above outcomes, as well as partial mediation of emotional distress and illness preoccupation, was tested using the CALIS procedure. The model explained 33%, 48% and 82% of the variance in the three outcomes, respectively. Work engagement was indirectly related through emotional distress to earlier emotional reactivity and debilitating beliefs. Social activities involvement was both directly and indirectly related through emotional distress to debilitating beliefs; and also indirectly related through emotional distress to emotional reactivity. Ambulation/independence was directly and negatively related to debilitating beliefs. Prolonged emotional distress was predicted by emotional reactivity and debilitating beliefs. Illness preoccupation turned out to be an independent outcome that was positively related to emotional reactivity. Thus, measuring dispositional emotional reactivity and debilitating beliefs at the hospitalization stage may be helpful in detecting patients at risk of poor future adjustment.

Key words: adjustment; debilitating beliefs; emotional reactivity; myocardial infarction; recovery.

INTRODUCTION

There is a considerable body of evidence indicating that emotional distress (e.g., excessive anxiety, irritability, depressive and somatic symptoms) after myocardial infarction (MI) hampers both the adjustment and recovery processes. It affects return to work (7, 14, 39) and the resumption of social, leisure, and sexual activities (24, 46), and is associated with subsequent morbidity and mortality (10, 11, 31, 55). Emotional factors may independently contribute to the above outcomes over and above the clinical severity of the MI (7, 11, 39, 55).

Ongoing research is seeking to identify personality characteristics that may be predictive of poor long-term recovery and functioning following MI for purposes of initiating early intervention to prevent or reduce undesirable outcomes (38, 43). In line with these efforts, the primary aim of the present longitudinal study was to determine whether dispositional emotional reactivity measured during hospitalization would predict adjustment to first MI through its influence on emotional distress. Emotional reactivity (ER) denotes a proneness toward readily entering into and sustaining a state of emotional arousal in response to emotional events (27). In terms of cognitive self-regulation theory (1), ER signifies a reported inefficacy in self-regulating thoughts and images and the resultant emotions in anticipation of, during, and following emotional events. ER appears to be a persistent psychological disposition, with a test-retest reliability of 0.72 over two to four years ($n = 1170$, (26)). It has been positively related to emotional distress (28), reported tension at work (29), and burnout (17). We thus hypothesized that dispositional

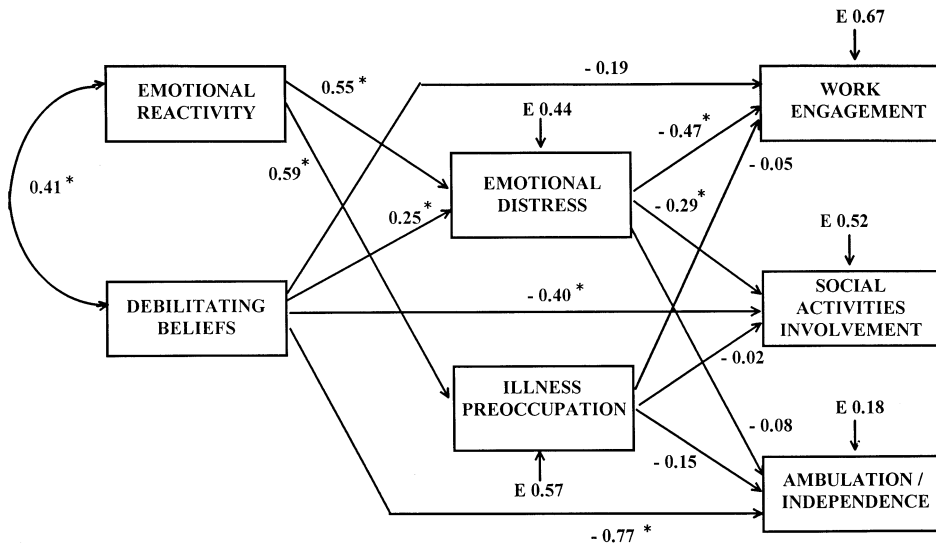


Fig. 1. The study model with standardized path coefficients; E = residual variance.

ER in MI patients would lead to protracted emotional distress, which would impede their psychosocial functioning.

Psychosocial adjustment to MI has in general not been related to the severity of the illness (44); it has been proposed that adjustment to illness is mediated by cognitive processes described variously as “patient’s interpretation of illness” (20), “illness representation” (32), or “perceived meaning of illness” (30). However, there is no accepted operational definition of the content of subjective interpretation of illness. Many studies have focused on the perceived severity of the illness (e.g., 42, 50). We reasoned that in attempting to predict psychosocial adjustment after MI, it would be more beneficial to gauge debilitating beliefs, defined here as self-generated beliefs of the limitations/restrictions imposed by the illness, rather than focusing on a global measure of perceived illness severity. Thus, another aim of the study was to examine whether debilitating beliefs held during the hospitalization period predict those outcomes most frequently selected as indicators of psychosocial adjustment to coronary heart disease (CHD): return to work, resumption of social activities, and ambulation/ independence (4, 16).

Study model

The general hypothesis in this study (illustrated in the

model in Fig. 1) was that, following MI, patient functioning in several important domains is directly and indirectly linked to ER and debilitating beliefs, as assessed during hospitalization (the exogenous or predictor variables here). The effect of ER on these outcomes was hypothesized to be mediated by emotional distress. Emotional distress was proved to be an important determinant of adjustment to MI. ER was found to be predictive of emotional outcomes in non-patient populations (17, 28, 29) and this was expected to generalize to cardiac patients as well. A major characteristic attributed to emotionally reactive persons is a propensity to extend the mental representation of stressful events (thereby adding to their chronicity) through recurrent intrusive thoughts and images (27). (For discussion of the contribution of intrusive thoughts and images to chronic distress outcome following stressful events, see Baum (2)). Thus, ER in MI patients was expected to be associated with protracted preoccupation with illness. Several studies have shown that illness preoccupation is related to poor outcome after MI (53, 55). We therefore hypothesized further that the association between ER and the outcomes studied would also be mediated through illness preoccupation.

A number of studies have demonstrated a relation between patients’ illness cognition and adjustment after MI (50, 51). Thus, we expected that debilitating beliefs would similarly directly affect all the out-

comes studied. Furthermore, the effect of debilitating beliefs on the above outcomes was expected to be partially mediated by emotional distress. Krantz (20) maintained that cognitive processes and subjective interpretations of illness are important determinants of mood state during recovery from MI. Thus, it was expected that MI patients who believed their medical condition implies a multitude of limitations and restrictions were likely to be emotionally distressed.

MATERIAL AND METHODS

Participants

The potential study sample consisted of 65 consecutive male patients hospitalized at the Meir Hospital in Israel during 1993 and 1994, and who met the following criteria: age < 60 years; uncomplicated first MI according to three known indices: Coronary Prognostic Index Total (34), Total Complication Score (23), and Ejection Fraction (33); at least 10 years of stable employment; and absence of past or present psychiatric disorder. All patients received standard care.

These rigorous selection criteria were adopted to control for possible confounders known to be associated with poor adjustment to MI, namely, older age, gender (female), number of previous infarctions and their severity, severity of current infarction, unstable work history, and poor pre-morbid mental health (7, 39). Three patients declined to participate in the follow-up examination (see below); hence the final sample was comprised of 62 patients. The ages ranged from 34 to 59 years (mean = 48.7 years), and education ranged from 8 to 20 years (mean = 12.3 years); 92% of the patients were married. The pre-injury employment status was distributed as follows: unskilled or semiskilled 20.3%, skilled 46.3%, clerical 7.4%, and professional 26.0%.

Procedure

All patients consented to participate in the two phases of the study: hospitalization and follow-up after 6 months (\pm 2 weeks). This follow-up period was chosen on the basis of evidence from studies in Israel that 80–90% of MI patients return to work within three months after discharge (18, 49). Participants were interviewed twice by a rehabilitation psychologist (I. H.), once upon discharge (T_1) and once at medical follow-up (usually a second follow-up) after six months (T_2). The data gathered concerned demographic variables, medical and work history, past or present psychological treatment, and psychiatric hospitalization. Following these interviews, participants completed various questionnaires, as specified below.

Instruments

Exogenous variables. Emotional reactivity was measured using a revised version of the ER scale (details in Ref. 28). The scale contained 11 items, plus 6 filler items, designed to gauge the following characteristics: (a) tendency to experience intrusive repetitious images and

thoughts following emotional events; (b) inability to control emotional arousal despite conscious attempts to do so; (c) tendency to become emotionally aroused when anticipating future events; and (d) experiencing excessively long and intense emotional responses to emotional events. Sample items: "When something unpleasant occurs before I go out in the evening, I continue thinking about it all evening"; "Whenever I think of an unpleasant event that once happened to me, I get upset about it all over again". The response scale for these items ranged from 1 (*very uncharacteristic of me*) to 6 (*very characteristic of me*). Score ranges, means, standard deviations and Cronbach alphas for this and all other scales are presented in Table I.

Debilitating beliefs were measured by an 11-item scale (see Appendix) developed for this study. Items were extracted from clinical interviews with 28 cardiac patients taken over a six-month period after hospitalization and concerned the perceived limitations/restrictions imposed by the illness. Sample items were: "Cardiac patients should reduce the number of working hours", and "As much as possible, cardiac patients should avoid tension-arousing situations, such as watching football on television". The extent to which these statements applied to respondents was rated on a 6-point scale (1—*strongly disagree*, 6—*strongly agree*). The debilitating beliefs scale was administered twice, once during hospitalization (T_1) and once at follow-up (T_2). The T_1 scores were used as predictors in testing the study model. Evidence for the reliability and validity of the debilitating beliefs scale was obtained in our pilot study of 85 post-first-MI patients conducted six to eight months after discharge from two centrally located hospitals. Ages ranged from 36–55 years (mean = 45.6 years); Cronbach alpha 0.86. Debilitating beliefs correlated negatively with number of working hours (-0.41), participation in social activities (-0.50) and ambulation/independence (-0.61). They also correlated negatively with perceived health status (-0.60) and acceptance of disability (-0.72), as measured by the Linkowski scale (22), and positively (0.45) with anxiety (measured by the Zung scale (56)) and illness preoccupation (0.49).

Endogenous variables. Emotional distress was gauged by the 35 items of the Somatization, Depression and Anxiety Subscales of the SCL-90-R (8). Responses for each item ranged from 1 (*not at all*) to 5 (*very much*). The total score for the three subscales was used here. The scale was administered twice, at T_1 and T_2 . Scores at T_2 were used for testing the study model.

Illness preoccupation was measured by seven items rated on a 5-point scale, adopted from Wiklund et al. (52). Sample items were, "How frequently do you think about your heart disease?" (1—*very seldom*, 5—*very often*); "To what extent does your heart disease worry you?"; "To what extent do you fear dying from a heart attack?" (1—*not at all*, 5—*very much*). This scale was administered at T_2 only.

Outcome measures (all measured at T_2 only). Work engagement was measured by the current number of daily working hours. In our pilot study this measure correlated more strongly with other outcomes than a dichotomous classification into working/not working or number of working days. This is consistent with the often-made point (see e.g. 39) that merely noting the patients' return or non-return to work does not disclose the full picture, as many patients may have a reduction in the quantity and quality of their work. Thus, the number of working hours may constitute a more valid measure of work engagement.

Table I. Means, standard deviations, and zero-order correlations among the study variables

Variable	Possible range	M	SD	Cronbach alphas							
					1	2	3	4	5	6	7
1. Emotional reactivity (T ₁)	11–66	37.3	12.4	0.81	–	0.41**	0.53**	0.44**	–0.37**	–0.37**	–0.41**
2. Debilitating beliefs (T ₁)	11–66	26.7	11.4	0.86	–	–	0.45**	0.35**	–0.36**	–0.44**	–0.72**
3. Emotional distress (T ₂)	35–175	58.6	17.7	0.90	–	–	–	0.40**	–0.50**	–0.43**	–0.45**
4. Illness preoccupation (T ₂)	7–35	15.3	5.6	0.83	–	–	–	–	–0.28*	–0.26*	–0.42**
5. Work engagement ^a (T ₂)	Min.0	4.5	2.1	–	–	–	–	–	–	0.20	0.52**
6. Social activities involvement(T ₂)	8–40	15.3	4.6	0.75	–	–	–	–	–	–	0.53**
7. Ambulation/Independence (T ₂)	9–45	25.0	6.2	0.82	–	–	–	–	–	–	–

Note: T₁ = measured during hospitalization. T₂ = measured at 6-months' follow-up.

^a No. of daily working hours.

* $p < 0.05$; ** $p < 0.01$.

Participation in social activities was assessed by an eight-item scale (36). Sample items were, "Do you meet with friends at home?"; "Do you go out with friends?"; "Do you go to lectures or other organized leisure activities?" Responses ranged from 1—*very seldom* to 5—*very often*.

Ambulation/independence was gauged by nine items scored on a 5-point scale (36). Sample items were, "How well do you manage your shopping?"; "How frequently do you drive alone?"; and "Do you go on long trips alone?"

RESULTS

Work engagement

With the exception of one patient, all returned to their previous work during the follow-up period. The average number of working days was 4.51 (SD = 2.14) and daily working hours, 6.35 (SD = 3.67). This was congruent with earlier findings obtained for uncomplicated first MI (9, 19, 40).

Stability of debilitating beliefs and emotional distress over time

Self-generated debilitating beliefs appeared to be stable over time. The mean scores at hospitalization (T₁) and follow-up (T₂) did not differ significantly and were 26.74 and 26.64, respectively ($n = 62$, $t = 0.09$, $p = 0.93$). The two scores highly correlated with each other ($r = 0.72$). Similar results were obtained regarding emotional distress. The mean scores at T₁ and T₂ were 58.64 and 59.86, respectively ($t = 0.31$, $p = 0.76$). The correlation between these scores was 0.63. The stability of emotional distress over time has been noted in earlier studies (14, 50, 54).

Testing the path model

The zero-order intercorrelations among all the study variables are presented in Table I; entries in this Table included the predictor (exogenous) variables at T₁ (ER and debilitating beliefs), endogenous variables (emotional distress and illness preoccupation at T₂), and outcome measures at T₂ (work engagement, social activities involvement and ambulation/ independence). All correlations (except one) were significant, and in the expected direction.

The fit of our model was evaluated through Structural Equation Modeling (SEM) using the CALIS procedure (37). The correlation matrix was used as input, with a maximum likelihood solution, applying the Bentler method (5). The Cronbach alphas reliabilities served as estimates for the variance of the latent constructs. The model fit proved to be acceptable. A χ^2 -test of goodness of fit resulted in the acceptance of the null hypothesis ($\chi^2(df = 8) = 11$, $p = 0.20$). In addition, the goodness of fit index (GFI) was 0.95 (the recommended value is > 0.90), and the Bentler & Bonett NFI index was 0.98 (see criteria in (15, 35, 37)).

The standardized path coefficients are presented in Fig. 1. Seven of the 12 path coefficients were significant (at $p < 0.05$). By and large, the variables in the model accounted for 33% of the variance in work engagement, 48% in social activities involvement, and 82% in ambulation/independence. As expected, emotional distress at follow-up was positively associated with ER ($\beta = 0.55$) and debilitating beliefs ($\beta = 0.25$) during hospitalization. ER and debilitating beliefs accounted for 56% of the variance in emotional distress. Emotional distress, in turn, was

negatively associated with work engagement ($\beta = -0.47$) and social activities involvement ($\beta = -0.29$). Interestingly, emotional distress did not significantly affect ambulation/independence. This latter outcome was directly and strongly related negatively ($\beta = -0.77$) to the debilitating beliefs existing during hospitalization. Debilitating beliefs also directly affected social activities involvement ($\beta = -0.40$).

As expected, illness preoccupation at follow-up was positively and directly related to ER ($\beta = 0.59$). However, it was not related to any of the behavioral outcomes studied. Thus, illness preoccupation appeared to be an independent outcome (possible explanations for this are discussed below).

DISCUSSION

Psychosocial adjustment following heart attack is known to be affected by a multitude of factors (7, 39). In this study, participants were selected in such a way as to allow for the control of several of these factors (see Methods), thereby enabling a more direct exploration of the contribution of personality and cognitive variables to such adjustment. The findings showed that dispositional ER and debilitating beliefs identified during hospitalization successfully predicted future behavioral, cognitive and emotional outcomes after a first and uncomplicated MI.

Behavioral adjustment was defined as functioning in three important domains: work; social activities; and ambulation/independence. The measure of work engagement used here was the number of work hours per day, and this turned out to be a more sensitive outcome measure than return to work (taken as the endpoint in many rehabilitation studies). Even though all the patients (with one exception) returned to work, considerable variation was observed in the number of daily working hours. Yet, the predictor variables in this study, mainly emotional distress, explained only 33% of the variance in work engagement. The primary reason for this may be that the return to work and the nature of the work performed are dependent on many external factors, such as the attitudes of employees and fellow workers, stress at work, work characteristics, job status, social policy, and socioeconomic situation (1, 3, 4, 12). A much higher proportion of the variance was explained for the other two behavioral outcomes—social activities involvement (48%) and ambulation/independence

(82%)—which were less affected by the above external constraints. Both outcomes can be viewed as markers of an absence of functional disability (25).

An important finding of this study, supportive of the model in Fig. 1, was the mediative role of emotional distress in linking ER and debilitating beliefs to poor psychosocial adjustment after MI. Emotional distress was negatively related to two important outcomes: work engagement and social functioning. Moreover, the level of emotional distress was found to be highly stable among the patients studied. It seems plausible that for the emotionally reactive patients, and to a lesser extent those with debilitating beliefs (judging from the path coefficients), the impact of the uncontrollable heart attack event became chronic and caused prolonged distress. Further support for this contention comes from the positive association between ER and illness preoccupation six months after the acute MI. These cumulative effects appear to impede the ability of the patients to cope with the stress and threat imposed by the heart attack, albeit of low severity and without complications.

Another important finding of the study was the direct negative effect of debilitating beliefs on rehabilitation outcomes, mostly ambulation/independence. These beliefs became self-fulfilling. Patients who held such beliefs during hospitalization were functionally disabled at follow-up, as manifested in expressed difficulties in driving or traveling alone, managing the shopping and other activities necessary for running the home and carrying on with routine family life. It was interesting to note that beliefs held during hospitalization did not change with later experience. There was no change in the mean score on the debilitating beliefs scale at follow-up, and the scores measured six months apart correlated highly. It seems probable that patients who held such beliefs did not make any attempt to challenge them or to perform any activities that would prove their capability to do so. It was not unexpected to find that debilitating beliefs negatively affected participation in social activities as well.

The above findings thus support the benefits pointed out by many researchers of focusing on the patient's interpretation of the illness when attempting to predict rehabilitation outcome (e.g. 20, 30, 32). Measurement of debilitating beliefs could be performed as part of such an assessment. The fact that self-generated debilitating beliefs already become

manifest during hospitalization suggests that these beliefs may have existed prior to the acute MI as part of the patient's "common-sense representation of illness" (6, 21, 41). Corroborating evidence for this possibility comes from the study of Havik & Maeland (13) showing that illness misconception (which also involves some debilitating beliefs) only moderately correlates with basic cardiac knowledge. This further suggests that providing patients with factual information about their physical condition (which was relatively good for nearly all the patients in the present study) was not sufficient to alter their pre-existing misconceptions of the negative implication of the illness.

Further studies are needed to examine whether the present findings will generalize to female patients, patients with significant post-MI complications, and to the same outcomes measured after a longer follow-up period. For example, the few studies that exist with longer follow-ups indicate that the percentage of MI patients who are actively employed decreases sizeably with time. This may become as low as 50% within 4 years after the heart attack (39). It seems worthy to examine whether the independent variables here will predict long-term persistence at work. We are aware that the study outcomes are based on self-reports. We do not know whether this fact partially accounts for the high proportions of the variances in social activities involvement (48%) and in ambulation/independence (82%) at T₂, explained by the predictor variables measured at T₁. It may be of value in future studies to validate the above self-reports of activities/inactivities against external criteria, e.g. spouse/companion reports. At any rate, additional studies are warranted to determine whether the present findings are replicated. Such studies may also include other variables such as social support and coping strategies known to affect patient outcomes.

Finally, a rather surprising finding was the lack of a relationship between illness preoccupation and any of the behavioral outcomes studied. This disagrees with evidence from the literature indicating that illness preoccupation is related to poor adjustment to MI (53). Inspection of the simple correlation matrix in Table I shows that this variable was indeed negatively and significantly correlated with work engagement (-0.28), social activities involvement (-0.26) and ambulation/ independence (-0.42). Yet, when the correlations with other variables were partialled out, the above correlations became non-significant. There

may be at least two reasons for this. One is that emotional consequences moderated the impact of illness preoccupation on behavioral outcomes. Another possible explanation is that illness preoccupation represents an independent cognitive marker of adjustment to MI. Such an approach has been adopted in a number of studies (52, 55). It implies that the study model may be modified to give illness preoccupation the same status as the behavioral outcomes. We explored this modified model (not shown) applying the CALIS procedure and found an excellent fit to our data. The GFI was 0.98 and the Bentler & Bonett NFI was 0.97. However, new data are needed to determine whether the modified theoretical model is supported in replication studies.

In summary, this study has shown that a combination of personality, cognitive, and affective variables already present during hospitalization are potent predictors of future psychosocial adjustment to acute MI, after important possible confounders have been empirically controlled. Measuring ER, emotional distress, and debilitating beliefs at the hospitalization stage may be important in detecting patients at risk for poor future adjustment. Such patients may be referred for counseling and psychological interventions (3, 44, 45, 47, 48) during hospitalization or convalescence in order to modify these factors, and by so doing improve their chances for successful rehabilitation.

Appendix

Debilitating beliefs scale

Below are statements describing responses of cardiac patients; please circle the number indicating to what extent you agree with these statements.

- 1 Cardiac patients should reduce the number of work hours.
- 2 As much as possible, cardiac patients should avoid tension-arousing situations such as watching football on television.
- 3 The families of cardiac patients should not concern the patient with their problems.
- 4 Work requiring effort leads to tension that may cause repeated attacks.
- 5 As much as possible, cardiac patients should avoid excursions.
- 6 Cardiac patients would find it difficult to find work suited to their ability and physical fitness.
- 7 As much as possible, cardiac patients should avoid strenuous physical activities, such as long journeys or driving.

- 8 A cardiac patient who is not careful and overdoes it at work, may get another heart attack.
- 9 Cardiac patients should not travel by air.
- 10 People after a heart attack should not participate in sports activities.
- 11 Sexual activities are harmful to cardiac patients.

Response scale:

Strongly Disagree				Strongly Agree	
1	2	3	4	5	6

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