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Emotional Distress in Younger (<55 Years) and Older (≥55) Patients After a First-Time Myocardial Infarction and Its Prospective Associations With Working Status and Secondary Preventive Goals Among the Younger Cohort

Insights From the Swedish SWEDEHEART Registry Study

Niclas Almén, PhD; Philip Leissner, MSc; Kristina Hambraeus, MD, PhD; Sabina Borg, PhD, RPT; Fredrika Norlund, PhD; Catrin Henriksson, PhD, RN; Pelle Johansson; Erik M.G. Olsson, PhD

Background: Research has shown that younger patients who have had a myocardial infarction (MI) experience more emotional distress than their older counterparts. **Objective:** In this study, we aimed to compare emotional distress 2 months post-MI (follow-up 1) between younger (<55) vs older (≥55) patients in Sweden, and investigate its impact on working status and 4 secondary preventive goals 1 year after MI (follow-up 2). **Methods:** Data (N = 50 213) from the SWEDEHEART National Quality Registers for Cardiac Care, which covers approximately 90% of all MIs in Sweden, were used. **Results:** After adjusting for confounders, logistic regression analyses showed that younger patients who had experienced an MI had higher odds of experiencing emotional distress than older patients at follow-up 1 (adjusted odds ratio [AOR], 1.59; 95% confidence interval [CI], 1.52–1.67) and follow-up 2 (AOR, 1.47; 95% CI, 1.40–1.55). Emotional distress at follow-up 1 was associated with lower odds of working (AOR, 0.60; 95% CI, 0.53–0.67) and achieving smoking and physical activity goals (AOR, 0.76; 95% CI, 0.67–0.86; AOR, 0.83; 95% CI, 0.76–0.91) at follow-up 2. However, emotional distress was not associated with achieving goals for low-density lipoproteins or systolic blood pressure at follow-up 2. **Conclusions:** Younger patients experienced emotional distress more often after a first-time MI than their older counterparts, and their distress predicted long-term lower levels of returning to work and achievement of smoking and physical activity goals. The results highlight the importance of identifying younger patients who have had an MI and are experiencing emotional distress, and offering them interventions targeting distress.

KEY WORDS: myocardial infarction, physical activity, emotional distress, return to work, smoking cessation

Niclas Almén, PhD
Senior Lecturer, Licensed Psychologist, Licensed Psychotherapist, Department of Women's and Children's Health, Uppsala University, and Department of Psychology and Social Work, Mid Sweden University, Östersund, Sweden.

Philip Leissner, MSc
Candidate, Licensed Psychologist, Department of Women's and Children's Health, Uppsala University, Sweden.

Kristina Hambraeus, PhD, MD
Department of Cardiology, Falun Hospital, Sweden.

Sabina Borg, PhD
Registered Physiotherapist, Department of Health, Medicine and Caring Sciences, Unit of Physiotherapy, Linköping University, Sweden.

Fredrika Norlund, PhD
Licensed Psychologist, Licensed Psychotherapist, Department of Women's and Children's Health, Uppsala University, Sweden.

Catrin Henriksson, PhD, RN
Lecturer, Department of Medical Sciences, Uppsala University, Sweden.

Pelle Johansson
Patient Representative, Stockholm, Sweden.

Erik M.G. Olsson, PhD
Full Professor, Licensed Psychologist, Department of Women's and Children's Health, Uppsala University, Sweden.

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Correspondence
Niclas Almén, PhD, Department of Psychology and Social Work, Mid Sweden University, 831 25 Östersund, Sweden (niclas.almen@miun.se).

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Background

Cardiovascular disease (CVD) is the leading cause of death and the main cause of loss of disability-adjusted life-years worldwide, contributing substantially to high healthcare costs, loss of productivity, and individual suffering.[1,2] The most common clinical manifestation of CVD is myocardial infarction (MI).[2] Although mortality rates from MI have decreased during the past decades,[2–5] younger patients have benefitted to a significantly lower extent.[6] Even if the incidence, lethality, and risk for reoccurrence of MI are dramatically lower among younger people,[3,4] the lifetime risk for younger individuals affected by CVD is significantly higher.[7]

Emotional distress, such as symptoms of anxiety and depression, after an MI is common.[8–10] This can partly be attributed to a normal reaction to a life-threatening event and the manifestation of a significant disease. For younger patients, an MI can be particularly stressful, as studies indicate that the prevalence of anxiety and depression is more than double that of older patients.[4,11] This may be due to the unexpectedness of an MI at a younger age and the greater disruption it causes for both family and working life. In addition, younger patients who have had an MI may experience higher levels of emotional distress before the MI.[12] Besides emotional distress being negative in itself and associated with decreased quality of life,[13,14] it is a risk factor for recurrent cardiac events and cardiac mortality.[15,16] This can be explained by several factors, presumably for example poor adherence to risk-reducing behavior change, such as smoking cessation, physical activity, and adherence to medications.[17] Emotional distress also seems to have a negative impact on returning to work among patients who have experienced an MI,[18,19] which is problematic since returning to work is a part of social readjustment after an MI.[20] Accordingly, it is generally estimated that up to 50% of cases where patients do not return to work after an MI cannot be explained by physical limitations alone, giving much room for psychosocial aspects.[21] The role of psychosocial factors in cardiac rehabilitation remains limited. However, when it was investigated in the Perfect CR-study, 2 of the most influential predictors for effective risk factor management were psychosocial management and having a psychologist in the rehabilitation team.[22] This finding indicates the general importance of handling potential emotional distress in cardiac rehabilitation, but we still need to understand the more specific effects of this distress on the management of the different risk factors and returning to work among patients who have experienced an MI. As indicated previously, it is likely that younger patients are more affected in these regards, but large-scale studies based on population data could provide stronger evidence.

The primary aim of the present study was to compare emotional distress after a first-time MI between younger (<55 years) and older (≥55 years) patients in Sweden, and to investigate whether emotional distress 2 months after the MI was associated with working status and achievement of 4 secondary preventive goals 1 year after the event among the younger patients. The secondary aim was to describe and compare sociodemographic factors, medical factors, and modifiable cardiovascular risk factors between younger and older patients who have experienced an MI.

Methods

Registries and Data

Data were collected from 2 subregistries included in the national quality registers for cardiovascular care, the Swedish Web-system for Enhancement and Development of Evidence-based care in Heart disease Evaluated According to Recommended Therapies (SWEDEHEART): The Information and Knowledge about Swedish Heart Intensive Care Admissions (RIKS-HIA), and the Secondary Prevention after Heart Intensive Care Admission (SEPHIA).[23] Approximately, these registers covers 90% and 80%, respectively, of all MIs in Sweden.[24]

The RIKS-HIA registry includes more than 100 variables collected during hospitalization, describing patient characteristics and acute MI care. The variables used were age, sex, hypertension, diabetes, previous stroke, ST-elevation MI, left ventricular ejection fraction, smoking status, body mass index, and low-density lipoprotein (LDL).

In SEPHIA, data were collected for patients who had experienced an MI and were below the age of 75 (until January 1, 2018, and below the age of 80 thereafter) at follow-up visits 2 months (time frame 6–10 weeks; henceforth called follow-up 1) and 1 year (time frame 12–14 months; henceforth called follow-up 2) post-MI. The variables used were emotional distress, work status, smoking status, physical activity, LDL, and systolic blood pressure (SBP).

In addition, data from the government agency Statistics Sweden, which is responsible for coordinating the system for the official statistics in Sweden, were used to obtain country of birth, civil status, education, and income during admission.

All subjects were informed of their inclusion in the SWEDEHEART registry and their right to withdraw and/or have their data removed without any obligation to state the reasons. The study was conducted in accordance with the Declaration of Helsinki, and ethical permission was received from the Regional Ethical Review Board in Uppsala, Sweden (dnr: 2013/478).

Subjects

Of a total of 165 042 MI admissions registered in RIKS-HIA, 79 690 patients younger than 75 years were treated for a first-time MI between January 1, 2006, and December 31, 2015. Of the individuals registered for cardiac rehabilitation, 51 213 were alive at follow-up

1 and 49 592 at follow-up 2. Reasons for noncontinued cardiac rehabilitation included treatment in a nonparticipating hospital and failure to be scheduled for follow-up visits within the specified time limits. The flow diagram of the subjects throughout the study is shown in the Figure.

Exposure and Outcome

Age grouped as <55 or ≥55 years, based on age at admission, was used as exposure variable. Emotional distress, based on one of the items in the EQ-5D-3L, which has been demonstrated to be a valid and reliable measure among people with CVDs,[25] was used as both an exposure and an outcome variable. The EQ-5D-3L includes 5 items with 3 response levels. Before rating, the subject is asked to "please tick the ONE box that best describes your health TODAY." The fifth item presents the following options: (1) "I am not anxious or depressed," (2) "I am anxious or depressed to some extent," and (3) "I am extremely anxious or depressed."[26] The second and third responses were combined in the analyses, creating a dichotomous variable, similar to what has been used in previous studies. The following measures were used as outcome variables. Working status was based on the self-report of 5 response options and dichotomized for the analyses as follows: working and studying (proportion studying: ~1%) were combined; and unemployment, retirement, and any level of sick leave were combined as the reference category. Smoking status was based on self-reporting of being a current smoker or not.[27] Physical activity was based on the self-reported number of days with >30 minutes of at least moderate physical activity during the last week, and the cut-off level for satisfactory level of physical activity was set to 5 corresponding to at least 150 minutes per week.[27] Satisfactory levels of SBP and LDL were <140 mm Hg and <1.8, respectively. All goals reflect national consensus and international guidelines that were available at the time of data collection.[27] Nonsmoking and cut-off levels for physical activity, SBP, and LDL constituted the secondary preventive goals for the present study. These are also national cardiac rehabilitation goals in Sweden, with the exception of physical activity, for which the national goal is participation in physiotherapist-led exercise, twice a week at least 3 months, at the hospital.

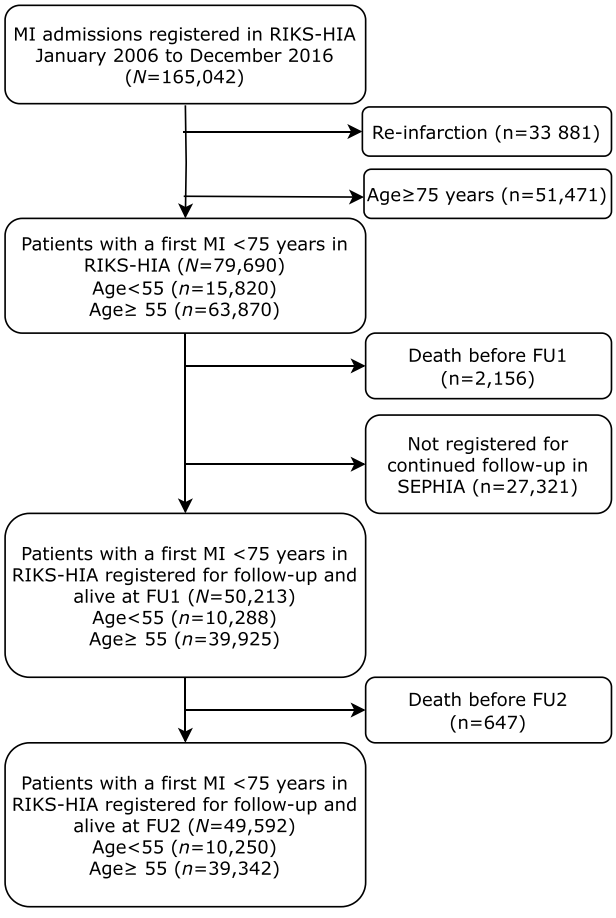

FIGURE. *Flow diagram of subjects throughout the study. Abbreviations: MI, myocardial infarction; FU1, follow-up 1; FU", follow-up 2.*

Covariates

The following variables recorded at admission were included as covariates in logistic regression models: sex (male/female), country of birth (Sweden/not Sweden), year of admission, diabetes (yes/no), university education (yes/no), income (5 quintiles), previous stroke (yes/no), ST-elevation MI (yes/no), left ventricular ejection fraction <50% (yes/no), body mass index (kg/m^2), LDL (≤4.1 vs higher; based on "high" levels for people without CVD);[28] hypertension (SBP ≥140 mm Hg vs higher), smoking (yes/no), and working status (working or studying vs not working or studying).

Statistical Analyzes

Chi-square tests and *t* tests were performed to test whether any differences existed between younger (<55 years) and older (≥55 years) patients who had experienced an MI regarding sociodemographics, medical factors, and modifiable cardiovascular risk factors at admission, emotional distress, working status, and the 4 secondary preventive goals at follow-up 1 and 2.

The associations between age groups and the risk of experiencing emotional distress at the 2 follow-up visits were investigated using logistic regression analysis. Crude odds ratio (OR) and adjusted OR (AOR) estimates with 95% confidence intervals (CI) were reported.

Differences between younger patients who had experienced an MI, with and without emotional distress at follow-up 1, regarding emotional distress, working

status, and achievement of secondary preventive goals at follow-up 2, were tested using chi-square tests.

Finally, the associations between emotional distress at follow-up 1 and working status and the secondary preventive goals at follow-up 2 were investigated using logistic regression analysis. Crude OR and AOR with 95% CI were reported.

An alpha level of $P < .05$ was chosen as the statistical significance level in all analyses. The levels of missing data at admission, follow-up 1, and follow-up 2 ranged from 0 to 21, 3–24, and 18–32, respectively. For *t* tests and chi-square tests, missing data were not imputed. For the logistic regression analyses, missing data were imputed using multiple imputation with chained equations, creating 20 imputed data sets.[29–31] The imputation was based on the assumption of data missing at random.[32] Statistical analyses were performed using Stata version 18.0, for PC (StataCorp, College Station, TX).

Results

There were differences ($P < .001$) between younger and older patients who had experienced an MI in all sociodemographic, medical, and modifiable cardiovascular risk factor variables. For example, in the younger group, there were more men and people born outside Sweden but fewer who were married or living together with their partner. Younger individuals had a higher level of education, were more often working or studying, and had a lower average income. Regarding medical and modifiable cardiovascular risk factors, hypertension, diabetes and low left ventricular ejection fraction (<50%) were proportionally less common in the younger group, whereas ST-elevation MI, smoking, obesity and overweight, and high levels of LDL cholesterol were proportionally more common. At follow-up 1, 48% of the younger patients and 35% of the older patients reported emotional distress. At follow-up 2, 41% of the younger patients and 31% of the older patients reported emotional distress (Table 1).

There was a clear relationship indicating more emotional distress in the younger age group at both follow-ups after adjusting for potential sociodemographic and medical confounders (Table 2).

Both the number of people working and the level of achievement of all 4 secondary preventive goals at follow-up 2 were lower for younger patients with previous emotional distress (at follow-up 1) compared with those without emotional distress, all of whom had experienced an MI. The goals for smoking and physical activity were also achieved to a lesser extent among those with emotional distress, whereas no difference was identified for LDL or SBP goals (Table 3).

Among younger patients who had experienced an MI, after adjusting for the predetermined set of confounders, statistically significant negative associations were observed between emotional distress (at follow-up 1) and working (AOR, 0.60), as well as achieving all 4 secondary preventive goals (AOR, 0.81; at follow-up 2). For the specific secondary preventive goals (at follow-up 2), statistically significant associations between the goals for smoking and physical activity, and emotional distress were found (AOR, 0.76 and 0.83, respectively), whereas no statistical associations were found between emotional distress and achievement of the LDL or SBP goals (Table 4).

Discussion

The aims of this study were to compare emotional distress in younger versus older patients, investigate emotional distress in younger patients (<55 years) who have experienced an MI and to analyze how this distress predicts their return to work and achievement of secondary preventive goals. In addition, we aimed to describe and compare sociodemographic factors, medical factors, and modifiable cardiovascular risk factors between younger and older patients who have experienced an MI.

Younger patients who had experienced an MI, compared with the older patients, differed in all sociodemographic, modifiable cardiovascular risk factors, and medical variables. From an MI risk factor point of view, the differences in smoking (46% among the young vs 28% among the older) and body mass index (47% overweight or obese among the young vs 33% among the older) stand out. Other cardiovascular risk factors, such as diabetes and hypertension, were more common among older adults, which is not surprising, as their prevalence increase with age. Furthermore, as previously well documented and confirmed here, sex differences were observed, with fewer women in the young MI group than in the older MI group. Some factors reflect societal development over time. For example, a larger proportion was born abroad and had a higher level of education in the younger MI group. In summary, the two age groups differed in several aspects, potentially influencing both primary and secondary prevention strategies.

After adjusting for sociodemographic and medical factors, younger patients exhibited an approximately 60% higher likelihood of experiencing emotional distress at follow-up 1 (two months after the MI), and nearly 50% at follow-up 2 (one year after the MI), compared with older patients. Emotional distress is a concern because it encompasses a range of aversive experiences. In addition, our results showed that emotional distress at follow-up 1 predicted fewer people working and fewer people who achieved secondary prevention goals at follow-up 2. A younger MI patient who was emotionally distressed at follow-up 1 had approximately 40% lower odds of working at follow-up 2 than a nonemotionally distressed young patient. When looking in more detail at the secondary prevention

TABLE 1 Sociodemographics, Medical Factors, and Modifiable Cardiovascular Risk Factors Among Individuals With a First MI Aged 55 to 74 Years and Younger Than 55 Years, Respectively, From the SWEDEHEART Registry

			Age Groups		
	Missing Data	All	<55 y	≥55 y	
	% (n)	(N = 50 213)	(n = 10 288; 20,5%)	(n = 39 925; 79.5%)	*P*
Variables at admission					
Women, % (n)	0% (0)	27% (13 464)	22% (2237)	28% (11 227)	<.001
Age (mean; SD), y	0% (0)	61.7 (8.7)	48.3 (5.1)	65.2 (5.5)	<.001
Born in Sweden	0% (5)	84% (42 159)	75% (7722)	86% (34 437)	<.001
Married or living together with partner	0% (63)	58% (28 945)	48% (4889)	60% (24 059)	<.001
Working/studying[a]	5% (2494)	46% (21 859)	84% (8137)	36% (13 722)	<.001
Highest level of education	0% (64)				<.001
Elementary or high school		78% (39 313)	76% (7813)	79% (31 500)	
University education		22% (10 836)	24% (2459)	21% (8377)	
Household income quintiles, averaged over the last 10 y before infarction	0% (150)				<.001
First quintile		20% (10 006)	35% (3602)	16% (6404)	
Second quintile		20% (10 013)	23% (2404)	19% (7609)	
Third quintile		20% (10 010)	18% (1826)	21% (8184)	
Fourth quintile		20% (10 019)	14% (1385)	22% (8634)	
Fifth quintile		20% (10 015)	10% (1013)	23% (9002)	
Hypertension	1% (273)	40% (20 157)	27% (2739)	44% (17 418)	<.001
Diabetes	0% (91)	15% (7467)	12% (1208)	16% (6259)	<.001
Previous stroke	0% (66)	4% (1822)	1% (150)	4% (1672)	<.001
STEMI	0% (70)	41% (20 672)	46% (4740)	40% (15 932)	<.001
LVEF <50%	14% (7067)	34% (14 667)	29% (2572)	35% (12 095)	<.001
Currently smoking	3% (1265)	32% (15 672)	46% (4656)	28% (11 016)	<.001
BMI categories	9% (4490)				<.001
Underweight		6% (2868)	4% (411)	7% (2457)	
Average weight		57% (26 226)	49% (4566)	60% (21 660)	
Overweight		29% (13 168)	35% (3239)	27% (9929)	
Obesity		8% (3461)	12% (1172)	6% (2289)	
BMI (kg/m^2), (m; SD)	9% (4490)	24.0 (4.1)	25.1 (4.4)	23.7 (3.9)	<.001
High levels of LDL-cholesterol at admission, (>4.1 mmol/L)	21% (10 590)	20% (8039)	24% (1985)	19% (6054)	<.001
LDL-cholesterol level, (m; SD)	21% (10 590)	3.3 (1.1)	3.5 (1.1)	3.3 (1.1)	<.001
2 mo after MI (follow-up 1)					
Emotional distress, yes	3% (1586)	38% (18 443)	48% (4765)	35% (13 678)	<.001
Currently working or studying	4% (1824)	30% (14 339)	54% (5309)	23% (9030)	<.001
Nonsmoking	3% (1646)	88% (42 862)	83% (8221)	90% (34 641)	<.001
Physical activity (>30 min × 5 times per week)	4% (1996)	50% (24 050)	48% (4721)	50% (19 329)	<.001
LDL <1.8 mmol/L	24% (11 868)	65% (25 007)	65% (5061)	65% (19 946)	.86
SBP <140 mm Hg	12% (5990)	67% (29 529)	80% (7222)	63% (22 307)	<.001
1 y after MI (follow-up 2)[b]					
Emotional distress, yes	18% (8868)	33% (13 345)	41% (3242)	31% (10 103)	<.001
Currently working or studying	18% (8992)	38% (15 283)	76% (6053)	28% (9230)	<.001
Nonsmoking	18% (8888)	87% (35 294)	80% (6388)	88% (28 906)	<.001
Physical (>30 min × 5 times per week)	19% (9350)	41% (16 696)	35% (2785)	43% (13 911)	<.001
LDL <1.8 mmol/L	32% (15 853)	68% (22 925)	69% (4528)	68% (18 397)	.017
SBP <140 mm Hg	27% (13 415)	69% (24 907)	80% (5675)	66% (19 232)	<.001

All percentages exclude missing data, except in the missing data column.
Abbreviations: BMI, body mass index; LDL, low-density lipoprotein; LVEF, left ventricular ejection fraction; MI, myocardial infarction; SBP, systolic blood pressure; STEMI, ST-elevation MI.
[a]Two hundred eighteen subjects were studying (140 subjects in the younger group and 78 subjects in the older group).
[b]Percentages were based on N = 49 592 (those still alive).

goals, it was the more behaviorally demanding goals (ie, smoking and physical activity) that were related to emotional distress, whereas LDL and SBP, which are mainly affected by pharmacotherapy, were not. The results showed that an emotionally distressed MI patient (at follow-up 1) had approximately 25% lower

TABLE 2 Logistic Regression Analysis of Emotional Distress Among Younger Patients (<55 Years) Compared With Older Patients (≥55 Years) Who Have Experienced an MI, 2 Months (FU1) and 1 Year After Admission (FU2), Respectively

	Crude		Adjusted[a]	
Outcomes	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Emotional distress, FU1[b]	1.69 (1.62–1.77)	<.001	1.59 (1.52–1.67)	<.001
Emotional distress, FU2[c]	1.56 (1.49–1.64)	<.001	1.47 (1.40–1.55)	<.001

Abbreviations: FU1, follow-up 1; FU2, follow-up 2; OR, odds ratio; CI, confidence interval; MI, myocardial infarction.
[a]The analyses were adjusted for sex, country of birth, education, income (quintile), year of admission, body mass index (kg/m^2), diabetes, previous stroke, ST-elevation MI, and left ventricular ejection fraction <50%, all measured at admission.
[b]N = 50 213, missing data were imputed using multiple imputation.
[c]N = 49 592, missing data were imputed using multiple imputation.

odds of being a nonsmoker and 17% lower odds of achieving the physical activity goal (>30 min × days/wk) at follow-up 2.

The results of the present study support the hypothesis that poor adherence to prescribed lifestyle behaviors can explain why emotional distress is a risk factor for MI. A general common effect of emotional distress is difficulty in handling demands in everyday life, for example, due to lack of motivation and fear.[33,34] To stop smoking and to be physically active after an MI can certainly be demanding both when it comes to motivation and fear (eg, fear of straining the heart). Accordingly, emotional distress was expected to predict poorer levels of nonsmoking and regular physical activity. This aligns with a previous study that demonstrated that patients with symptoms of depression were significantly less likely to complete outpatient cardiac rehabilitation programs than those without these symptoms.[17] Even though we also expected an association between emotional distress and LDL and SBP, these measures are highly dependent on medical treatments, and the behavior of taking the pill may not be as demanding for the person and therefore may not be so impacted by their emotional state. In a previous study, it has been demonstrated that emotional distress was in fact negatively associated with adherence to statin medication (which lowers LDL).[35] However, this effect was small and started to show only 1 year after the MI, and the effect on adherence was dose dependent on the level of emotional distress. This previous findings may indicate that 1 year is a too short follow-up period to show results in medication-dependent preventive goals, and that the threshold chosen for emotional distress will probably affect the results. In the present study, the threshold may have been too low and/or the follow-up period too short for emotional distress to have an effect on LDL and SBP. Another study has shown that more specific illness-related emotional distress, but not general emotional distress, predicted future medication adherence among patients with diabetes.[36] It is possible that had we used another measure of emotional distress, our results could have been different.

There are several ways to reduce emotional distress. Engaging a patient's supportive social network (ie, family, friends, and significant others) seems to be helpful to reduce emotional distress after an MI.[37] Also, there is preliminary evidence that finding a balance between

TABLE 3 Emotional Distress, Working Status, and Secondary Preventive Goals 1 Year After Admission (FU2) Among Younger Patients (<55 Years) Who Have Experienced an MI, With and Without Emotional Distress, Respectively, 2 Months After Admission (FU1)

			MI Patients <55 y		
		All	No Emotional Distress, FU1	Emotional Distress, FU1	
	Missing Data	**(N = 9898)**	**(n = 5165; 52.2%)**	**(n = 4765; 47.8%)**	***P***
Outcomes (FU2)					
Emotional distress	20% (1949)	41% (3225)	22% (918)	62% (2307)	<0.001
Currently working or studying	20% (1975)	76% (6024)	83% (3497)	68% (2527)	<0.001
Achieved all 4 secondary preventive goals	37% (3701)	16% (1001)	18% (580)	14% (421)	<0.001
Achieved smoking goal	20% (1950)	80% (6360)	84% (3521)	76% (2839)	<0.001
Achieved physical activity goal	20% (2018)	35% (2782)	36% (1516)	34% (1266)	0.002
Achieved LDL goal	34% (3381)	69% (4510)	70% (2434)	68% (2076)	0.33
Achieved SBP goal	29% (2864)	80% (5621)	80% (2970)	81% (2681)	0.71

Smoking goal: no current smoking at all; physical activity goal: >30 min × 5 days/wk; LDL goal: <1.8; SBP goal: ≤140 mm Hg.
All percentages exclude missing variable, except in the missing data column.
Abbreviations: FU1, follow-up 1; FU2, follow-up 2; LDL, low-density lipoprotein; MI, myocardial infarction; SBP, systolic blood pressure.

TABLE 4 Logistic Regression Analysis of Working Status and Secondary Preventive Goals at Follow-Up 2 Among Emotionally Distressed Younger Patients (<55 Years) Who Have Experienced an MI and Are Emotionally Distressed Compared With Those Who Are Not Emotionally Distressed, at Follow-Up 1

	Crude		Adjusted[a]	
Outcomes (at Follow-Up 2)	**OR (95% CI)**	***P***	**OR (95% CI)**	***P***
Currently working or studying	0.44 (0.40–0.49)	<.001	0.60 (0.53–0.67)	<.001
Achieved all 4 secondary preventive goals	0.77 (0.69–0.87)	<.001	0.81 (0.72–0.93)	.002
Achieved smoking goal	0.59 (0.54–0.66)	<.001	0.76 (0.67–0.86)	<.001
Achieved physical activity goal	0.86 (0.79–0.93)	.001	0.83 (0.76–0.91)	<.001
Achieved LDL goal	0.94 (0.85–1.04)	.25	0.96 (0.86–1.07)	.48
Achieved SBP goal	1.04 (0.93–1.16)	.53	1.06 (0.94–1.20)	.31

Smoking goal: no current smoking at all; physical activity goal: >30 min × 5 days/wk; LDL goal: <1.8; SBP goal: ≤140 mm Hg.
N = 10 250, missing data were imputed using multiple imputation.
Abbreviations: LDL, low-density lipoprotein; SBP, systolic blood pressure; MI, myocardial infarction.
[a]The analyses were adjusted for sex, country of birth, education, income (quintile), year of admission, diabetes, previous stroke, ST-elevation MI, left ventricular ejection fraction <50%, body mass index (kg/m^2), LDL level, hypertension, smoking status, and working status, all measured at admission.

stress/effort and recovery in everyday life can reduce emotional distress.[38] Regarding systematic psychological interventions, a recent Cochrane review from 2024 indicates that such interventions may lead to a moderate reduction in depression and anxiety among patients with coronary heart disease experiencing emotional distress.[39] It is worth noting that most of the intervention studies included in the review were cognitive behavioral therapy.

Nonetheless, we need to attain insights into what triggers emotional distress in younger people who have had an MI. With this knowledge, we would probably gain more clarity on how emotional distress could be counteracted in this population. We also need to find ways in healthcare to pinpoint the specific individual's emotional problem to match the intervention. Therefore, person-centered care may be of considerable importance. For example, if the patient experiences cardiac anxiety/fear, which will likely undermine health behaviors and return to work,[40] it is important to offer the patient help to challenge the fears via exposure-based therapy,[41] whereas other interventions may be ineffective. The interventions with the strongest evidence base for reducing emotional distress are resource-demanding complex interventions, particularly cognitive behavioral therapies.[39] A reasonable goal is to investigate how these measures can be implemented, and whether it is possible to help younger patients who have experienced an MI reduce their emotional distress with simpler and easily implemented measures. In addition, apart from the potential role of emotional distress in facilitating the ability to work, returning to work after an MI may lead to further reductions in emotional distress.[20] This is particularly important as to leave the labor market prematurely is a risk factor for CVD mortality.[42] However, unfavorable work environments and situations can also amplify emotional distress, hinder work re-engagement, and increase the risk of recurrent MI events.[42]

This study has several limitations. First, this was an observational study; therefore, the causal relationship between the variables could not be determined. To increase the likelihood of finding a relevant causal association, we controlled for potential confounders and the exposure and outcomes were timely separated. However, it is possible that more confounding variables were not accounted for. Second, the results are only generalizable to patients attending cardiac rehabilitation. We had no data on patients who for any reason chose not to participate in the regular cardiac rehabilitation that was offered at no cost. The goals in focus are based on general recommendations and are rehabilitation goals just for those who participate in rehabilitation. Third, the amount of missing outcome data at follow-up 2 was 18%–32% per variable. The missing data was imputed based on a large number of relevant predictors, but this may still not lead to a perfect replacement for missing data.[43] Fourth, an abstract concept such as emotional distress is difficult to measure. In this study, we used one item from the EQ-5D-3L instrument, where both anxiety and depression were included in the question. Although this fails to capture the nuances of emotional distress, it is still a valid measure of heightened average levels of emotional distress.[26] Fifth, all outcome measures, except LDL and SBP, were self-reported, which threatens internal validity, for example, via social desirability and memory bias. Sixth, individuals who smoke tobacco exclusively via water pipes or e-cigarettes might report that they do not smoke, whereas others might identify themselves as smokers. However, because the use of water pipes and e-cigarettes appears to be uncommon in Sweden, particularly among middle-aged and older individuals, this is unlikely to significantly affect our results.[44,45] Seventh, data were collected until 7 years ago, which may have reduced the generalizability of the findings to the present context. However, to our knowledge, no major change has been made since 2017 (the final year of

What's New and Important

- Emotional distress after an MI was more common among younger patients (<55 years) than among older patients (≥55 years).
- Emotional distress 2 months after an MI predicted a lower proportion of people returning to work and less achievement of secondary preventive goals regarding smoking and physical activity one year after the MI among younger patients.
- The results highlight the importance of identifying emotional distress among younger patients with MI and offering interventions targeting emotional distress.

follow-up data collection), which suggests that the results can be generalized to the current situation. All in all, these limitations have been handled to the best of our ability, and we consider our findings robust and reliable, contributing valuable insights to the field. The present study also has several strengths; for example, a large sample size resulted in high statistical power. Moreover, the collection of data from routine healthcare in Sweden, which covered approximately 90% of the studied population, strongly supports the external validity (ie, generalizability) of the findings. We also adjusted the analyses for a good number of potentially confounding factors.

Conclusions

In conclusion, younger patients who had experienced an MI differed from older patients in many respects. In particular, younger patients experienced emotional distress post-MI more often than older patients, and this distress predicted long-term lower levels of work and achievement of secondary preventive goals regarding smoking and physical activity. The results highlight the importance of identifying young patients who have had an MI and are experiencing emotional distress and offering interventions targeting distress. Emotional factors appear to be undertargeted in cardiac rehabilitation. If emotional distress can be effectively intervened, it may lead to an increased chance of returning to work and better achievement of secondary preventive goals. This, in turn, may also result in fewer CVD recurrences in these patients.

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