

Symptoms of Depression and Anxiety as Barriers to Participation in Cardiac Rehabilitation Programs Among Arab and Jewish Patients in Israel

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Purpose: Despite its proven efficacy, low participation rates in cardiac prevention and rehabilitation programs (CPRPs) prevail worldwide, especially among ethnic minorities. This is strongly evident in Israel's Arab minority. Since psychological distress has been found to be associated with CPRP participation and minorities are subjected to higher levels of distress, it is plausible that distress may be an important barrier for CPRP participation among minority patients. The current prospective study assessed the contribution of depression and anxiety symptoms to participation in a CPRP after acute coronary syndrome, both in the enrollment phase and when considering adherence over time, among Jewish (majority) and Arab (minority) patients in Israel.

Methods: Patients were interviewed during hospitalization about their emotional status and at a 6-mo follow-up concerning participation in a CPRP. Analyses were performed on 397 patients. The Brief Symptom Inventory was used. Logistic regression modeling was applied.

Results: Symptoms of depression, but not anxiety, were frequently observed among Arab patients compared with their Jewish counterparts. In analyses adjusted for age, sex, ethnicity, and sociodemographic and clinical characteristics, having symptoms of anxiety was associated with less participation in a CPRP, evident for both Jews and Arabs; this association was less evident for symptoms of depression. Multivariable adjusted models did not show a significant association of symptoms of anxiety or depression with adherence in a CPRP. Accounting for psychological distress did not reduce the sharp difference between Jews and Arabs in CPRP participation.

Conclusion: Symptoms of distress may serve as barriers to CPRP participation, regardless of ethnic origin.

Key Words: acute coronary syndrome • anxiety • Arab minority • cardiac rehabilitation • depression • Israel

Cardiac patients are strongly advised to join formal cardiac prevention and rehabilitation programs (CPRPs) to promote lifestyle change and management of classic risk

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factors for acute coronary syndrome (ACS; defined as an acute myocardial infarction [AMI] or unstable angina pectoris [UAP]). Both European^{1,2} and American^{3,4} guidelines recommend cardiac rehabilitation as an important element in effective care for secondary prevention following an ACS. Despite these recommendations, low participation rates in a CPRP prevail worldwide and especially among ethnic minorities.^{5,6} In Israel, which consists of a majority of 75% Jews and a minority comprising mostly Arab citizens, a large gap in CPRP attendance was previously observed (61% of the Jewish patients attended a CPRP compared with only 17% of the Arab patients).⁶

A factor that has been reported to be associated with attendance in a CPRP is psychological distress. Former literature reviews revealed that depression consistently predicts poor participation in a CPRP.^{7,8} For example, Kronish et al⁹ reported that patients presenting with persistent depression were half as likely to be enrolled in a CPRP compared with patients without persistent depression. Findings regarding anxiety, however, are less consistent.⁸ Whereas Leibowitz et al¹⁰ identified anxiety as a variable strongly predicting nonparticipation in a CPRP, Grace et al¹¹ found anxiety to be associated with almost double the adjusted odds for CPRP attendance.

These psychological variables appear to be more prominent when considering minorities. Studies of psychological distress in minorities consistently show that, compared with the majority, minorities are subjected to higher levels of psychological distress, especially in the form of depression,¹² probably because of social and environmental adversity.¹³ In a population-based study in Israel, Kaplan et al¹⁴ demonstrated an almost 3-fold higher prevalence of depression among the Arab minority compared with the Jewish majority, which was attributable largely to educational level and health status.

Based on the higher rates of psychological distress found among minorities and the evidence regarding the contribution of both depression and anxiety to CPRP adherence, it is plausible to propose that psychological distress might explain part of the difference in CPRP attendance between cardiac patients of different ethnic origins. Therefore, the objective of the current study was to explore the putative contribution of symptoms of depression and anxiety to CPRP participation in a sample of Jewish and Arab cardiac patients in Israel.

METHODS

The methods of the present study have been previously reported^{6,15-17} and are summarized here.

PARTICIPANTS

The study was undertaken at a regional hospital in central Israel serving both the Arab and Jewish communities of the

proximal area. The hospital provides an in-hospital comprehensive CPRP, open to all clinically suitable patients, and the cost is completely covered by national health insurance for all citizens. A pre-discharge orientation visit to the rehabilitation center is a routine part of hospital care for Jewish and Arab patients alike with ACS, as is providing each eligible patient a discharge letter that includes a recommendation for joining the CPRP. This specific program is available 6 d/wk, 13 hr/d (except for half-days on Fridays), and therefore is highly accessible in terms of hours that the program is open.

The study population was selected from a registry that included all patients who resided in the catchment area of the Meir Medical Center in Israel and were admitted to the coronary care unit (CCU) for ACS between January 2009 and August 2010.

Patients were excluded using 1 or more of the following criteria: (1) had severe physical or mental disability that prevented participation in physical activities; (2) were unable to commit to the study (nonpermanent resident in Israel, prisoners, homeless, drug addiction, or alcoholism); (3) previously participated in a CPRP; (4) were unable to be interviewed in Hebrew or Arabic; or (5) were transferred before being interviewed to another institution for further treatment. We emphasize that the eligibility criteria for inclusion in the study, in addition to informed consent, were physical and emotional suitability for joining the CPRP. There were no other stated criteria for denying patients from visiting the CPRP or being referred to the program.

Of the 649 eligible patients, 501 consented to be interviewed at baseline (77.2%) and 420 consented to be interviewed again 6 mo later, yielding an 83.8% response, with no difference between Arabs and Jews in response rates. There were, however, higher response rates at follow-up among men than among women, among patients admitted directly to the CCU versus transfers from other wards for interventional treatment, and among MI patients than among UAP patients. Informed consent was obtained from each patient. The study was authorized by the Meir Hospital institutional review board.

PROCEDURES

Patients were interviewed about participation in the CPRP by interviewers proficient in Hebrew and Arabic during their hospital stay, including assessing their emotional state, and at the 6-mo follow-up.

Psychological Distress

Depression (7 items) and Anxiety (6 items) scales of the validated Brief Symptom Inventory¹⁸ were administered to assess emotional distress, using the validated Hebrew version¹⁹ and a novel version translated to Arabic specifically for the current study. This translation was performed by professional language translators taking into account cultural differences and utilizing the Brislin²⁰ back translation technique. Examples of items for anxiety are “feeling nervousness or shakiness inside” and “feeling fearful” and those for depression are “feeling lonely” and “feeling no interest in things.” Responses for each item of the level of distress over the past days ranged from 1 (not at all) to 5 (extremely). The average score for each of the 2 subscales was used. Cronbach α scores for depression and anxiety in this study sample were 0.83 and 0.79, respectively.

PARTICIPATION IN CPRP

CPRP participation and its duration were self-reported at the follow-up interview. Participation was defined as taking part in a long-term CPRP after the index event either at the

Meir Medical Center or elsewhere. Patients were included if they participated for at least the initial month of the program (categorically coded into either yes/no status). Patients who were still active at the time of the follow-up interview or had completed an appreciable period of participation (at least 3-6 mo) were also defined as persisting in the program over time. To validate self-reports from patients regarding participation in the CPRP, a review of all patient files at the Meir CPRP (comprising 70% of patients enrolled) was undertaken. This review detected that all patients had indeed participated in the CPRP and not merely in a short convalescence program.

SOCIODEMOGRAPHIC AND CLINICAL CHARACTERISTICS

Sociodemographic characteristics included ethnicity (Jews/Arabs), age, sex, level of education (ranging from no formal education to the highest certificate/degree earned), employment status (gainfully employed or not), economic situation (subjective assessment), religiosity, subjective socioeconomic position (SEP), which consisted of a drawing of a 10-rung ladder on which individuals placed themselves²¹ and has been used in studies with ethnically diverse samples^{22,23} and clinical factors including diagnosis (MI, UAP), hospitalization unit (CCU, internal medicine unit), and history of coronary heart disease.

DATA ANALYSIS

The unadjusted differences between Jews and Arabs for sociodemographic variables were analyzed using *t* tests and χ^2 tests, and for symptoms of anxiety and depression using the Mann-Whitney and χ^2 tests. The Kruskal-Wallis test was used to evaluate differences in anxiety or in depression between the following 4 groups: (1) Jews who participated in a CPRP; (2) Jews who did not participate in a CPRP; (3) Arabs who participated in a CPRP; and (4) Arabs who did not participate. The Mann-Whitney test was used for *post hoc* analysis. The association between anxiety and depression was assessed using the Spearman correlation. Associations between the sociodemographic and clinical characteristics of the sample (independent variables) and the psychological variables (dependent) were assessed applying binary logistic regression, in which anxiety and depression were defined as dichotomous variables (1 = existence of at least 1 symptom; 0 = no symptoms).

Associations between the psychological variables and participation in a CPRP were separately evaluated for depression and anxiety using logistic modeling. In this analysis, the psychological variables were introduced as continuous predictors and included 2 unadjusted models for anxiety and depression, respectively, 2 additional models adjusted for ethnic group, age, and sex, and 2 models adjusted for additional sociodemographic and clinical covariates.

These sociodemographic and clinical variables were considered as potential confounders if, when introduced singly, they affected the excess unadjusted bivariate odds ratio (1 – OR) of anxiety or depression by more than 5%. Variables meeting this criterion were included in multivariable adjusted models. Redundant variables were subsequently excluded by a backward stepwise procedure, if the adjusted 1 – OR changed by less than 5%, with age, sex, and ethnicity forced into the model. Interactions between ethnicity and the psychological variables were tested with multiplicative terms in the logistic models.

For the ordinal covariates, the mean values were imputed for missing data (education [n = 4], SEP [n = 8], and economic situation [n = 5]). For dichotomous variables

(employment status [$n = 2$ missing] and history of ischemic heart disease [IHD] [$n = 3$ missing]) and for the main predictors anxiety and depression (16 and 18 missing data, respectively), no imputation was performed. Consequently, 397 patients (292 Jews and 105 Arabs) were included in the analysis.

RESULTS

Of the 397 patients included in this analysis, 199 (50.1%) were classified as participants in the CPRP. Of these, 42 patients (21%) withdrew from the CPRP after 1 to 2 mo. An additional 51 patients (26%) left the CPRP after completing at least 3 to 6 mo. The remainder of the patients ($n = 106$; 53%) were still active at the time of the 6-mo follow-up interview. The 51 patients who completed participation and the 106 who were still active at the 6-mo follow-up (a total of 157 patients) were considered as persisting in the program.

Main characteristics of the Jewish and Arab patients are described in Table 1. An unadjusted comparison between Jewish and Arab patients in the psychological variables (Table 2) showed statistically significant differences between

the 2 ethnic groups in the levels of depression, with Arab patients showing a higher median number of symptoms. No significant unadjusted ethnic differences were evident for levels of anxiety. A substantial part of the current sample reported at least 1 symptom of either anxiety or depression.

Unadjusted logistic regression showed that the levels of education, economic situation, and SEP were inversely associated with the existence of at least 1 symptom of distress (Table 3). A higher SEP and better economic situation were associated with a reduced presence of symptoms of anxiety and depression. In addition, a higher educational level was associated with the absence of symptoms of depression. All variables in Table 3 were associated with CPRP participation except for age and sex. A strong positive association between symptoms of anxiety and depression was evident ($r_{\text{Spearman}} = 0.66, P < .001, n = 397$).

Differences in symptoms of anxiety and depression among the Arab and Jewish patients by CPRP participation status are presented in Table 4. The Kruskal-Wallis test revealed a statistically significant difference between 4 groups, the ethnic groups (Arabs/Jews) by CPRP participation status (yes/no), and for both anxiety and depression. A

Table 1

Sociodemographic Characteristics of Jewish and Arab Participants (n = 397)^a

	Jews (n = 292)	Arabs (n = 105)	Total (N = 397)
Age, y	61.5 ± 10.4	53.7 ± 9.7 ^b	59.5 ± 10.8
Sex			
Male	240 (82.2)	97 (92.4) ^c	337 (84.9)
Female	52 (17.8)	8 (7.6)	60 (15.1)
Education level			
No formal education	16 (5.5)	6 (5.7) ^b	22 (5.5)
Elementary school or junior high school	45 (15.4)	49 (46.7)	94 (23.7)
High school	88 (30.1)	39 (37.1)	127 (32.0)
Professional nonacademic institution	59 (20.2)	6 (5.7)	65 (16.4)
Academic institution	84 (28.8)	5 (4.8)	89 (22.4)
Socioeconomic position	6.49 ± 1.99	5.62 ± 2.14 ^b	6.26 ± 2.07
Employment status			
Working for pay	170 (58.2)	60 (57.1)	230 (57.9)
Not working for pay	122 (41.8)	45 (42.9)	167 (42.1)
Economic situation			
Excellent	10 (3.4)	3 (2.9) ^b	13 (3.3)
Very good	57 (19.5)	6 (5.7)	63 (15.9)
Good	166 (56.8)	57 (54.3)	223 (56.2)
Not good	40 (13.7)	16 (15.2)	56 (14.1)
Bad	7 (2.4)	10 (9.5)	17 (4.3)
Very bad	12 (4.1)	13 (12.4)	25 (6.3)
Religiosity			
Secular	174 (59.6)	15 (14.3) ^b	189 (47.6)
Traditional	91 (31.2)	56 (53.3)	147 (37.0)
Religious	27 (9.2)	34 (32.4)	61 (15.4)
Diagnosis			
MI	212 (72.6)	75 (71.4)	287 (72.3)
Unstable angina	80 (27.4)	30 (28.6)	110 (27.7)
Hospital units			
CCU	208 (71.2)	68 (64.8)	276 (69.5)
Internal medicine	84 (28.8)	37 (35.2)	121 (30.5)
History of CHD			
No	179 (61.3)	65 (61.9)	244 (61.5)
Yes	113 (38.7)	40 (38.1)	153 (38.5)

Abbreviations: CCU, coronary care unit; CHD, coronary heart disease; MI, myocardial infarction.

^aData reported as mean ± standard deviation or number (%).

^b $P < .001$.

^c $P < .05$.

Table 2

Unadjusted Anxiety and Depression Symptom Scores in Jewish and Arab ACS Patients

	Jews (n = 292)	Arabs (n = 105)	Total (N = 397)	P Value ^a
Anxiety				
Mean ± SD	1.83 ± 0.86	1.90 ± 0.91	1.85 ± 0.87	.575 ^b
Median (IQR)	1.50 (1.17, 2.33)	1.67 (1.04, 2.46)	1.67 (1.17, 2.33)	
Existence of at least 1 symptom, n (%)	226 (77.4)	79 (75.2)	305 (76.8)	.653 ^c
Depression				
Mean ± SD	1.49 ± 0.72	1.76 ± 0.89	1.56 ± 0.78	<.001 ^b
Median (IQR)	1.14 (1.00, 1.71)	1.43 (1.14, 2.00)	1.29 (1.00, 1.86)	
Existence of at least 1 symptom, n (%)	171 (58.6)	79 (75.2)	250 (63.0)	.002 ^c

Abbreviations: ACS, acute coronary syndrome; IQR, interquartile range; SD, standard deviation.

^aP values are for differences between Arab and Jewish patients calculated using:

^bMann-Whitney or

^cχ² tests.

post hoc test indicated fewer symptoms of anxiety among CPRP participants than among nonparticipants, separately for Jews (comparison 1, $P = .054$) and Arabs (comparison 2, $P = .017$). Symptoms of depression were fewer, although not significantly so, among both Jews and Arabs who participated in a CPRP compared with those who did not (comparisons 3 and 4).

Table 5 presents the unadjusted and multivariable adjusted associations of emotional state and ethnicity with participation in a CPRP for at least 1 mo ($n = 199$), as reported 6 mo after the index hospitalization. Six models were assessed, each controlling for a different set of putative confounders. In all adjusted analyses, ethnicity, sex, and age were “forced” into the model. The unadjusted logistic model 1.1 pointed to an inverse association between symptoms of anxiety and participation in a CPRP, which persisted when ethnicity, age, and sex were incorporated into the

model (model 1.2), and was moderately attenuated when the additional covariates (level of education, SEP, history of IHD, and discharge diagnosis) were also included (model 1.3). Thus, the results demonstrated that the more anxiety symptoms a person expresses, the lower are the odds of CPRP participation. As for depression, the unadjusted logistic model showed an inverse association between symptoms of depression and participation in a CPRP (model 2.1) of similar magnitude to that of anxiety and which persisted when ethnicity, age, and sex were included in the model (model 2.2). However, this association was fully attenuated when the additional covariates (level of education, SEP, history of IHD, and discharge diagnosis) were included (model 2.3). Of note, the removal of age and sex from the models had no effect on the ORs or their CIs.

We next restricted the analyses shown in Table 5 to the subgroup participants that persevered in their CPRP attendance

Table 3

Associations of Sociodemographic Characteristics and Illness Characteristics With Symptoms of Anxiety and Depression, and CPRP Participation Assessed by Unadjusted Logistic Regression (N = 397)^a

	Anxiety ^b	P Value	Depression ^c	P Value	CPRP Participation ^d	P Value
Age ^e	0.98 (0.96-1.01)	.15	0.98 (0.97-1.00)	.10	1.00 (0.98-1.02)	.99
Sex ^f	0.71 (0.35-1.43)	.34	0.83 (0.46-1.48)	.52	0.62 (0.36-1.09)	.10
Ethnic group ^g	0.89 (0.53-1.49)	.65	2.15 (1.30-3.55)	.003	0.14 (0.08-0.24)	<.001
Education level ^h	0.90 (0.74-1.09)	.29	0.81 (0.68-0.96)	.02	1.58 (1.32-1.88)	<.001
SEP ⁱ	0.88 (0.78-0.99)	.04	0.76 (0.68-0.85)	<.001	1.28 (1.15-1.42)	<.001
Discharge diagnosis ^j	1.29 (0.75-2.21)	.35	1.45 (0.91-2.32)	.12	0.35 (0.22-0.56)	<.001
History of CHD ^k	1.16 (0.71-1.88)	.55	1.36 (0.89-2.08)	.16	0.49 (0.32-0.74)	<.001
Employment status ^l	1.49 (0.92-2.42)	.11	1.13 (0.75-1.72)	.55	0.61 (0.41-0.92)	.02
Economic situation ^m	1.29 (1.01-1.63)	.04	1.76 (1.39-2.23)	<.001	0.71 (0.58-0.86)	<.001
Hospitalization unit ⁿ	1.32 (0.78-2.23)	.30	1.28 (0.82-2.01)	.28	0.47 (0.30-0.73)	<.001

Abbreviations: CCU, coronary care unit; CHD, coronary heart disease; CPRP, cardiac prevention and rehabilitation program; SEP, socioeconomic position.

^aData reported as OR (95% CI).

^bAnxiety: 1 = existence of at least 1 symptom; 0 = no symptoms.

^cDepression: 1 = existence of at least 1 symptom; 0 = no symptoms.

^dCPRP: participation in cardiac prevention and rehabilitation program: 0 = no, 1 = yes.

^eAge (y) introduced as continuous variable.

^fSex: 0 = male, 1 = female.

^gEthnic group: 0 = Jews, 1 = Arabs.

^hEducation level: introduced as an ordinal variable (5-point scale from 1 = no formal education to 5 = academic education).

ⁱSEP introduced as an ordinal variable (10-point scale from 1 = the least well off to 10 = the best well off).

^jDischarge diagnosis: 0 = myocardial infarction, 1 = unstable angina.

^kHistory of CHD: 0 = no, 1 = yes.

^lEmployment status: 0 = working for pay, 1 = not working for pay.

^mEconomic situation introduced as an ordinal variable (6-point scale from 1 = excellent to 6 = very bad).

ⁿHospital unit: 0 = CCU, 1 = internal medicine.

Table 4

Differences in Symptoms of Anxiety and Depression Between Participants and Nonparticipants in CPRP Among Jewish and Arab ACS Patients^a

	Jews, CPRP Participation		Arabs, CPRP Participation		Total, CPRP Participation		P Value ^b
	Yes (n = 180)	No (n = 112)	Yes (n = 19)	No (n = 86)	Yes (n = 199)	No (n = 198)	
Anxiety							
Mean ± SD	1.73 ± 0.75 ^c	2.00 ± 0.99 ^e	1.53 ± 0.82 ^d	1.99 ± 0.91 ^d	1.71 ± 0.75	1.99 ± 0.96	.016
Median (IQR)	1.50 (1.17, 2.17)	1.67 (1.17, 2.67)	1.17 (1.00, 1.67)	1.82 (1.17, 2.54)	1.50 (1.00, 2.17)	1.67 (1.17, 2.67)	
Existence of at least 1 symptom, n (%)	137 (76.1)	89 (79.5)	10 (52.6)	69 (80.2)	147 (73.9)	158 (79.8)	.063
Depression							
Mean ± SD	1.40 ± 0.62 ^e	1.63 ± 0.85 ^e	1.52 ± 0.63 ^f	1.82 ± 0.93 ^f	1.41 ± 0.62	1.71 ± 0.89	.001
Median (IQR)	1.14 (1.00, 1.57)	1.29 (1.00, 1.96)	1.29 (1.00, 1.86)	1.43 (1.14, 2.00)	1.14 (1.00, 1.57)	1.43 (1.00, 2.00)	
Existence of at least 1 symptom, n (%)	103 (57.2)	68 (60.7)	13 (68.4)	66 (76.7)	116 (58.3)	134 (67.7)	.018

Abbreviations: CPRP, cardiac prevention and rehabilitation program; IQR, interquartile range; SD, standard deviation.

^aEach notation (c-f) represents a *post hoc* test for differences in mean/median. Two groups were compared in each test by using the Mann-Whitney *post hoc* test. These are represented in the table by the same indicator number. Following are the P values for the differences between the mean rank for each comparison: ^cP = .054; ^dP = .017; ^eP = .064; ^fP = .238.

^bThe Kruskal-Wallis test was used to evaluate the differences in symptoms of anxiety and depression between the following 4 groups: ^cJews who participated in CPRP; ^dJews who did not participate in CPRP; ^eArabs who participated in CPRP; and ^fArabs who did not participate on CPRP. The χ^2 test was used to evaluate differences in at least 1 symptom between the same 4 groups.

(n = 157), excluding those who participated for only 1 to 2 mo (n = 42), and compared them with the nonparticipants (see Supplemental Digital Content 1, available at: <http://links.lww.com/JCRP/A65>; n = 198). The multivariable adjusted associations of symptoms of anxiety and depression with perseverance in attendance became nonsignificant.

Finally, the introduction of multiplicative interaction terms of ethnicity with each of the psychological variables was not statistically significant for either participation ($P_{\text{anxiety}} = .38$ and $P_{\text{depression}} = .80$, respectively) or perseverance ($P_{\text{anxiety}} = .14$ and $P_{\text{depression}} = .60$, respectively) over time.

The fact that the associations of symptoms of anxiety and depression with CPRP participation were attenuated in the presence of the additional variables introduced in model 2.3 raised the question whether emotional state may mediate the association between the sociodemographic variables and CPRP participation. Therefore, we undertook a set of *post hoc* analyses in which we separately assessed the contribution of each of these variables added to models 1.2 and 2.2, including and excluding symptoms of depression or anxiety from the model. No material change in the magnitude of the associations of each of these sociodemographic variables with CPRP participation was evident irrespective of whether symptoms of depression or anxiety were in the model, indicating that no overt mediation was detected.

Finally, symptoms of anxiety and depression failed to explain the difference between Jews and Arabs in CPRP participation, a difference that remained strong and unaltered through all analyses.

DISCUSSION

In an earlier publication that used a data mining technique,²⁴ we reported on the contribution of several explanatory variables to CPRP attendance among Arab and Jewish cardiac patients in Israel and were able to pinpoint the most predictive ones, namely, receiving a letter recommending participation in CPRP, older age (among the Jewish patients), and level of anxiety (among the Arab patients). This analysis indicated that anxiety is an important and informative variable and served as the focus of the current study. We were able to further investigate whether the large gap in utilizing health promoting services between Arab and Jewish cardiac

patients (CPRP in our case) can be attributed to differences in psychological distress between these 2 ethnic groups.

Whereas no differences were found between Arab and Jewish patients in symptoms of anxiety, Arabs reported a higher frequency of symptoms of depression than Jews. Yet, these differences in psychological distress did not emerge as a robust explanation for the wide gap found between the Jews and the Arabs in the use of an efficacious intervention, CPRP.

Although psychological distress failed to emerge as the explanatory factor underlying the ethnic gap in CPRP utilization, it nevertheless was shown to contribute significantly within each group separately. Symptoms of both anxiety and depression showed similar associations with CPRP attendance in unadjusted analyses and when adjusted for ethnicity, age, and sex, with symptoms of anxiety also showing a significant contribution when controlling for additional covariates. The more symptoms of emotional distress reported by a person, the less that person tended to join CPRP. Thus, despite the evident contribution of a CPRP to the reduction in both morbidity and mortality,²⁵ ironically, even despite its potential to reduce distress in patients (due to the social support, medical care, careful follow-up, etc), it seems that patients who express even modestly greater distress symptoms, and especially anxiety symptoms, abstain from enrolling in this helpful rehabilitation program.

It might be that patients who had more anxiety symptoms when the ACS occurred were also more disposed to perceive a CPRP as a reminder of the life-threatening cardiac event that they had experienced and therefore were reluctant to enroll in the program. An additional explanation could be that a CPRP might be conceived as endangering one's health. These results are consistent with our earlier findings,¹⁶ which showed that cardiac patients who perceived themselves to be highly predisposed to additional cardiac events refrained from exercising on a regular basis. Thus, any attempt to enhance CPRP attendance must take into consideration the emotional disposition of the patients.

Further covariate adjustment weakened the association of anxiety and depression symptoms with CPRP participation, more so for depression symptoms, suggesting either mediating or confounding effects. We were unable to demonstrate mediation of the effects of lower education and SEP on

Table 5

Associations of Emotional State^a and Ethnicity^b With Participation in CPRP^c 6 mo After Index Hospitalization^d

Model	Anxiety	Depression	Ethnicity	Age and Sex ^e	Additional Confounders ^e	Nagelkerke R ² Value
Model 1.1 ^f	OR = 0.68; 95% CI, 0.53-0.86; <i>P</i> = .001	Not introduced	Not introduced	Not introduced	Not introduced	0.04
Model 1.2 ^g	OR = 0.62; 95% CI, 0.48-0.81; <i>P</i> < .001	Not introduced	OR = 0.10; 95% CI, 0.05-0.18; <i>P</i> < .001	Introduced	Not introduced	0.26
Model 1.3 ^h	OR = 0.75; 95% CI, 0.56-0.99; <i>P</i> = .045	Not introduced	OR = 0.13; 95% CI, 0.07-0.24; <i>P</i> < .001	Introduced	Introduced	0.33
Model 2.1 ⁱ	Not introduced	OR = 0.59; 95% CI, 0.45-0.79; <i>P</i> < .001	Not introduced	Not introduced	Not introduced	0.05
Model 2.2 ^j	Not introduced	OR = 0.62; 95% CI, 0.45-0.84; <i>P</i> = .002	OR = 0.11; 95% CI, 0.06-0.20; <i>P</i> < .001	Introduced	Not introduced	0.25
Model 2.3 ^k	Not introduced	OR = 0.79; 95% CI, 0.56-1.11; <i>P</i> = .18	OR = 0.14; 95% CI, 0.07-0.26; <i>P</i> < .001	Introduced	Introduced	0.33

Abbreviations: CCU, coronary care unit; CHD, coronary heart disease; CPRP, cardiac prevention and rehabilitation program; SEP, socioeconomic position.

^aEmotional state included symptoms of anxiety and depression that were introduced as ordinal variables (5-point scale from 1 = not at all to 5 = extremely); the OR are per point.

^bEthnicity values: 0 = Jews, 1 = Arabs.

^cCPRP: cardiac prevention and rehabilitation program (dependent variable in all models): 0 = no, 1 = yes.

^d34 of the 420 patients had some missing data. For the ordinal covariates, mean values were imputed for education (*n* = 4), SEP (*n* = 8), and economic situation (*n* = 5); 23 patients who had some missing data for employment status (dichotomous, *n* = 2), for history of CHD (dichotomous, *n* = 3), or for the main predictors (symptoms of anxiety, *n* = 16 or depression, *n* = 18) were excluded from the analysis. Overall, 397 patients were included in the models.

^ePotential confounders considered: Sex: 0 = male, 1 = female; Age (*y*) introduced as continuous variable; Level of education introduced as an ordinal variable (5-point scale from 1 = no formal education to 5 = academic education); Employment status: 0 = working for pay, 1 = not working for pay; SEP introduced as an ordinal variable (10-point scale from 1 = the least well off to 10 = the best well off); Economic situation introduced as an ordinal variable (6-point scale from 1 = excellent to 6 = very bad); Discharge diagnosis: 0 = myocardial infarction, 1 = unstable angina; Hospital unit: 0 = CCU, 1 = internal medicine; History of CHD: 0 = no, 1 = yes.

^fModel 1.1, predictor included: anxiety.

^gModel 1.2, adjusted for ethnicity, age, and sex.

^hModel 1.3, adjusted for ethnicity, age, sex, and additional confounders (level of education, history of CHD, SEP, and discharge diagnosis).

ⁱModel 2.1, predictor included: depression.

^jModel 2.2, adjusted for ethnicity, age, and sex.

^kModel 2.3, adjusted for ethnicity, age, sex, and additional confounders (level of education, history of CHD, SEP, and discharge diagnosis).

CPRP participation through anxiety and depression symptoms. Since intervention regarding alteration of these key sociodemographic variables is a slow process that requires major policy changes at the macro level, efforts should be channeled into focusing special attention on these high-risk patients. These patients could be offered psychoeducational materials consisting of information about the benefits of CPRP. Furthermore, we suggest consideration of clinical trials directed at patients who present with symptoms of emotional distress to be initiated during their ACS hospital stay, including interventions aimed at managing symptoms of depression and anxiety, with the objective of facilitating CPRP utilization.

Neither symptoms of depression or anxiety were associated with perseverance in a CPRP. However, our study was underpowered to detect such differences. It might be that the effect of distress is mostly important as a barrier to initiate the first step and enroll in a CPRP, whereas while already in the program, other variables are more important for continuation. Future studies should also assess barriers that predict both enrollment and perseverance, and design interventions accordingly.

Additional limitations of the study should be mentioned. The small number of Arab women in our sample is a limitation that needs to be addressed in future studies. In addition, uneven response rates may have influenced the representativeness of our sample. We cannot exclude the possibility that new-onset morbidity, not diagnosed during hospitalization, may both have prevented patients from attending CPRP during the 6-mo follow-up and have been associated with more symptoms of depression and anxiety. CPRP participation was based on self-report, which may, for example,

be affected by social desirability. However, we showed that self-reported participation was completely accurate. Nevertheless, duration of participation was not validated. Consequently, future studies are advised to use objective means of determining length of participation by examining patient files at the CPRP. Finally, the study also represents the experience of a single center and should be extended to a broader sample.

Despite these limitations, the current study contributes in the realm of health promotion showing that patients who report even a few symptoms of anxiety and depression are at substantially increased risk of avoiding rehabilitation programs, regardless of their ethnic origin. Consequently, these manifestations should be assessed and monitored as early as during hospitalization.

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