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# Comparison of prevalence of symptoms of depression, anxiety, and hostility in elderly patients with heart failure, myocardial infarction, and a coronary artery bypass graft

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**OBJECTIVE:** This study sought to compare the prevalence of anxiety, depression, and hostility among 3 clinically diverse elderly cardiac patient cohorts and a reference group of healthy elders.

**METHODS:** This was a multicenter, comparative study. A total of 1167 individuals participated: 260 healthy elders, and 907 elderly cardiac patients who were at least 3 months past a hospitalization (478 heart-failure patients, 298 postmyocardial infarction patients, and 131 postcoronary artery bypass graft patients). Symptoms of anxiety, depression, and hostility were measured using the Multiple Affect Adjective Checklist.

**RESULTS:** The prevalence of anxiety, depression, and hostility was higher in patients in each of the cardiac patient groups than in the group of healthy elders. Almost three quarters of patients with heart failure reported experiencing symptoms of depression, and the heart-failure group manifested the greatest percentage of patients with depressive symptoms.

**CONCLUSIONS:** The high levels of emotional distress common in cardiac patients are not a function of aging, because healthy elders exhibit low levels of anxiety, depression, and hostility. (Heart Lung® 2010;39:378–385.)

Negative emotions (ie, depression, anxiety, and hostility) appear to be more common among cardiac patients than among healthy individuals. Whether this phenomenon is related to cardiac disease alone or to the older age of most cardiac patients is unclear. The incidence of cardiac disease increases dramatically with age.

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Although some researchers reported that aging is associated with a reduction in anxiety and depression levels,<sup>1</sup> others documented higher levels of negative emotions in the elderly.<sup>2,3</sup> Higher rates of suicide are seen in the elderly, and the distinctive stresses of aging (eg, loss of friends and loved ones, and retirement) may contribute to substantially higher rates of emotional distress.<sup>4</sup>

This argument is not simply academic. Negative emotional states adversely and independently affect quality of life,<sup>5-7</sup> adherence to recommended treatments,<sup>8-10</sup> costs of care,<sup>11,12</sup> and physical outcomes in patients with coronary heart disease and heart failure.<sup>13-21</sup> The risks engendered by negative emotional states may be equal to, or greater than, those seen with traditional risk factors such as the presence of diabetes, smoking, elevated low-density lipoprotein, and the presence of comorbidities.<sup>5,19</sup> Despite the

importance of negative emotional states to the quality of life, morbidity, and mortality of cardiac patients, clinicians still do not routinely assess for emotional distress as a significant risk factor.<sup>22,23</sup> One major factor limiting the application by clinicians of evidence regarding negative emotional states is the perception that major confounding factors such as age obscure the impact of cardiac disease on emotional states. Thus, this study sought to determine the impact of cardiac disease on psychological adjustment by comparing the prevalence of depression, anxiety, and hostility in 3 elderly cardiac patient groups (ie, outpatients with heart failure, patients after a myocardial infarction, and patients after a coronary artery bypass graft) with that of a group of healthy elders.

## METHODS

In this multicenter, comparative study, data from 3 outpatient cohorts of community-dwelling cardiac patients and a group of community-dwelling elders without known cardiac disease were compared in terms of anxiety, depression, and hostility. A multicenter design was used to increase clinical diversity and heterogeneity in the sample, to enhance generalizability.

### Participants

After approval by our respective Institutional Review Boards, cardiac patients were recruited from outpatient clinics at academic medical centers in the Western, Midwestern, and Southern United States, and a cohort of elders without cardiac disease was recruited from senior centers. All participants gave written, informed consent. Cardiac patients who met the following inclusion criteria were enrolled: (1) at least 3 months past a hospitalization; (2) community-dwelling; (3) age  $\geq 60$  years; (4) no cognitive impairment (ie, patients unable to converse appropriately or diagnosed with dementia or Alzheimer's disease); and (5) a confirmed diagnosis. Elders without cardiac disease were community-dwelling, had no cognitive impairments, were aged  $\geq 60$  years, and were free of known cardiac disease.

### Measurement

Data on sociodemographic characteristics were collected from all participants by an interview and questionnaire. Clinical data were collected about patients by patient interview and medical-record review. Anxiety, depression, and hostility were measured in participants using the Multiple Affect Adjective Checklist.

**Multiple affect adjective checklist.** The Multiple Affect Adjective Checklist (MAACL) assesses states of anxiety, depression, and hostility.<sup>24,25</sup> The MAACL is a set of 132 positive and negative adjectives representing each of the 3 emotional states, arranged in alphabetical order. Subjects read through the adjectives and check all those that reflect how they currently feel. The instrument is scored by calculating the number of negative adjectives checked, and the number of positive adjectives not checked. Higher scores indicate that a respondent has higher levels of the given emotion. Respondents receive separate scores for anxiety, depression, and hostility. Standard thresholds for anxiety, depression, and hostility were established at scores of 7, 11, and 7, respectively. This instrument measures the intensity of symptoms of anxiety, depression, and hostility, and is not used to render a clinical diagnosis. Nonetheless, this instrument was chosen for this project because of its clinical utility and ease of comparison among sites, and because dysphoric symptoms, even in the absence of a clinical diagnosis, were shown to exert a negative impact on outcomes.<sup>18,26</sup> The MAACL has been used extensively in research, and its sensitivity, reliability, and validity were repeatedly demonstrated.<sup>24,25,27</sup> Reliability was confirmed in this study with the calculation of Cronbach's  $\alpha$  in each sample for each subscale of the MAACL. In each of the 4 groups and each of the 3 subscales, Cronbach's  $\alpha$  was  $>.85$ .

### Data analysis

Non-normally distributed data were transformed for a better approximation of normal distribution, using log transformations as needed. Data were pooled for all sites, because no differences in outcomes were evident among sites. Analysis of variance was used to compare mean anxiety, depression, and hostility scores among the cardiac-patient and healthy elder groups. This provided an unadjusted comparison of the means. We adjusted for baseline age, gender, ethnicity, marital status, educational level, and comorbidities, using subsequent analysis of covariance models. When a significant difference was found, post hoc testing using Bonferroni comparisons identified specific group differences. All analyses were conducted using SPSS software, release 13.0 (SPSS, Inc., Chicago, IL). All tests for statistical significance were 2-tailed, and  $\alpha = .05$ .

## RESULTS

A total of 1167 individuals participated in this study: 907 cardiac patients, and 260 healthy elders. In the cardiac-patient group, 478 heart-failure

patients, 298 postmyocardial infarction patients, and 131 postcoronary artery bypass graft patients were enrolled. Given our age criterion for enrollment in the study, there were no differences in age among the 4 groups. As expected, however, given the typical cardiac profiles seen in the community, there were a number of differences in baseline characteristics among groups (Table I).

### Group differences in anxiety, depression, and hostility scores

An examination of differences in anxiety, depression, and hostility scores among groups revealed significant group differences for each emotion (Table II). For anxiety, the 3 cardiac-patient groups were similar, and expressed significantly higher levels of anxiety than the healthy elders ( $P = .001$ ), whose mean for anxiety was 40% lower than the normative threshold for anxiety. For depression, healthy elders expressed a mean level that was 8% below the threshold for depression, whereas the heart-failure group expressed a mean depression level that was significantly higher than for either of the other 2 cardiac patient groups ( $P = .001$ ). Hostility levels were similar, and were highest in patients after a myocardial infarction and after a coronary artery bypass graft, compared with the healthy elder group, in whom hostility was lowest ( $P = .001$ ), and 16% below the normative threshold.

The percentage of cardiac patients in each group exceeding the threshold for anxiety was 37% to 44%, compared with only 17% among healthy elders (Fig 1). With regard to depression, 63% of heart-failure patients exceeded the threshold for depression, compared with 56% of postmyocardial infarction patients, 53% of postcoronary artery bypass graft patients, and only 33% of healthy elders. A total of 62% of postcoronary artery bypass graft patients, compared with 34% of healthy elders, exceeded the hostility threshold.

To control for sociodemographic or clinical factors that might also affect anxiety, depression, or hostility levels, we used analysis of covariance models, with age as the covariate to adjust for gender, marital status, ethnicity, educational level, presence of hypertension or diabetes, and medications used. Within this elderly sample, age did not affect the levels of anxiety, depression, or hostility in any model.

There were no interactions between group (ie, the 3 cardiac-patient groups and the healthy elder group) and gender, although there was a main effect of gender for anxiety ( $P = .04$ ) and depression ( $P = .03$ ), but not for hostility. Women expressed significantly greater levels of anxiety and depression than men in all 4 groups (Table III).

There was no education by group interaction, but there was a main effect of educational level.

**Table I**

Baseline sample characteristics

Characteristics	Healthy elders (n = 260)	Coronary artery bypass graft (n = 131)	Postmyocardial infarction (n = 298)	Heart failure (n = 478)	P
Age, mean $\pm$ SD (y)	67.3 $\pm$ 11.4	66.3 $\pm$ 6.7	65.8 $\pm$ 7.2	65.6 $\pm$ 9.2	.078
Female (%)	78.0	6.1	13.4	25.8	.001
$\leq$ High school (%)	33.7	31.7	39.4	33.6	.393
Married/ cohabitating (%)	50.4	100.0	100.0	66.4	.001
Ethnicity					.001
Caucasian	68.1	90.8	69.1	64.4	
African American	25.8	3.8	7.0	9.4	
Hispanic	.0	.0	3.7	7.5	
Other	6.2	5.3	7.7	8.8	
Hypertension (%)	55.8	29.6	35.7	51.5	.001
Diabetes (%)	16.1	14.9	12.2	38.1	.001
Left ventricular ejection fraction, mean $\pm$ SD (%)	Not assessed	58.6 $\pm$ 10.9	50.5 $\pm$ 16.9	29.5 $\pm$ 12.2	.001

**Table II**

Comparison of anxiety, depression, and hostility scores among 3 cardiac patient groups and healthy elderly group

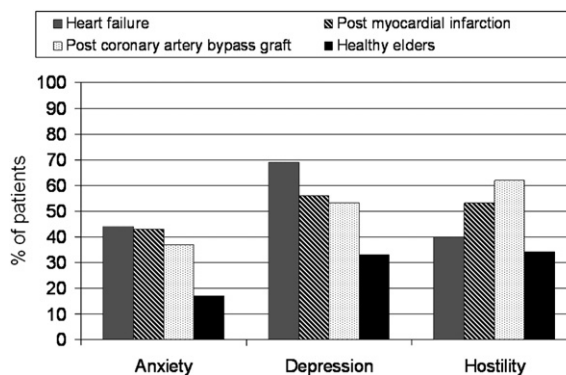
	Healthy elders (n = 260)	Coronary artery bypass graft (n = 131)	Postmyocardial infarction (n = 298)	Heart failure (n = 478)	P
Anxiety score, mean ± SD (95% CI)	4.2 ± 3.3 (3.8-4.6)	6.8 ± 4.0 (6.1-7.5)	6.9 ± 4.6 (6.4-7.4)	6.9 ± 4.7 (6.3-7.4)	.001*
Depression score, mean ± SD (95% CI)	10.2 ± 6.3 (9.4-11.0)	13.0 ± 5.5 (12.0-13.9)	12.6 ± 6.5 (11.8-13.3)	14.2 ± 7.6 (13.4-15.1)	.001†
Hostility score, mean ± SD (95% CI)	6.3 ± 3.5 (5.9-6.8)	8.5 ± 4.1 (7.8-9.2)	8.2 ± 4.3 (7.7-8.7)	6.9 ± 4.3 (6.4-7.4)	.001‡

Higher scores indicate higher levels of anxiety, depression, or hostility.

\*Post hoc Bonferroni comparisons revealed differences between healthy elderly group vs all other groups.

†Post hoc Bonferroni comparisons revealed differences between heart failure and myocardial infarction, and between healthy elderly group vs all other groups.

‡Post hoc Bonferroni comparisons revealed differences between healthy elders vs myocardial infarction and coronary artery bypass, and between heart failure vs myocardial infarction and coronary artery bypass.



**Fig 1** Percentage of patients in each group exceeding published threshold for anxiety, depression, and hostility.

Individuals in each group with only high school or less education reported experiencing significantly higher levels of anxiety (P=.001), depression (P=.001), and hostility (P=.006) than those who had attended at least some college (Fig 2). In this sample, there was no interaction or main effect of marital status, ethnicity/race, hypertension, diabetes, or medications used on levels of anxiety, depression, or hostility.

**DISCUSSION**

Our findings demonstrate that the higher levels of emotional distress seen in older cardiac patients are not a function of aging, but are directly associated with cardiac disease. Patients with heart failure and patients after a myocardial infarction and after a coronary artery bypass graft exhibited substantially higher levels of anxiety and depression than did a group of healthy elders. Hostility levels were higher in postmyocardial infarction and postcoronary artery bypass graft patients than in healthy elders who were similar to heart-failure patients. In the healthy elders, mean levels of each emotion were well below the normative threshold for distress, whereas they were above the threshold for patients in each of the 3 distinct cardiac groups. Thus, aging does not account for the higher levels of emotional distress seen in cardiac patients.

Our findings demonstrated that of the sociodemographic and clinical variables considered, only gender and educational status affected levels of anxiety, depression, or hostility, and they did so in a consistent fashion among groups. Those with a high school education or less manifested higher levels of psychological distress than did those with at least some college education. Educational attainment is often considered a surrogate for socioeconomic

**Table III**

Comparison of anxiety, depression, and hostility scores according to gender among 3 cardiac patient groups and healthy elderly group

	Healthy elders (n = 260)	Coronary artery bypass graft (n = 131)	Postmyocardial infarction (n = 298)	Heart failure (n = 478)	P
Anxiety score, Women mean ± SD	4.4 ± 3.4	7.6 ± 4.1	8.5 ± 4.6	7.2 ± 4.8	.028*
Men	3.6 ± 3.0	6.8 ± 4.0	6.6 ± 4.5	6.7 ± 4.5	
Depression score, Women mean ± SD	10.4 ± 6.6	15.0 ± 4.5	14.1 ± 6.4	15.0 ± 7.5	.037*
Men	9.1 ± 5.3	12.8 ± 5.6	12.4 ± 6.5	13.9 ± 7.7	
Hostility score, Women mean ± SD	6.4 ± 3.5	9.0 ± 3.1	8.8 ± 3.9	6.2 ± 4.0	.616 <sup>†</sup>
Men	5.8 ± 3.7	8.5 ± 4.2	8.1 ± 4.4	7.2 ± 4.4	

Higher scores indicate higher levels of anxiety, depression, or hostility.

\*Main effect of gender; no group by gender interaction.

<sup>†</sup>No interaction of group by gender, and no gender main effect.

status, which is associated strongly and inversely with poor cardiac outcomes.<sup>28,29</sup> This relationship is driven not only by the poorer health habits and higher levels of cardiac risk factors seen in individuals of lower educational attainment, but by the chronic stresses of lower socioeconomic status,<sup>30</sup> often manifested as depression, anxiety, or hostility.

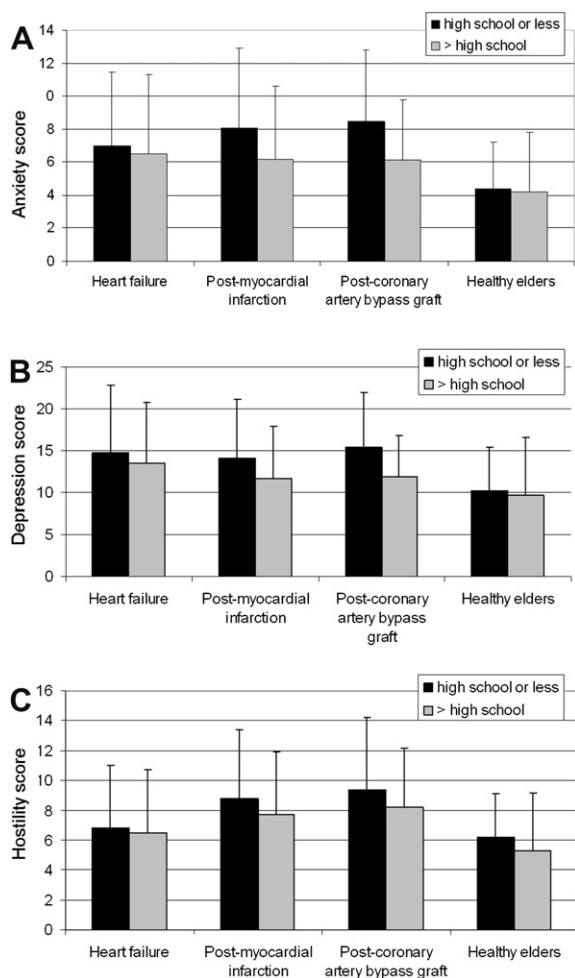
We also noted that women reported higher levels of anxiety and depression in all groups than did men. We and others previously reported on this phenomenon.<sup>5,31,32</sup> In each cardiac-patient group in this study, women consistently reported levels in excess of the thresholds for anxiety or depression. Given the consistency with the finding that women experience higher levels of psychological distress, future research should explore the relationship between poorer cardiac outcomes among women and higher levels of anxiety and depression. Even though women's levels of depression were higher than men's, in each male cardiac-patient group, the mean level of depression was also higher than the threshold for depression.

Our data indicate that the majority of patients after a myocardial infarction, after a coronary artery bypass, and with heart failure have depressive symptoms, that about 40% of these cardiac patients experience anxiety, and that hostility is apparent in about half of these patients. These levels of depression are consistent with those reported in the literature when considering the combined prevalence of clinical diagnoses and symptoms of psychological distress.<sup>33</sup> Neither anxiety nor hostility have been studied in sufficient depth to provide reliable estimates of prevalence.

The high levels of depression, anxiety, and hostility in these older cardiac-patient samples are of

concern for a number of reasons. First, both greater age and negative emotions predict short-term and long-term morbidity and mortality among patients with heart failure, a coronary artery bypass graft, and a myocardial infarction.<sup>5,6,13,16-18,21,34-42</sup> The combined impact of increasing age and negative emotions substantially increases the risk faced by elderly cardiac patients for poor quality of life, recurrent cardiac events, and increased mortality. Under these circumstances, it is imperative that clinicians recognize and appropriately manage negative emotions in their cardiac patients.

Second, emotional distress is modifiable, but only if it is recognized and treated. Although anxiety or depression will diminish in some cases without treatment, investigators documented poor resolutions of either condition over the long term.<sup>10,43</sup> In current clinical practice, the recognition and treatment of psychological distress are extremely poor, even when levels are as high as they are in the current patient sample.<sup>22,23,43</sup> A number of reasons may account for the under-recognition and under-treatment of dysphoric states.<sup>19,33</sup> Many clinicians think that emotional distress after a cardiac event is a normal response to illness that will resolve with time. Others fail to appreciate the extent of the problem, or believe that they will easily recognize serious emotional distress in their patients when it is present, despite evidence to the contrary.<sup>22,23</sup> Finally, healthcare providers exhibit a general lack of knowledge regarding the appropriate assessment and treatment of emotional distress. Many clinicians believe that assessment is too difficult, and that treatment options are few.



**Fig 2** Anxiety (A), depression (B), and hostility (C) levels in each group compared according to level of education. Individuals in each group with only high school or less education reported experiencing significantly higher levels of anxiety ( $P = .001$ ), depression ( $P = .001$ ), and hostility ( $P = .006$ ) than those who had attended at least some college.

Third, emotional distress, and particularly anxiety and depression, can be easily assessed in the clinical setting by nonpsychiatrists, and effective nonpharmacologic and pharmacologic treatments exist.<sup>19,33,44</sup> Despite the notable failure of some large-scale intervention trials to demonstrate a significant impact on outcomes,<sup>45</sup> other trials demonstrated that reducing emotional distress with nonpharmacologic interventions can reduce mortality,<sup>46</sup> particularly in the subset of patients with high distress.<sup>47</sup> The pharmacologic management of depression and anxiety is effective and safe in the elderly,<sup>48</sup> when medications appropriate for cardiac patients (eg, selective serotonin reuptake inhibitors) are used judiciously.

## Limitations

This study had some potential limitations. We assessed for severity of symptoms in 3 dysphoric states (anxiety, depression, and hostility), but we did not make clinical diagnoses. However, evidence indicates that even symptoms of anxiety and depression are of major importance in predicting poor outcomes in cardiac patients.<sup>5,18,49</sup>

Some sociodemographic differences were evident between the healthy elderly group and the cardiac-patient groups, and were unavoidable, given the demographics typical of healthy elders. These differences had the potential to affect our findings. There were significantly more women in the healthy elderly group than in any of the cardiac-patient groups, but given the higher levels of anxiety seen in all groups among women, this probably resulted in an overestimation of levels of psychological distress in the healthy elderly group. The end result of this bias would be to decrease the differences between healthy elders and cardiac-patient groups. Thus the differences in psychological distress between healthy elders and cardiac patients are likely even more dramatic than we have shown here.

## CONCLUSIONS

The emotional distress seen in elderly cardiac patients is not a function of aging, because healthy elders, even those with hypertension and diabetes, have low levels of anxiety, depression, and hostility. Women and those of lower educational attainment are particularly at risk for psychological distress. Patients with heart failure exhibit the highest levels of depression, whereas heart-failure and postmyocardial infarction patients experience the highest levels of anxiety, and patients after a coronary artery bypass exhibit the highest levels of hostility. These findings add to the burgeoning literature demonstrating the increased prevalence of negative emotions in cardiac patients, dispel the notion that negative emotions in elderly cardiac patients are a function of aging, and call for more aggressive assessment and management of psychological distress.

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