Published in final edited form as:

Eur J Cardiovasc Nurs. 2012 September ; 11(3): 356–365. doi:10.1177/1474515112438010.

Commonalities and Differences in Correlates of Depressive Symptoms in Men and Women with Heart Failure

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Heart failure (HF) is a major cause of excess morbidity and mortality, and a leading contributor to healthcare expenditures in the U.S. with estimated direct and indirect costs of greater than 37.2 billion dollars per year.[1] Direct costs are mainly attributed to repeat hospitalizations (75%), and on average are approximately € 10,000 per patient per hospitalization in Europe.[2] Depressive symptoms are common in outpatients with HF with a prevalence of 13–42%, [34–6] and the presence of depressive symptoms is linked to poorer clinical outcomes in patients with HF [3, 7–9] Patients with HF and depressive symptoms commonly suffer from poorer quality of life, declining functional status, greater symptom burden, poorer adherence, more frequent rehospitalizations, and worse survival.[3, 8, 10–12] Given the common finding that women experience higher levels of depression than men, [13] a major step to understanding depression in patients with HF is determining how gender contributes to the depression experience.

Gender contributes to differences in clinical presentation and outcomes in patients with HF, [14] yet most research on depressed patients with HF does not examine gender differences despite the increased prevalence of depressive symptoms in women.[13] Consequently, it is impossible to determine if women and men with HF differ on important characteristics such as demographics, behavioral, clinical, and psychosocial variables that may influence depression. Gender differences among patients with heart failure must be considered when developing targeted, preventive treatment strategies in order to address healthcare costs and

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societal burden related to the increasing numbers of men and women with HF.[15] Therefore the aims of this study were to 1) compare the prevalence and severity of depressive symptoms between men and women enrolled in a large HF registry and 2) to determine gender differences in predictors of depressive symptoms from among relevant demographic (i.e., age, ethnicity, marital status, education, and financial status), behavioral (i.e., smoking and exercise), clinical (i.e., HF etiology, functional status, functional capacity, comorbidity burden, and body mass index), and psychosocial (i.e., anxiety, perceived control, and health perceptions) factors.

REVIEW OF RELEVANT LITERATURE

Heart failure (HF) patients with depressive symptoms have poorer clinical outcomes, [3, 7, 8, 10, 11, 16–19] lower quality of life and substantially higher health care costs than HF patients without such symptoms.[3, 8, 11, 12] A recent meta analysis demonstrated that patients with HF who have depressive symptoms are more than twice as likely to die or experience a cardiac event compared to HF patients without depressive symptoms.[3] Although depression is more prevalent in women overall and in cardiac disease in general,[20] investigators recently reported finding more male than female depression sufferers in a large cohort of patients with HF.[21] However, little is known about the role of gender in comorbid HF and depression. Given the importance of depression in HF, further investigation is needed to ascertain how gender interacts with HF and depressive symptoms to influence clinical outcomes.

Previous studies have reported demographic factors which are related to HF and depression. The incidence of depression is inversely related to age.[22] Patients with HF manifest greater depressive symptoms when they are younger.[7, 8, 23, 24] Other sociodemographic risk factors for depression among patients with HF include low educational attainment, being unmarried or living alone, and being unemployed or having a low income.[17, 25–27] In comorbid depression and HF, ethnicity prevalence data have been mixed, with one large study reporting a higher rate of depression history in whites[16] and a smaller study finding that non-Hispanic Blacks were more likely to be depressed than others.[28]

Biological and behavioral factors are likely linked to both depression and HF. For example, higher NYHA functional class is associated with higher prevalence of depression[3] and may be a reflection of higher illness burden from HF that contributes to depression.[15] Unhealthy behaviors such as alcohol and tobacco use, poor nutrition, sedentary lifestyle and poor adherence to medical regimens are associated with depression in HF patients.[29, 30]

Patients with chronic illnesses such as HF experience increased mental distress.[31, 32] Symptoms of anxiety are highly prevalent in HF patients. [28, 33, 34] Anxiety symptoms overlap significantly with depressive symptoms and increase the risk of mortality and functional disability as well as health care utilization and cost.[8, 35, 36] In addition to anxiety, perceptions of health status, functional capacity, and perceived control influence the incidence and severity of depressive symptoms[37–39] and are linked to poorer outcomes.[4041] Higher levels of perceived control are linked with fewer anxious and depressive symptoms and a higher likelihood of patient involvement in self-care management, which is related to

improved outcomes in HF patients.[28, 38, 42] HF patients who indicate low perceived health status are more prone to develop depressive symptoms.[17]

Previous studies of depression and HF have included measures of sociodemographic, clinical, behavioral and psychosocial risk factors.[7, 17, 29, 43–45] A comprehensive multivariate examination has not, however, been conducted and few studies have reported comparisons by gender.[7, 10]

METHODS

Data from the HF Quality of Life Collaborative,[46–48] an ongoing HF health-related quality of life registry, were used to meet the study aims. A total of 622 patients in the registry had complete data on all variables.

Adult patients over age 18 were enrolled from cardiology clinics associated with academic medical centers in the Midwest, Northeast, South and Southeast of the United States. Patients were included if they had a documented diagnosis from a cardiologist of chronic HF from either preserved or non-preserved ejection fraction and were community dwelling (i.e., not residing in an extended care or skilled nursing facility). Patients were excluded if they had acute myocardial infarction or stroke within the prior 3 months or were cognitively impaired as determined by inability to answer questions from the researcher, complete questionnaires, or provide informed consent. All participants provided written informed consent, and all participating sites obtained institutional review board approval.

Measures

Demographic variables—Data on age, gender, ethnicity, education level, marital status, and financial status were collected by patient self-reported questionnaires. Because participants commonly are reluctant to provide income data, we used an accepted alternative approach in which patients were asked to respond to the question, “Considering your household income, would you say you…” with the following three options: 1) are comfortable; 2) have enough to make ends meet; or 3) do not have enough to make ends meet?” This method reflects the impact of a participant’s socioeconomic status on daily life.[49]

Behavioral and clinical variables—Data on smoking and exercise were collected using patient questionnaires. Body mass index (BMI) was calculated from height and weight available by medical record review. Etiology of HF was determined from medical record review, and was indicated as ischemic or non-ischemic (includes largely idiopathic and hypertensive HF).

NYHA functional class was determined by careful patient interview. NYHA is a subjective indicator of functional status. [50] Based on patients’ report of how able they are to perform their usual activities they are assigned a NYHA classification of I (ordinary physical activity causes no symptoms of fatigue, dyspnea, angina or palpitations), II (symptoms with ordinary physical activity that slightly limit physical activity), III (symptoms occur with less than ordinary physical activity and markedly limit activity) or IV (symptoms occur even at rest).

Reproducibility both among different raters (inter-rater reliability) and across the same rater (intra-rater reliability) was insured by training raters and testing them in sample patients until inter-rater agreement is 100%.

Comorbidity burden was assessed using the interview format of the Charlson Comorbidity Index.[51] Higher scores on the Charlson Comorbidity Index indicate greater comorbidity burden. Most conditions are scored with 1 point although some (e.g., hemiplegia, cirrhosis) are assigned >1 point. Scores can range from 0 to 34 but because each subject has HF they will have a score >1. Responses are summed, weighted, and indexed into one of 3 categories (low, moderate, or high) according to the published method. Validity was demonstrated when comorbidity category predicted mortality, complications, health care resource use, length of hospital stay, and discharge disposition.[52, 53] Comorbidities were documented during the patient and family interview at the time of patient enrollment, and confirmed by reviewing the medical record.

The Duke Activity Status Index (DASI) was used to measure self-reported functional capacity with higher scores indicating higher functional capacity.[54] The DASI consists of 12 activity items. Each item has four (1-can do without limitation to 4 – unable to do) response options. Each item is scored with a zero given to responses of 2, 3, or 4 all of which indicate there is some degree of limitation performing the activity. For a response of 1 (can do without difficulty), the item is given a weighted score based on the MET level associated with the given activity. The total score is calculated by summing all the item scores, and can range from 0 to 58.2. The reliability[55] and the validity[55, 56] of the DASI have been supported in previous studies. The Cronbach's α for this scale in the current study was 0.85.

Psychosocial variables—The severity of depressive symptoms was measured using the Patient Health Questionnaire-9 (PHQ-9).[57, 58] The PHQ-9 is widely used and has been demonstrated to be valid across diverse groups of individuals including patients with HF.[59] The items on the PHQ-9 are derived from DSM-IV criteria for diagnosing depression.[60] This instrument consists of 9 items each rated by the patient using the range of 0 (*not at all*) to 3 (*nearly every day*). The scores range from 0–27 with higher scores indicating more severe depressive symptoms. A score of greater than or equal to 10 is defined as having moderate depressive symptoms, [57, 58] and this is the cutpoint we used in this study to define the presence of depressive symptoms.

Anxiety: Anxiety was measured using the anxiety scale of the Brief Symptom Inventory (BSI).[61, 62] The anxiety scale of the BSI consists of six items that are rated by patients on a 5-point Likert type scale that ranges from 0 (no distress related to the item) to 4 (extreme distress related to the item). The score is calculated by averaging the ratings of the items with a possible range from 0 to 4. Acceptable reliability and validity have been demonstrated for this instrument in psychiatric and medical patients, including those with HF.[61–63]

Perceived Control: Perceived control was measured by the Control Attitudes Scale (CAS).[64] The CAS consists of a total of 4-items that are ranked by the respondent on a 7-point scale according to the degree to which they agree or disagree with a given statement;

ratings on two of the items are reversed before scoring. The total score can range from 4 to 28 with higher scores indicating greater perceived control. The instrument has well-established reliability and validity in a variety of cardiac populations, including HF.[38, 65]

Health Perception: Health perception was measured by a single item from the Medical Outcomes Study Short Form −36. Patients rated their health on a Likert type scale 1–5, (1 equals excellent, and 5 equals poor).

Data Analysis

To describe sample characteristics, we compared each demographic, behavioral, clinical and psychosocial characteristic based on gender and presence of depressive symptoms. Comparisons were done using two-way analysis of variance (ANOVA), or chi-square, as appropriate. For ANOVAs, posthoc group comparisons were conducted using the Tukey statistic.

To address Specific Aim 1, chi-square was used to determine the prevalence of depressive symptoms in men and women by comparing the proportion of men and women who met criteria for depressive symptoms. Independent t-tests were used to determine the severity of depressive symptoms in men and women by comparing the means of scores on the PHQ-9 between men and women. Analysis of variance (ANOVA) was used to determine main effects of gender and/or depressive symptoms.

To address Specific Aim 2, regression analyses were used to identify multivariate predictors of depressive symptoms in men and women. Separate multiple regressions were run for men and women. Variables were entered in three blocks: demographic, behavioral and clinical, and psychosocial variables to determine which factors were independently associated with depression scores. At each step, variables were forced into the model in order to provide simultaneous control within the step.

RESULTS

Sample Characteristics

Data from a total of 622 patients, 436 men and 186 women, are included.

Sample characteristics are compared among patients with and without depressive symptoms stratified by gender in Table 1. Interactions were examined first, and if no interaction was present, main effects were examined. There were no main effects for gender or depressive symptoms in the characteristics of ethnicity, marital status, smoking history, or body mass index. The only interaction in gender by depressive symptoms was present for the variable of financial status. Women who reported not having enough to make ends meet were more likely to have higher levels of depressive symptoms than women who reported being financially comfortable or having enough to make ends meet. There was no association between levels of depressive symptoms and financial status in men.

There were differences based on depressive symptoms (i.e., main effect of depressive symptoms) in age, years of education, exercise behavior, NYHA class, comorbidity burden,

health perceptions, anxiety and perceived control (Table 1). With regard to age, both men and women with depressive symptoms were younger compared to those without depressive symptoms (Table 1, $p = 0.02$ main effect for depressive symptoms). Regardless of gender, those with depressive symptoms had attained fewer years of education than those without depressive symptoms ($p = 0.015$, Table 1). In both men ($p = 0.001$) and women ($p = 0.015$), those with depressive symptoms reported performing less exercise than those without depressive symptoms (Table 1). In both men and women ($p = 0.001$ for both), there was a greater proportion of people with depressive symptoms in the worse NYHA functional classes (Table 1). Regardless of gender, those who had depressive symptoms reported a greater comorbidity burden ($p = 0.001$) than those who did not have depressive symptoms (Table 1). In both men and women, health perceptions were worse ($p = 0.001$), anxiety levels were higher ($p = 0.001$), and levels of perceived control were lower ($p = 0.001$) in those with depressive symptoms than in those without depressive symptoms (Table 1).

There were gender differences (i.e., main effect of gender), but no difference based on depressive symptoms in etiology of heart failure (Table 1). More women than men had a non-ischemic etiology (hypertension) for their HF ($p = 0.05$).

There was both a main effect of gender ($p = 0.045$) and a main effect of depressive symptoms ($p = 0.001$) on functional capacity as measured by the DASI (Table 1). Women reported lower functional capacity than men. Individuals of either gender who had depressive symptoms reported lower functional capacity than those without depressive symptoms.

Specific Aim 1

A total of 134 men (28%) met the criterion for depressive symptoms, while 65 women (35%) met the criteria for depressive symptoms ($p = 0.00$). Mean scores on the PHQ-9 were significantly different between men and women (7.02 ± 6.0 versus 8.63 ± 6.3, respectively, $p = 0.003$), with women having higher mean scores on the PHQ-9, representing greater severity of depressive symptoms than men

Specific Aim 2: Gender-Specific Predictors of Depression

Separate multivariate regression analyses were used to identify predictors of depressive symptoms in men (Table 2) and women (Table 3). In men, demographic variables entered in the first step explained 7% of the variance in depressive symptoms. The R^2 increased to 29% in the second step with the addition of the behavioral and clinical variables. The R^2 increased by an additional 19% in the third step with the addition of the psychosocial variables. The final model explained 49% of the variance in depressive symptoms in men. Six variables independently predicted higher levels of depressive symptoms in men: lower financial status, worse NYHA class, poorer functional status, poor ratings of perceived health, increased anxiety and low perceived control.

In women, demographic variables entered in the first step of the regression model explained 12% variance in depressive symptoms. The R^2 increased by 17% to 27% in the second step with the addition of the behavioral and clinical variables. The R^2 increased by an additional 25% in the third step with the addition of the psychosocial variables. The final model

explained 52% of the variance in depressive symptoms in women. Three variables independently contributed to the prediction of higher levels of depressive symptoms in women: higher BMI, higher anxiety and lower perceived control.

DISCUSSION

The present study is among the first to report differences in behavioral and clinical correlates of depressive symptoms and report commonalities of psychosocial correlates of depressive symptoms in a diverse multicenter outpatient sample of women and men. In the current study, depressive symptoms were predicted by socioeconomic status, NYHA Classification, functional status, current health perception, perceived control and anxiety in men. In women, predictors of depressive symptoms were BMI, perceived control and anxiety. Only perceived control and anxiety were predictors in both men and women. In HF patients their perceptions of their ability to control their symptoms, illness and lives was an important correlate of depressive symptoms. A sense of control is known to be important in reducing anxiety and depression. This relationship has also been found to be true in many cohorts of cardiac patients. In randomized trials, where HF patients have been given control of therapeutic strategies such as home-based exercise programs, daily weights and self-management, investigators have shown favorable effects on QOL. The finding that perceived control is an important correlate of depressive symptoms has implications for the development of more nursing interventions. Reducing morbidity and mortality in HF patients with depressive symptoms should be the goal for optimal outcomes and perhaps men and women need different standards of care. HF patients require a high degree of self-management thus programs focused on increasing autonomy and encouraging patient control in decision making regarding care should be designed. We determined that women with HF reported substantially higher levels of depressive symptoms than men. Few studies of HF patients report significant gender differences in depression. Friedman reports no gender differences in depression among older adults with HF. [66] When comparing men and women Heo et al found high levels of depression and anxiety, but no significant gender differences.[67, 68] Vaccarino found a trend toward greater depressive symptoms in women. [19] Sample sizes in the previous studies were relatively small, ranging from 98 to 381,[19, 66–68] and it may be that the small sample sizes in prior research contribute to the lack of gender differences. This speculation is suggested by the findings from a large study of over 48,000 hospitalized HF patients in which women and whites were more likely to have a history of depression when compared with men and minority groups.[16]

In conducting separate multivariable models for each gender, we demonstrated that there are different models of factors associated with the presence of depressive symptoms in women and men with HF. In both men and women with HF, models that included demographic, clinical, behavioral and psychosocial variables explained about half the variance in depressive symptoms. In both men and women, the addition of psychosocial variables explained the largest amount of variance in depressive symptoms. The strong predictive value of psychosocial variables over clinical and demographic variables has been demonstrated previously.[64, 69] Only perceived control and anxiety were correlates in both men and women. In women, the relationship of anxiety and perceived control to depressive

symptoms was more powerful than similar relationships in men, with depressive symptoms explaining greater than 50% of the model variance in women.

For both men and women with HF, their perceptions of their ability to control their symptoms, illness and lives was an important correlate of depressive symptoms. A sense of control is known to be important in reducing anxiety and depression in patients experiencing cardiac events.[70, 71] This relationship has also been found to be true in many cohorts of cardiac patients, including those recovering from myocardial infarction and coronary artery bypass graft surgery. [64, 72] In randomized trials, where HF patients have been given control of therapeutic strategies such as home-based exercise programs, daily weights and self-management of diuretic therapy, investigators have demonstrated improved outcomes.[38, 73] The finding that perceived control is an important correlate of depressive symptoms has implications for the development of more nursing interventions.

For both men and women in the current study, anxiety was a correlate of depressive symptoms. Anxiety, along with other negative emotions, is known to be predictive of CHD [74] and stroke.[75] Researchers have reported that both men and women who struggle with the emotional and life-altering effects of HF have heightened levels of anxiety. [42] Further, anxiety is highly prevalent in HF patients, with reports as high as 63%, similar to rates in lung disease or cancer. [76] Of note, anxiety at any level in the HF population has negative consequences.[33, 34] The current study confirms the strong association of anxiety and depressive symptoms in both men and women. While an initial study indicated that a stress-management intervention may reduce depressive symptoms, along with other negative physical and emotional symptoms, in HF patients,[77] future studies may need to identify gender-specific interventions to reduce anxiety in men and women with HF in order to positively affect comorbid depression.

In men, depressive symptoms were associated with financial status, functional status (NYHA classification), functional capacity (DASI scores), current health perception, perceived control and anxiety. The NYHA classification provides a measurement of perceptions of disease - related restrictions in physical activity.[78] In this study, NYHA classification contributed independently to the presence of depressive symptoms for men, but not for women with HF. Physical restrictions that affect daily activities have been reported as more bothersome for males which may affect their perception of self-worth.[79] Additionally, it is known that MI patients who have depressive symptoms are less likely to exercise.[80] Further, the relationship between depressive symptoms is believed to be bidirectional, so that both contribute synergistically to a downward spiral characterized by Whooley et al as a “mutually reinforcing” phenomena.[80] It is possible that this “mutually reinforcing” relationship of depressive symptoms and lack of exercise is mediated by other factors, such as increased negative health perceptions and lower levels of perceived control over health, among non-exercisers. Further study is needed to elucidate these relationships in the context of HF and inform targeted interventions aimed at reducing depressive symptoms and increasing exercise in HF patients.

Health perception was a significant predictor of depressive symptoms for men only. A possible explanation for this male-only finding may be that men may place more value than

women on role-related self-worth. They describe the physical limitations, social restrictions in their work and leisure activities caused by HF as hindering them from taking part in activities that had been a natural part of their lives.[81] For men recovering from MI, in particular, functional status appears to have great importance and has been shown to have significant impact on self rating of health.[82] Faced with HF symptoms, men with HF may perceive their health as unrealistically low, underestimate their actual functional potential, and believe that they have lost core social roles as providers. Such negative thinking would be consistent with depressive symptoms.[7] While further study to support our findings is needed, interventions for men with HF that are designed to focus on attaining realistic perceptions of health warrant exploration.

Body mass index was a correlate of depressive symptoms in women with HF only. Weight is an important issue in women that can transcend their feelings about body image and societal expectations.[83] Being overweight or obese may potentially increase feelings of anxiety and low perceived control in women in this study. Primary care providers need to address BMI and develop individualized strategies for weight reduction and management to deter the escalating and detrimental effects of high BMI on depressive symptoms in women. Future studies should include exercise, nutrition and psychological interventions to reduce the incidence and progression of depressive symptoms in women and be longitudinal in design.

Implications for Nursing

Reducing hospital readmissions, morbidity and mortality in HF patients with depressive symptoms should be the goal for optimal outcomes and perhaps men and women need different standards of care.[79] Advanced Practice Nurses (APNs), who possess advanced assessment and disease management skills, are in a unique position to assess and evaluate depressive symptoms in HF patients and to employ educational and counseling programs to reduce depressive symptoms in HF patients. Documentation of mental health screening is essential in HF patients in order for eligible patients to receive necessary mental health treatment.[84] APNs are adept at pulling care teams together to institute patient –centered care, promoting care integration and coordination, and improving access to care. Such activities hold great potential to identify and treat depressive symptoms in men and women with HF. HF patients require a high degree of self-management thus programs focused on increasing autonomy and encouraging patient control in decision making regarding care should be designed. Educating patients and families to identify worsening symptoms and to adjust and revise treatments is an example of increasing control and potentially decreasing hospitalizations and economic burdens on the family and on society.

Previous studies have found little gender difference in predictors of symptoms of depression.[66, 85] Important findings from the present study should be used to develop different management models for men and women. Nursing will play a critical role in adequately identifying and managing HF patients at risk for depression, and decreasing the personal and societal burden of depression in this growing population.

Strengths and Limitations—The strengths of our investigation included a relatively large sample size, multicenter enrollment of subjects, and the availability of a broad spectrum of covariates of interest for multivariable analyses by gender. In most previous studies interpretation of the findings on gender differences has been seriously hampered due to power problems. In addition the number of variables was restricted and inconsistent across designs. Limitations of the current study include a use of a convenience sample, which limits the generalizability. Patients who have depressive symptoms may be less likely to participate in research. Data for the study were collected by self-report questionnaires that may not reflect patients' true feelings. The sample was predominately Caucasian and English-speaking, so caution should be used in generalizing results to those patients who do not speak English and are not Caucasian.

Conclusions

Heart failure is a debilitating and chronic clinical syndrome which is compromised by the presence of depressive symptoms. Studies of correlates of depressive symptoms among patients with HF are important because symptomatic depression is a widespread and debilitating illness. The present study demonstrates that there are differences and commonalities in correlates of depressive symptoms in men and women from a relatively large, heterogeneous sample of patients with HF from diverse parts of the country.

We found distinct differences in demographic, clinical, behavioral and psychosocial predictors of symptoms of depression for men and women. Identification of correlates of depressive symptoms and of gender differences is helpful for the development of gender-based risk profiles, and determination of targets of gender-based interventions to reduce depressive symptoms. In the present study the psychological factors of perceived control and anxiety were independent correlates of depressive symptoms in both men and women. Although anxiety and perceived control were also strong correlates of depressive symptoms for women with HF, they seemed to stem from important relationships rather than physical achievement. Evidence from this study provides justification to support gender specific standards of care [79] and gender specifics treatments and management to address the problem of depressive symptoms, which have been associated with increased use of health care resources and increased costs.[7]

Acknowledgments

Funding: The project described was supported by grant numbers R01 NR008567 and R01 NR009280 from NIH, the National Institute of Nursing Research, and by a Center grant, 1P20NR010679 from NIH, National Institute of Nursing Research. It was also supported by NRSA Clinical Scholars Training in Cardiovascular Science (grant number: T32 HL091812).

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Table 1

Sample Characteristics Compared by Gender and by Depressive Symptom Status

	Male (N=436)		Female (N=186)		
	No Depressive Symptoms	**Depressive Symptoms**	**No Depressive Symptoms**	**Depressive Symptoms**	***p* value**
Demographic Characteristics					
Age (Mean ± SD)	62.49 ± 12.79	57.77 ± 11.53	61.33 ± 13.41	60.60 ± 12.38	.021‡
Ethnicity, N (%)					
African American	43 (14)	22 (18)	35 (29)	14 (22)	NS
Caucasian	265 (85)	102 (82)	82 (68)	48 (74)	
All others	4 (1)	0 (0)	4 (3)	3 (5)	
Marital Status, N (%)					
Single/Divorced/Widowed (compared to married)	101 (32)	51 (41)	81 (67)	37(57)	NS
Years Education, (Mean ± SD)	13.7 ± 3.6	12.0 ± 3.0	13.3 ± 2.9	12.6 ± 2.0	.015‡
Financial Status, N (%)					.001*
Comfortable	117 (38)	34 (28)	37 (37)	12 (19)	
Enough to make ends meet	151 (49)	49 (40)	58 (48)	53 (51)	
Not enough to make ends meet	42 (14)	40 (33)	26 (22)	20 (31)	
Behavioral and Clinical Characteristics					
Exercise (during past week), N (%)					.001 for men; .015 for women**
None	82 (26)	58 (47)	40 (33)	34 (52)	
<30 min per week	42 (14)	22 (18)	21 (17)	12 (19)	
30–60 min per week	49 (16)	13 (11)	26 (22)	6 (9)	
1–3 hours per week	77 (25)	15 (12)	18 (15)	11 (17)	
>3 hours per week	62 (20)	15 (12)	16 (13)	2 (3)	
Smoking, N (%)					NS
Current or quit < 1 year	73 (23)	42 (33)	28 (23)	19 (29)	

	Male (N=436)		Female (N=186)		
	No Depressive Symptoms	**Depressive Symptoms**	**No Depressive Symptoms**	**Depressive Symptoms**	***p* value**
Former quit > 1 year	152 (49)	49 (40)	43 (36)	27 (42)	
Never	87 (28)	33 (27)	50 (41)	19 (29)	
Body Mass Index, (Mean ± SD)	30.27 ± 7.22	29.95 ± 7.40	30.38 ± 8.18	32.34 ± 8.92	NS
Charlson Comorbidity Index Scores (Mean ± SD)	3.27 ± 2.03	3.75 ± 2.33	3.09 ± 1.98	4.34 ± 2.72	.001‡
Etiology, N (%)					.05§
Ischemic	188 (59)	66 (59)	47 (33)	33 (43)	
Non-ischemic (idiopathic, hypertensive, alcoholic)	132 (41)	53 (47)	95 (67)	43 (57)	
NYHA Functional Class, N (%)					.001 for men and women**
I & II	164 (53)	28 (23)	49 (41)	10 (15)	
III & IV	148 (47)	96 (77)	72 (60)	55 (85)	
Functional Capacity (DASI scores) (Mean ± SD)	16.97 ± 14.00	7.00 ± 8.01	12.86 ± 11.56	6.62 ± 7.46	.001 for depressive symptoms; .045 for gender†‡
Psychosocial Characteristics					
Health Perception (now), N (%):					.001**
Excellent	7 (2)	2 (2)	2 (2)	1 (2)	
Very good	40 (13)	4 (3)	16 (13)	2 (3)	
Good	113 (36)	14 (11)	43 (36)	16 (25)	
Fair	105 (34)	58 (47)	43 (36)	16 (25)	
Poor	47 (15)	46 (37)	17 (14)	30 (46)	
Perceived control (CAS total scores), (Mean ± SD)	17.69 ± 5.13	14.09 ± 5.54	16.90 ± 5.82	14.31 ± 6.14	.001‡
Anxiety (BSI scores), (Mean ± SD)	.48 ± .59	1.53 ± 1.09	.61 ± .62	1.58 ± 1.11	.001‡

Notes: CAS=Control Attitudes Scale; BSI= Brief Symptom Inventory; DASI= Duke Activity Status Index; PHQ-9=Patient Health Questionnaire-9;

*Differences by gender and depressive symptoms by chi-square

†Main effect of gender by ANOVA;

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‡Main effect of depressive symptoms by ANOVA

§Differences by gender only using chi-square

**Differences by depressive symptoms only using chi-square

NS= No significant differences

Table 2

Predictors of depressive symptoms in men (N= 436)

Predictor variables	Standardized β*	p-value*
Age	−0.003	0.937
Ethnicity	0.026	0.485
Marital status	−0.013	0.731
Education	−0.022	0.546
Financial status	0.087	0.027
Exercise	−0.065	0.074
Smoking	−0.014	0.709
Body mass index	−0.019	0.603
Charlson Comorbidity Index scores	0.017	0.665
Etiology	0.075	0.061
NYHA class	0.138	0.001
Functional capacity (DASI)	−0.159	<0.001
Health perception	0.086	0.043
Perceived control	−0.120	0.002
Anxiety	0.423	<0.001

Notes: NYHA= New York Heart Association; DASI Duke Activity Status Index;

*Standardized βs and p-values shown are for the final model

Table 3

Predictors of depressive symptoms in women (N= 186)

Predictor variables	Standardized β*	p-value*
Age	−0.003	0.954
Ethnicity	0.084	0.142
Marital status	0.066	0.234
Education	−0.098	0.069
Financial status	0.085	0.119
Exercise	−0.097	0.086
Smoking	−0.022	0.693
Body mass index	0.118	0.037
Charlson Comorbidity Index scores	0.114	0.059
Etiology	0.013	0.830
NYHA class	0.108	0.073
Functional capacity (DASI)	−0.030	0.636
Health perception	−0.001	0.983
Perceived control	−0.147	0.013
Anxiety	0.539	<0.001

Notes: NYHA= New York Heart Association; DASI Duke Activity Status Index;

*Standardized βs and p-values shown are for the final model