Correlates of Depression at Baseline Among African Americans Enrolled in Cardiac Rehabilitation

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Abstract

PURPOSE—To compare baseline psychosocial characteristics of African Americans entering phase 2 cardiac rehabilitation who have depression symptoms at or above threshold (Center for Epidemiological Studies Depression Scale [CES-D] score ≥ 16) with those who do not (CES-D score <16).

METHODS—A nonrandom sample of 112 men and women ($n = 78$ without depression, $n = 34$ with depression) was recruited through local phase 2 cardiac rehabilitation programs. Data were obtained by a structured interview and brief physical examination using several reliable and valid instruments. Chi-square tests, Kruskal-Wallis 2-sample tests, Spearman rank correlation coefficients, and logistic regression models were used for analyses.

RESULTS—We found that 30% of the participants were above the depression symptom threshold. Demographic characteristics were not significantly different between individuals at or above threshold and those below threshold. However, depressed individuals above threshold were more likely to be dissatisfied with their neighborhoods ($P = .01$) and had lower optimism scores ($P < .0001$), higher stress scores ($P < .0001$), lower adaptive coping scores ($P = .05$), and higher problematic coping scores ($P < .01$) than their counterparts who were below threshold. In the logistic regression model, the odds of being above the depression symptom threshold increased with stress ($P < .001$) and decreased with optimism ($P = .03$); none of the other psychosocial characteristics had an independent effect on depression symptoms.

CONCLUSIONS—At baseline, African Americans starting phase 2 cardiac rehabilitation with depression symptoms at or above threshold had more stress and fewer stress resilience factors. Assessing depression and stress resilience factors is important and may lead to more active participation in cardiac rehabilitation once enrolled, as well as optimal cardiovascular health outcomes.

Keywords

African Americans; cardiac rehabilitation; depression; stress

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African Americans are at greater risk for cardiovascular disease and stroke death than whites,[1] have more obesity and lower exercise capacity,[2] suffer premature mortality because of cardiovascular disease,[3] experience heart failure (HF) at an earlier age compared with other racial groups,[4] and demonstrate a higher rate of hospitalization for HF than whites.[3,5] To eliminate these disparities, it is essential that African Americans receive high-quality care, especially in cardiac rehabilitation programs. Secondary prevention programs reduce depression and mortality, increase functional capacity, improve cardiovascular risk factors and quality of life, and decrease hospitalization rates for recurrent cardiac events.[6,7]

Depression symptoms are common in patients with coronary heart disease (CHD) and HF[8–10] and may be a factor underlying cardiovascular health disparity. Individuals with established CHD and depression are 1.9 to 5.5 times more likely to have a subsequent cardiac event than those without depression.[11] Depression among HF patients is associated with increased healthcare usage, as well as a 2-fold risk of death and comorbid clinical events.[9,12] Despite its prognostic importance and prevalence, moderate to severe depression symptoms are sometimes poorly recognized, particularly among minorities; thus, these compelling data provided the rationale for this study.[13]

The theory of stress-induced depression and stress resilience guided our investigation.[14] The theory hypothesizes that the stressors people experience may cause depression.[15] Ongoing stressors, as well as stressful life events such as an acute myocardial infarction or an exacerbation of HF, may be sufficiently disruptive to interfere with maintenance of an optimistic approach to life.[15,16] However, events that precipitate depression in some people may be successfully negotiated by others.[15]

Researchers have described the construct of resilience, which refers to adaptation despite adversity.[17] Individuals with psychosocial resilience factors may be more stress resilient and less likely to develop stress-induced depression. Positive emotions (eg, optimism), pathways to meaning in life (eg, religion or spirituality), social support, and adaptive coping have all been identified as basic psychosocial resilience factors.[14] Recently, neurobiological resistance factors (eg, highly functional dopamine-mediated reward system or a serotonin system that remains in effect during prolonged periods of high stress) have been linked to psychosocial resilience factors.[14] Thus, there is a psychobiologic basis of depression and resilience to stress.

Few investigators have examined factors associated with depression symptoms in African Americans enrolled in exercise-based cardiac rehabilitation programs. Therefore, the purpose of this study was to compare psychosocial stress resilience characteristics between African Americans starting phase 2 cardiac rehabilitation who have depression symptoms at or above the threshold (Center for Epidemiological Studies Depression Scale [CES-D] score ≥ 16) with those who do not (CES-D < 16). We hypothesized that depression symptoms would be (1) positively associated with stress and problematic coping and (2) negatively associated with psychosocial resilience factors, that is, social support, dispositional optimism, adaptive coping, and religiosity.

METHODS

A nonrandom sample of 112 patients was recruited from 5 local phase 2 cardiac rehabilitation programs. Participants were African American individuals older than 18 years, enrolled in cardiac rehabilitation because of a diagnosis of CHD or HF, and who had a support partner who was also willing to participate in the study. Support partners were identified by the patient as providing the most assistance with their disease management. Patients were excluded if they had a diagnosis of New York Heart Association functional

class IV HF, had difficulty understanding or responding to questions, and were unable or unwilling to give consent. The Wayne State University Human Investigation Committee approved the study protocol.

Baseline Assessments

A trained research assistant collected data by structured interview and conducted a brief physical examination in a private room at the Center for Urban and African American Health at Wayne State University. The interview and examination approximated 2 hours. With 1 exception, all data were collected at baseline; because of some missing data, data from the Brief Cope Inventory[18] were collected at either baseline or 6-week follow-up and were used in analyses. Upon examining these data, adaptive coping scores were not significantly different between the 2 time periods, and while there was a small statistical difference between the mean problematic coping scores, the scores were not considered clinically different.

An investigator-developed questionnaire was used to quantify information regarding gender, age, level of education, income, and smoking status. Seated blood pressure (BP) was measured using an auscultatory technique and a calibrated aneroid sphygmomanometer in accordance with JNC-7 guidelines.[19] Height and weight measurements were used to calculate body mass index (kg/m^2), and habitual physical activity was assessed by asking participants how many minutes or hours they spent doing "moderate," "hard," or "very hard" activities on each day of the week. Neighborhood satisfaction was determined by asking participants to report their level of satisfaction with 9 neighborhood characteristics (ie, safety, grocery stores, physical appearance, recreational facilities, streets, lighting, sidewalks, parks, and restaurants) on a scale ranging from 4 (*very satisfied*) to 1 (*very dissatisfied*).

Stress was measured with the 14-item Perceived Stress Scale[20]; Cronbach alpha in this sample was .78. Depression was measured with the CES-D.[21] A cutoff score of 16 or more is suggestive of clinical depression and was used as the threshold score to divide the sample into 2 comparison groups (CES-D score < 16 vs 16). The Cronbach alpha in this sample was .88.

Social support was measured by 2 different approaches. Received health-related support was assessed using a 4-item health-related support scale.[22] Items asked patients to report how often their support partners provided them with information, listened to concerns, provided assistance, and agreed with their decisions relative to their health. Nevertheless, this measure does not reflect all received support, but support from a particular individual. The Cronbach alpha in this sample was .76. Two additional questions were used as indicators of global support. Patients were asked to respond on a 4-point scale ranging from 4 (*strongly agree*) to 1 (*strongly disagree*) about whether there are people they can depend on to help when they really need it and whether they have close relationships that provide them with a sense of emotional security and well-being.[23] Because these items were strongly associated, a single item combining both measures was used in the logistic model.

Optimism was measured by the 12-item Life Orientation Test.[24] The mean score was used for analyses, with higher scores reflecting a greater expectation of optimistic outcomes. The Cronbach alpha for the full scale was .71. The 28-item Brief Cope Inventory[24] was employed to assess coping reactions that individuals may use when faced with stressful situations. Consistent with prior research,[25] coping reactions were organized into 2 subscales: adaptive (active coping, planning, positive reframing, acceptance, humor, religion, using emotional support, using instrumental support, self-distraction, and venting) and problematic (denial, substance use, behavioral disengagement, and self-blame). The

Cronbach alpha for the adaptive scale was .84 and for the problematic scale was .73. An investigatordeveloped question of "how important is religion to you?" was used as an indicator of religiosity. This question had a 3-point scale ranging from 3 (*very important*) to 1 (*not important*).

Analyses

Analyses were conducted using Stata/SE 10.0. Chisquare tests were used to assess the association between CES-D scores and nominal demographic characteristics such as gender and marital status. Kruskal-Wallis 2-sample tests were used to assess the association between CES-D scores and continuous or ordinal characteristics such as age, education, and ordinal psychosocial measures. Spearman's rank correlation coefficient was used to assess the strength of the association between psychosocial measures. Multivariable logistic regression models were fitted to assess the simultaneous association of psychosocial characteristics with CES-D scores. Those psychosocial characteristics with sparse distributions of responses (ie, importance of religion, having someone to depend upon, and having someone to provide emotional support) were dichotomized in the model. A *P* value of < .05 was considered statistically significant.

RESULTS

At baseline, 34 of the 112 participants (30%) had depression symptoms at or above the threshold (CES-D score   16) as compared with 78 (70%) who were below the threshold. There were no statistically significant differences in any of the demographic or health characteristics between these 2 groups (Table 1). The majority of the sample was well educated, married, and not working. Although participants with depression symptoms at or above the threshold had slightly lower incomes, the differences between groups were not significant. Comparable numbers of participants in both groups lived below the poverty level; however, participants with depression symptoms above the threshold were marginally less satisfied with their neighborhoods (*P* = .05).

There were no statistically significant differences between individuals at or above the depression symptom threshold and those below the threshold relative to BP, weight, or exercise habits (Table 2). Overall, BP was controlled and the majority of the sample was obese and sedentary or did not meet contemporary recommendations of 30 or more minutes of moderate intensity physical activity, at least 5 or more days a week.[26]

Individuals with depression symptom scores at or above the threshold had higher stress scores (*P* < .0001), lower optimism scores (*P* < .0001), marginally lower adaptive coping scores (*P* = .05), higher problematic coping scores (*P* < .01), and reported less social support (*P* = .01) than individuals who had depressive symptom scores below the threshold (Table 2). Individuals with depressive symptom scores below the threshold had greater amounts of both health-related and global social support (*P* = .01), were more likely to have friends or family on whom they could depend for help when they really needed it (*P* = .03), and were also more likely to have close relationships that provided a sense of emotional security (*P* = .01) compared with those with depressive symptoms at or above the threshold. Both those who were at or above the depression symptom threshold and those who were below reported that religion was very important to them and the difference was not statistically significant (85% vs 87%, respectively, *P* = .66).

The psychosocial measures were strongly correlated (Table 3). Stress had a strong negative association with optimism (*P* = .0002), a strong positive association with problematic coping (*P* = .007), a negative association with having someone to depend on for help (*P* = .04), a negative association with having someone who provides emotional support (*P* = .007), and a

strong negative association with received social support (P = .001). Optimism was associated with adaptive coping (P = .02); having someone to depend on for help was also associated with adaptive coping (P = .03).

Tables 4 and 5 describe 3 logistic regression models for depression, 1 assessing the simultaneous association of psychosocial characteristics for the overall sample, as well as 1 model for each gender. In the model with psychosocial characteristics for the overall sample (Table 4), the odds of being at or above the depression symptom threshold increased with stress (odds ratio = 1.25, P < .001) and decreased with optimism (odds ratio = 0.13, P = .03). None of the other psychosocial characteristics had an independent effect on depression symptoms, which is not surprising given the strong association of stress with many of the other psychosocial characteristics.

Before analyzing relationships between the multiple psychosocial characteristics and depression symptoms for each gender, univariate gender differences were examined. There were no statistically significant gender differences in either number of depression symptoms (P = .24) or in proportion of individuals at or above the depression symptom threshold (P = .37) (data not displayed). Neither were there gender differences in adaptive coping (P = .16), problematic coping (P = .86), stress (P = .13), optimism (P = .99), having someone to depend upon for help (P = .72), or having a close relationship that provides emotional support (P = .49) (data not displayed). Women were more likely to state that religion was important (P = .02) and to report less received social support (P = .006) (data not displayed). In the separate multivariable logistic models for men and women (Table 5), only stress was a statistically significant predictor of being above the depression symptom threshold for men (OR = 1.22, P = .02) and for women (OR = 1.30, P = .002). Optimism was not a statistically significant predictor of depression symptoms in either model.

DISCUSSION

Our study was conducted to compare baseline psychosocial stress resilience characteristics between African Americans starting phase 2 cardiac rehabilitation who have depression symptoms at or above the threshold (CES-D score   16) with those who do not (CES-D < 16). Prevalence of depression symptoms, as defined by the CES-D threshold of 16 or more, was 30%, similar to what has been previously reported for whites.[27] The substantial proportion of individuals with depression symptoms above the threshold highlights the importance of routinely assessing for depression because patients with more depression symptoms have higher mortality rates and are less likely to adhere to recommended behavior and lifestyle changes intended to reduce risk of subsequent cardiac events.[28,29]

We hypothesized that depression symptoms would be (1) positively associated with stress and problematic coping and (2) negatively associated with psychosocial resilience factors, that is, social support, dispositional optimism, adaptive coping, and religiosity. With the exception of religiosity, the univariate analyses supported both hypotheses and are consistent with the depression and stress resilience theory. This suggests that evaluating sources of stress, the relevance of stress, and strategies for managing stress may be useful. Investigators have found that including stress management or cognitive behavioral stress-management sessions focused on cognitive restructuring, identifying sources of stress, and using problem-focused rather than emotion-focused coping strategies, in addition to including exercise, relaxation training, or secondary prevention recommendations within cardiac rehabilitation, facilitates decreases in depression.[27,30–33] However, other studies suggest that rehabilitation programs that include psychological therapy, counseling, relaxation training, and stress management have no effect on depression.[34] Therefore, future research should determine the best way to address stress and depression as part of cardiac

rehabilitation services, especially services directed to African Americans. Strategies that are effective in 1 segment of the population may not be either feasible or applicable to other segments of the population. Ethnic minority groups may be less likely than the white middle class to seek professional treatment of depression, with the former conceptualizing depression symptoms as social problems and the later viewing depression as a medical condition requiring professional treatment.[35]

Our findings also suggest that attention to the need for social support, enhancement of social support, and cognitive interventions that promote optimistic thinking and modify pessimistic thoughts may reduce stress and thus depression symptoms. However, such interventions should be evaluated in future research. The only hypothesized stress resilience factor not related to depression symptoms was religiosity, which may indicate a weakness in our 1-item measure, that is, how important is religion to you? Finally, our multiple logis tic model suggests that even when controlling for other psychosocial factors, stress remains strongly associated with a greater number of depression symptoms.

In contrast to other studies that have shown that women experience greater depression symptoms than men,[36–38] there were no gender differences in our sample. According to the depression and stress resilience theory, if women were to have more symptoms of depression, they would likely have fewer stress resilience factors. This was not the case in our study. There were no gender differences in adaptive or problematic coping, stress, or optimism.

There were no significant differences in any of the demographic characteristics with the exception of neighborhood satisfaction. Participants with depression symptoms were significantly less satisfied with their neighborhood environment, that is, less satisfied with the safety, availability of grocery stores, physical appearance, recreational facilities, streets, lighting, sidewalks, parks, and restaurants, than participants without depression symptoms. Depression symptoms may sensitize individuals to the negative aspects of their environment.

We recognize several limitations to our study design and methodology. First, causal inference cannot be implied because our analyses were based on cross-sectional data. Additionally, our sample was conveniently selected and restricted to African Americans, limiting the generalizability of our results. Finally, our cohort of patients with depression symptoms at or above the threshold ($n = 34$) was relatively small.

In conclusion, other investigators have reported that participation in cardiac rehabilitation results in similarly positive outcomes across racial and ethnic minority groups.[39] Thus, it is important to optimize cardiac rehabilitation participation among African Americans by assessing depression and stress resilience factors at baseline. Such assessments may lead to more active participation in cardiac rehabilitation once enrolled, as well as optimal cardiovascular health outcomes.

Acknowledgments

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Table 1

Baseline Demographic Characteristics of Sample (*N* = 112)

Characteristic	Median (IQR) (*n* = 34)	Median (IQR) (*n* = 78)	*P*
Age	55.0 (52.0, 68.0)	61.0 (53.0, 68.0)	.39
	Number with depressive symptoms (%)	**Number with depressive symptoms (%)**	
Gender			
Male	13 (38)	37 (45)	.37
Female	21 (62)	41 (53)	
Education			
8th grade or less	1 (3)	1 (1)	.16
Some high school	3 (9)	7 (9)	
High school/general educational development	2 (6)	18 (23)	
Some college	18 (53)	24 (31)	
Associate degree	5 (15)	7 (9)	
Bachelor's degree	2 (6)	11 (14)	
Master's degree	3 (9)	5 (6)	
Doctorate degree	0 (0)	3 (4)	
Other	0 (0)	2 (3)	
Marital status			
Married	18 (53)	47 (60)	.96
Widowed	6 (18)	11 (14)	
Separated	1 (3)	2 (3)	
Divorced	7 (21)	12 (15)	
Never married	1 (3)	4 (5)	
Nonmarital union	1 (3)	2 (3)	
Currently working?			
Yes	10 (29)	17 (22)	.41
No	24 (71)	60 (77)	
Household income	$35–$39.9	$40–$44.9	.70
(in $1,000s)	($20–$99.9)	($15–$99.9)	
Neighborhood SES—% in census track below poverty level	18.9 (11.3, 29.1)	17.7 (9.7, 26.6)	.63
Neighborhood satisfaction	2.5 (2.2, 3.0)	2.8 (2.4, 3.0)	.05

Abbreviations: IQR, interquartile range; SES, socioeconomic status.

Table 2

Baseline Health, Social, Personality, and Psychological Characteristics of the Sample ($N = 112$)

Characteristic	Median (IQR) ($n = 34$)	Median (IQR) ($n = 78$)	P
Blood pressure, mm Hg			
Systolic	127 (113, 139)	125 (112, 135)	.47
Diastolic	73 (68, 82)	74 (67, 82)	.85
BMI, kg/m^2	33 (27, 39)	33 (26, 38)	.98
	Number (%) with depressive symptoms	**Number (%) without depressive symptoms**	
Physical activity (>30 min/d, d/wk)			
Yes	16 (47)	41 (53)	
No	18 (53)	37 (47)	.59
Currently smoking[a]			
Yes	5 (15)	5 (7)	.25
No	29 (85)	62 (93)	
Stress (large values, high stress)	28.5 (24.0, 33.0)	19.0 (14.0, 23.0)	<.0001
Depression	25 (20.0, 27.0)	6 (4.0, 10.0)	
Social support			
Health-related received	10.0 (7.0, 12.0)	12.0 (9.0, 14.0)	.01
People to depend on for help			
Disagree/strongly disagree	6 (18)	4 (5)	.03
Agree/strongly agree	28 (82)	74 (95)	
Close relationships to provide emotional security			
Disagree/strongly disagree	6 (18)	3 (4)	.01
Agree/strongly agree	28 (82)	75 (96)	
Has both people to depend on for help and close relationships that provide emotional security			
Disagree/strongly disagree	25 (74)	72 (92)	.01
Agree/strongly agree	9 (26)	6 (8)	
Dispositional optimism	2.7 (2.5, 3.0)	3.1 (2.8, 3.3)	<.0001
Coping			
Adaptive	1.7 (1.5, 2.1)	2.0 (1.6, 2.3)	.05
Problematic	0.9 (0.5, 1.2)	0.6 (0.4, 1.0)	.01
Religiosity (How important is religion to you?)			
Not/somewhat	5 (15)	9 (12)	.66
Very	29 (85)	68 (87)	

Abbreviations: BMI, body mass index; IQR, interquartile range.

[a]11 patients without depressive symptoms had missing data.

Table 3

Baseline Correlation Matrix Between Psychosocial Measures ($N = 112$)[a]

	1	2	3	4	5	6	7	8
1. Stress	1.00							
2. Optimism	−0.34 (.0002)	1.00						
3. Adaptive coping	−0.11 (.27)	0.22 (.02)	1.00					
4. Problematic coping	0.26 (.007)	−0.18 (.07)	0.32 (.0006)	1.00				
5. Religiosity	0.04 (65)	0.03 (.74)	0.11 (.24)	−0.05 (.61)	1.00			
6. Social support—someone to depend on for help	−0.20 (.04)	0.03 (.72)	0.21 (.03)	−.07 (.44)	0.16 (.09)	1.00		
7. Social support—have a relationship that provides emotional support	−0.26 (.007)	0.20 (.04)	0.15 (.10)	−0.05 (.59)	−0.02 (.87)	0.37 (.0001)	1.00	
8. Health-related received support	−0.31(.001)	0.18 (.06)	0.06 (.56)	−0.21 (.03)	0.12 (.21)	0.27 (.004)	0.12 (.20)	1.00

[a]P values are in parentheses.

Table 4

Multiple Logistic Regression Model for Depression With other Psychosocial Characteristics: Baseline Data (*N* = 112)

	Overall		
	OR	**95% CI**	***P***
Adaptive coping	0.52	0.17, 1.63	.26
Problematic coping	1.83	0.44, 7.56	.41
Stress	1.25	1.12, 1.39	<.001
Optimism	0.13	0.02, 0.81	.03
People to depend on and close relationships	0.61	0.14, 2.74	.52
Importance of religion	1.48	0.23, 9.60	.68
Social support received	0.93	0.80, 1.09	.39

Abbreviations: CI, confidence interval; OR, odds ratio.

Table 5

Multiple Logistic Regression Models By Gender: Baseline Data (n = 62 Women and 50 Men)

	Men			Women		
	OR	95% CI	*P*	OR	95% CI	*P*
Adaptive coping	0.72	0.12, 4.24	.71	0.25	0.04, 1.55	.14
Problematic coping	0.54	0.05, 6.36	.63	3.35	0.41, 27.22	.26
Stress	1.22	1.04, 1.43	.02	1.30	1.10, 1.53	<.001
Optimism	0.10	0.00, 3.56	.21	0.12	0.01, 1.41	.09
People to depend on and close relationships	0.63	0.06, 6.79	.70	0.36	0.04, 3.47	.38
Importance of religion	7.72	0.33, 178.69	.20	0.24	0.01, 4.85	.35
Social support received	0.77	0.55, 1.08	.13	0.98	0.79, 1.22	.87

Abbreviations: CI, confidence interval; OR, odds ratio.