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Social Network and Health Outcomes among African American Cardiac Rehabilitation Patients

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Abstract

Objective—To test the hypotheses that the number of close social network members and health-related support provided by social network members is predictive of coping efficacy and health behaviors.

Methods—Cross-sectional data were collected from 115 African Americans enrolled in cardiac rehabilitation. Measures included Social Convoy Model, SF-36, Social Interaction Questionnaire, the Patient Self-Efficacy Questionnaire and an investigator developed assessment of health behaviors.

Results—Bivariate relationships were found between the number of inner network members and coping efficacy ($r=.19$, $p<.05$) health behaviors ($r=.18$, $p<.06$) and between health related support and coping efficacy ($r=.22$, $p.05$) and health behaviors ($r=.28$, $p<.001$). Regression analyses support the hypotheses that close network members predicted better coping efficacy ($\beta=.18$, $p<.05$) and health behaviors ($\beta=.19$, $p<.05$). Health-related support also predicted coping efficacy ($\beta=.23$, $p<.05$) and health behaviors ($\beta=.30$, $p<.01$).

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Conclusion—African Americans with larger inner networks have more health support, better health behaviors and higher coping efficacy. The number of close social network members and related health support promote health through health behaviors and coping efficacy.

Decades of research about social networks have made it abundantly clear that strong social networks are important for health and well-being via the social support that ensues.^{1,2,3,4} Social networks are defined by Kahn and Antonucci³ as a network of family and friends who provide support to an individual. The early work of Berkman and Syme¹ on social networks and its predictive value on mortality has been replicated and extended so that researchers now understand that the social value of others translates into psychological and physical health.^{5,6,7,8} However, less research has focused on the pathways that connect social networks and better health. The goal of the current study was to determine whether social network size and related support provision influenced the health behaviors and coping efficacy in a sample of African American cardiac rehabilitation patients.

Social Networks and Cardiovascular Disease

The health benefits of social networks are particularly important for patients with cardiovascular disease (CVD). Social isolation and the stress that results are considered to be especially harmful for patients with CVD as they increase the likelihood for depressive symptoms and hinder health behavior modifications.⁹

Conversely, supportive behaviors from social network members are helpful and promote health and well being among patients with CVD.^{10, 11} For example, research by Lett et al.¹⁰ found that the social support provided by social network members was associated with better psychological well-being for non-depressed patients with coronary heart disease. Similarly, Rutledge and colleagues¹¹ identified social network size as a predictor of strokes among women with CVD, women with smaller social networks were more likely to have a stroke over a median 5.9 years follow up.

There is very little research on the behavioral pathways that explains the health benefits of social networks and the health support that is provided. Recent research by Molloy, Perkins-Porras, Strike, and Steptoe¹² found that cardiac rehabilitation patients with larger social networks had better attendance at prescribed rehabilitation sessions. However, there is still much unknown about the mechanisms in which social networks promote health, particularly among patients with CVD.

Health Behaviors and Coping Efficacy

Adherence with medical recommendations is difficult for many people.¹³ This is especially true for the healthy lifestyle changes that patients must make to maintain health and well-being after a cardiac event.¹⁴ The ability to maintain recommended health behaviors is often thought to occur through an individual's coping efficacy. Coping efficacy demonstrates the self-efficacy of an individual as he or she deals with health behavior modifications. Coping efficacy specifically reflects the individual's ability to deal with the current stressful situation and adherence with the recommended lifestyle modifications.¹⁵ Supportive behaviors from close social network members are an integral influence on efficacy and adherence.^{16, 17, 18} Patient coping efficacy is vital to the health, well-being, and mortality of patients with heart disease.¹⁸ In a study of cardiac rehabilitation patients, Woodgate, Brawley, and Shields¹⁹ found that social support was associated with patients' self-efficacy in cardiac rehabilitation activities, thus influencing patient's compliance with proper cardiac rehabilitation maintenance.

There is also limited research on the specific role of social networks play in helping individuals lead a healthy lifestyle. However, the research on the relationship between social support and adherence with leading a healthy lifestyle provides a basis for which to understand the contributions of social networks on health behaviors.^{20, 21, 22} For example, in a study of 373 men and women, Jackson²¹ found that social support, depressive symptoms, and daily hassles were significant predictors of health behaviors among women. Specifically, greater levels of social support from close family and friends (e.g. close network members) positively predicted healthier diets, greater levels of exercise, less substance abuse and greater adherence with medical treatment for the women in this study. It is not clear why men's health behaviors were not affected, but the findings suggest that gender, social support, and health behaviors be examined further. Although, this study did not specifically measure social networks, its relationship between the support provided by close friends and family and health provide a strong link between the positive benefits that may ensue.

The Social Networks of African Americans

The social networks of African Americans are considered to be smaller than those of Caucasians.^{23, 24} However, some research has found these networks to be highly supportive.^{23, 25} For example, Ajrouch et al.²³ found that although African Americans had smaller networks than Caucasians, they had more frequent contact with their close network members than Caucasians did. Therefore, the influence of these network members should have a vital impact on one's health and well-being.

Theoretical Framework

The theoretical framework for this study is the social convoy model³ which stems from a lifespan perspective of attachment theory.²⁶ According the convoy model, individuals move through life surrounded by people to whom they feel emotionally close.²⁷ Although some people may stay within an individual's convoy throughout the life course, others may disappear or reenter the convoy at later phases, depending, on an individual's needs and goals. The convoy model provides a visual representation of how close the individual's' network members are and what they provide in terms of social support. Social networks are characterized as having inner, middle and outer circles. The inner circle is made up of individuals to whom the person feels close, so close it would be hard to imagine life without them. The middle circle contains persons to whom the individual feels close to but not quite as close as those in the inner circle. The outer circle contains person to whom the individual feels less close to, but still are important. Kahn and Antonucci³ posited that the inner network members provide social support to an individual. Inner network members are therefore seen as attachment figures in one's life. Therefore, the support that one receives from their close network members provides the psychological and physiological health benefits similar to those of secure attachment behaviors.^{28, 26}

Aims and Hypotheses

The goal of the current study is to determine if social network support and size of the inner network members will influence health behaviors such as weight management, diet, smoking and exercise, and coping efficacy in sample of patients enrolled in cardiac rehabilitation. Social networks encompass many individuals within a person's social structure. However, more connected individuals are considered to have more health benefits.⁸ Closer network members are thought to be close attachment figures.^{3, 29} Therefore, we hypothesized that the number of close (ie. inner circle) network members will positively predict health behaviors and coping efficacy. Additionally, health related support from the closest social network members will positively predict health behaviors and coping efficacy.

Method

Design, Setting and Sample

The current study is a secondary analysis using baseline data from a larger randomized intervention trial designed to evaluate the effectiveness of a social support intervention on health outcome for African Americans enrolled in phase II cardiac rehabilitation. Participants were recruited from 5 local cardiac rehabilitation programs.

Procedure

Trained research assistants collected data by structured interviews in a private location convenient for participants. All participants were compensated \$15 for the interview which lasted about an hour. Data were collected at baseline (about a month after beginning cardiac rehabilitation) except the social network convoy data, which were collected at the 3-month follow up. The current study was approved by the Institute Review Board at Wayne State University.

Measures

Social network and social network health support—Social network data were collected using the Social Convoy Model questionnaire.³ Participants were provided with three concentric circles and asked to place the initials of their social network members in inner, middle or outer circles depending on how close they feel to that individual. Closest members of the social network are placed in the inner-most circle of the convoy. The focus of this study was the relationship between health behaviors and coping efficacy and the size and support generated from inner network members. Inner circle members were summed to create the variable of “close social network support”.

After naming the social network members, participants were asked a series of questions about 10 of their closest members. These questions included age, sex, proximity and health-related support. This study did not include questions relating to relationship to the network members or frequency of contact with the network members. Participants were asked if they talk with this person about their health (“yes” or “no”). All “yes” responses were added to create a sum of “health-related support” from close social network members. Responses could range then from 0-10 with high numbers indicating more health-related support.

The social convoy questionnaire is considered to be a valid measure.^{5, 30} Previous research examining the social networks of African American participants has used the social convoy measure and has demonstrated its use as well.^{23, 25}

Health behaviors—The health behaviors of interest in this study included healthy eating, weight management, smoking and physical activity. Items from two sets of questions (Table 2) were used to create a health behavior score. All questions were grounded in the transtheoretical model of behavior change and addressed participant's stage of readiness for change. Participants were asked to respond yes or no to 4 questions about weight management. “Yes” items were scored as 1 and “no” items were scored as 0. For the remaining 4 health behavior scale items participants answered questions about frequency of smoking, healthy eating, physical activity and regular exercise. Participants who responded; *yes, more than six months* or *yes, less than six months* were categorized as “active”. Participants who responded; *no, but intend to in 30 days*, *no, but intend to in six months*, and *no, do not intend to in six months* were categorized as “inactive”. Participants who were non-smokers were placed in the “active” group for that item. “Active” responses were scored as 1 and “inactive” responses were scored as 0. Responses from all questions were summed to create an overall health behavior score, with possible scores ranging from 0-8;

higher scores indicated healthier behaviors. Other investigators evaluating participant's readiness to engage in health behaviors have used similar coding and scoring strategies.³¹

Patient coping efficacy—Patient coping efficacy was assessed with the 10-item Coyne and Smith¹⁶ Patient Self-Efficacy questionnaire. This measure was specifically designed to evaluate coping efficacy among patients recovering from a cardiac event. Participants were asked about their ability to cope with 10 items related to their heart event-related recovery including making healthy lifestyle changes, taking care of his or her health and stress on a scale of 1 (not at all) to 7 (very much so). Although the original instrument contained 10-items, we eliminated the item related to smoking as the baseline rate of smoking was very low in our sample (about 10%). Smoking was not ignored in this study as it was calculated in the health behavior variable. The 9 items were then summed to create a total score of coping efficacy ranging from 9 to 63 with higher numbers indicating better coping efficacy. Cronbach's alpha for this measure was .84. Previous research examining coping efficacy in cardiac patients using this instrument have included African American participants demonstrating its use in this population.¹⁸

Demographic variables—An investigator-developed questionnaire was used to collect data about age, gender, education and income.³²

Mental and physical well-being—Mental and physical well-being was assessed by the SF-36 mental and physical subscales.³³ The SF-36 is a generic health survey that contains 36 questions. The survey contains 8 dimension including physical functioning (PF); role physical (RP); bodily pain (BP); general health (GH); vitality (VT); social functioning (SF); role emotional (RE); and mental health (MH). The eight scales form two distinct higher-ordered clusters: physical and mental health. Participants are asked to respond about how they have been feeling over the last 4 weeks relative to each survey item. Items scores are summed to composite scores ranging from 0-100, higher numbers indicate health and well being. Cronbach's alpha for patient mental subscale was .90 and for patient physical subscale was .88.

Data Analysis

Data analyses were conducted using SPSS version 17.0. The significance level was set at .05. Descriptive statistics were used to assess all study variables. Pearson's correlation coefficients were used to examine the bivariate relationships between the independent and dependent variables. Stepwise hierarchical linear regressions were used to evaluate the hypotheses of the number of inner network members predicting healthier behaviors and coping efficacy and health related support predicting healthier behaviors and coping efficacy.

Results

Description of Sample

There were 115 patients in the sample; demographic characteristics are provided in Table 1. There was no age difference between those that completed the social network data and those that did not ($p = .19$). Participants reported a mean of 14.2 members in their combined inner, middle and outer circles, with a range of 1-63. Most participants had networks ranging from 1 to 30. As reported in Table 1, the number of inner circle network members ranged between 1-20, the number of middle circle ranged from 0-21 and the number of outer circle ranged from 0-26. No significant relationships were found between the middle and outer circles and the variables of interest in this study. Since we were interested in the presence of close

supportive relationships (as described by Kahn & Antonucci³), only the inner circle network members were used for all regression analyses.

There were numerous cardiovascular disease diagnoses represented in the sample. For the purpose of reporting, diagnoses were coded into six categories, congestive heart failure (n=16, 14%), myocardial infarction (n=34, 30%), stent placement (n=23, 20%), CABG surgery (n=22, 19%), angina (n=14, 12%) and other (n=4, 4%). The primary diagnosis for one participant was missing. Analysis of variance was run with these six groups on the two dependent variables. No significant mean level differences were found between the six diagnosis groups on health behaviors and patient coping efficacy.

Mean scores for the major study variables are provided in Table 1. The mean score for the SF-36 physical health scale was 33.81 and 51.88 for the mental health score. These mean SF-36 scores are lower than SF-36 norms established in a sample of outpatients who had recent myocardial infarction (mean age=58 years), i.e., 63.26 for the combined physical health subscales and 72.90 for the combined mental health subscales.³³ In addition, as can be seen in Table 1, coping efficacy appeared high in this sample with a mean score of 54.10. Frequencies for each health behavior item can be seen in Table 2.

Bivariate Relationships Among Major Study Variables

As can be seen in Table 3, a positive bivariate relationship was found between the number of inner network members and coping efficacy ($p < .05$) and a near significant positive relationship was found between the number of inner network members and health behaviors ($p < .06$). Similarly, health support from the inner network members was positively and significantly related to coping efficacy ($p < .01$) and health behaviors ($p < .05$). There was a strong relationship between the number of inner network members and health support from the inner network members ($r = .79, p < .001$), therefore two regressions were computed, one with the number of inner network members as an independent variable and the other with health support as an independent variable (Tables 4 and 5).

Regression Analyses Evaluating Hypotheses

The first goal was to determine if the inner network size predicted health behaviors and patient coping efficacy. As can be seen in Tables 4 and 5, separate hierarchical linear regressions were run for each of the dependent variables. Due to missing data 3 participants were deleted from the health behavior analysis (N=112) and 6 participants were deleted from the coping efficacy analysis. As hypothesized, after controlling for age, gender, mental health, and physical health, the number of inner social network members significantly positively predicted healthy behaviors and patient coping efficacy (Table 4). Larger inner networks were positively associated with better health behaviors and better coping efficacy. Similarly, health support of network members also predicted health behaviors and patient coping efficacy (Table 5). Not surprisingly patient mental and physical health also predicted coping efficacy. Interestingly, gender and age predicted health behaviors in both sets of regression. Meaning, that females had better health behaviors than males and younger participants had better health behaviors than older participants.

Discussion

The goal of this study was to determine if the number of close network members and health support provided by those close members predicted better health behaviors and coping efficacy. Participants with larger inner circle networks had more health support, better health behaviors, were able to cope better with recovery and had better mental health.

The data demonstrated that social networks and the health support that they provide promote health via health behaviors and coping efficacy. On the bivariate level, the relationship between the number of inner network members and health behaviors was marginal. In addition, the relationships of gender with health behaviors and coping efficacy were also marginal and the relationship of age and health behaviors and coping efficacy were not significant. The lack of significance in these relationships was assumed to be caused by the sample size and age variability. With a larger sample these correlations may have been significant. Therefore, it was not surprising that when examining these relationships on the multivariate level they became significant.

Previous research has found that the relationship between social networks and health exists especially among patients with cardiovascular disease.^{10, 11} The current study had similar findings. The number of inner circle members and the total number of network members were positively related to patients' mental health and the number of inner circle members was marginally positively related to patients' physical health. However, this study extended previous research by providing important behavioral and psychosocial mechanisms through which social networks may have protective effects on health. The number of inner circle members was predictive of better health behaviors and greater coping efficacy. Better health behaviors and greater coping efficacy will result in better health, especially after a cardiac event. Similarly, more health support from close network members was also positively related to better health behaviors and better coping efficacy. These findings provide a different pathway between social networks and better health than found in previous literature. Research discussed earlier had found that lower levels of social support provided by the network members were related to greater likelihood of depression and strokes.^{10, 11} The findings of the present study highlight the importance of assessing both the social network size as well as the support received from the network as it may be of great importance in the physical and psychological recovery after a cardiac event. Individuals with small networks or lower support may need added assistance or referral to community resources. Although previous literature discussed the smaller networks of African Americans as being sufficient,^{23, 24} neither of these studies examined these differences after a cardiac event. After a major medical event, such as the case in this study, network size is of great importance.

The multivariate analyses provided further insight into the relationships that predict health behaviors. The relationship between gender and health behaviors was an unexpected finding that was not part of the original hypothesis. Previous literature on gender differences in health behaviors had been mixed, with some researchers finding support for females reporting better health behaviors and some reporting this relationship for males.^{34, 35, 36} In a large sample of older adults, Gallant and Dorn³⁵ found that social network characteristics (e.g. social support from the social network members) influenced positive health behaviors for the women in the study. Women in this study reported less smoking and alcohol consumption than men did. The social support literature has often found gender differences in social support, with women reporting receiving and providing more support.^{37, 38, 39} The current study did not examine these relationships but this may partially explain the relationship of females and health behaviors. Perhaps, in the larger context of support exchanges, women are receiving more support from their networks and therefore better health behaviors ensue.

Females reporting better health behaviors were also found by Jackson;²¹ the author attributes gender differences in health behaviors to a combination of societal norms and women's greater willingness to seek and comply with medical recommendations. However, the study by Jackson²¹ was not among CVD patients and the health behaviors included drinking and substance abuse, not measured in this study. Therefore, the findings by

Jackson,²¹ based on a different study population, may not be fully applicable to the sample in the current study. In addition, Jackson²¹ found the opposite relationship between age and health behaviors with younger adults reporting worse health behaviors than older adults. Again, this may reflect the population and the variables measured.

Younger patients in this study also reported better health behaviors than older adults. This finding is easier to explain as younger adults are often more adaptable to change in diet and smoking and may find it easier to achieve physical activity and regular exercise than older adults do. Previous literature has shown that physical activity and aerobic exercise capacity decrease with age.^{40, 41} In a longitudinal study Fleg et al⁴⁰ found that rates of physical activity significantly decline as individuals' age. Therefore, this study's findings on younger adults reporting better health behaviors, a measure which included multiple questions on physical activity and exercise, may reflect this age difference. Further, the study by Fleg et al⁴⁰ also found that although both men and women showed this decline, men showed a larger decline.

This study has multiple implications for cardiac rehabilitation patient care. Patients with smaller support systems may be at a higher risk for a poorer recovery after a cardiac event than those with larger support systems. Therefore, it will be of great importance for nursing and rehabilitation staff to identify those who may have these smaller or weaker support systems as to better aid in the recovery of the cardiac event. The gender differences found in this study, with women reporting better health behaviors, also brings into question the likelihood that male patients may not be asking for or receiving the help that they need. Therefore, clinical staff should pay close attention to the needs of male patients. In addition, nursing and rehabilitation staff may serve as an alternative support system for cardiac rehabilitation patients and their families as patients face the long road of recovery and must maintain a healthier lifestyle.

Clinicians and researchers have understood that support from family members is important to recovery. However, the extent to which close network members actually promote health via health behaviors and efficacy had not been fully recognized. The current study underscores the importance of including both the patient and the close social network members in cardiac rehabilitation classes as these network members contribute to the patients health behaviors and psychological well-being after a cardiac event.

This study extends knowledge about the benefits of social networks among African Americans^{23, 24} and emphasizes the important influence that social networks may have on health behaviors and coping efficacy among African Americans enrolled in cardiac rehabilitation. In order to eliminate the treatment and mortality disparities that exists between African Americans and Caucasians with cardiovascular disease, there is a need to further our understanding of the psychosocial factors that contribute to disease self-management and coping following a cardiac event.

Limitations

The study was limited in that it was cross-sectional data. The participants were interviewed shortly after their cardiac event therefore it is possible that as time went on changes in network size and network health support changed, as did their effects. The patients also varied as to when they started cardiac rehabilitation and so it is unknown how that may have affected the variables of interest. In addition, the sample size was small for this study as not all of the participants completed this measure. Therefore a representative picture of the network characteristics of the larger sample was not available. In addition, a larger sample may provide a clearer understanding of the contributions of social networks and health. Another limitation was that, although significant, the total variance accounted for was small.

Therefore, it is likely that other variables not measured are also contributing to health behaviors and coping efficacy. The goal of this study was to demonstrate the importance of social networks in supporting health behaviors and coping efficacy, not to determine every contributing variable. Thus, this study extended the research on the relationships between social networks and health behaviors and provided further evidence that close network members are beneficial for health and well-being.

Future Directions

The current study elucidates the relationship between social networks, social support, coping efficacy and health outcomes. Future research should examine the longitudinal effects on social networks on patients with CVD as they learn to live with their disease and manage their lifestyle as it relates to their health.

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Table 1
Demographic variables and means of study variables (N=115)

	Mean/Frequency	Range
Patient age	60.49 (11.18)	31-85
% married	58%	
% female	54%	
% ≥ High school	70%	
Circle count	14.22 (9.29)	1-63
Inner circle	7.04 (3.87)	1 -20
Middle circle	4.35 (3.71)	0-21
Outer circle	3.04 (4.22)	0-26
Health support *	5.55 (2.77)	1-10
Healthier behaviors *	4.68 (1.72)	0-7
Patient coping efficacy *	54.05 (7.50)	28-63
SF-36 mental health *	51.88 (10.56)	19-65
SF-36 physical health *	33.81 (10.55)	15-56

* Higher scores indicate better

Table 2
Frequency of Health Behaviors

<u>Health Behavior</u>	Yes
1. In the past month have you been actively trying to lose weight?	63 (55%)
2. In the past month, have you been actively trying to keep from gaining weight?	80 (70%)
3. Are you seriously considering trying to lose weight to reach your goal in the next six months?	73 (64%)
4. Have you maintained your desired weight for more than six months?	44 (38%)
5. Do you regularly eat five servings of fruit and vegetables each day?	30 (26%)
6. Have you quit smoking (or non smoker)?	104 (90%)
7. Do you engage in moderate physical activity?	66 (57%)
8. Do you engage in and regular exercise?	78 (68%)

Table 3

Correlations of Study Variables

	1	2	3	4	5	6	7	8
1. Age	--							
2. Inner Circle	-.09	--						
3. Total Network	-.09	.68**	--					
4. Health Support	-.03	.79**	.45**	--				
5. Healthier Behaviors	-.15	.18 ^a	.11	.28**	--			
6. Coping Efficacy	-.09	.19*	.21*	.22*	.10	--		
7. SF-36 mental	.16	.21*	.19*	.16	.08	.30**	--	
8. SF-36 Physical	-.06	-.17	-.11	-.13	.12	.24*	-.09	--

^ap < .10.

* p < .05.

** p < .001

Table 4

Regression analyses of the number of close social network members predicting healthier behaviors and patient coping efficacy.

Variable	Healthier behaviors (N=112) β	Patient coping efficacy (N=109) β
Step 1		
Sex	.23 [*]	-.07
Age	-.18 [*]	-.13
SF-36 mental	.13	.34 ^{**}
SF-36 physical	.18	.25 ^{**}
ΔR^2	.09 [*]	.19 ^{**}
Step 2		
Close social network members	.19 [*]	.18 [*]
ΔR^2	.03 [*]	.03 [*]
Total R^2	.13	.22

*
p<.05.

**
p<.01

Table 5

Regression analyses of the number of close social network health support predicting healthier behaviors and patient coping efficacy.

Variable	Healthier behaviors (N=112) β	Patient coping efficacy (N=109) β
Step 1		
Sex	.23 [*]	-.07
Age	-.18 [*]	-.13
SF-36 mental	.13	.34 ^{**}
SF-36 physical	.18	.25 ^{**}
ΔR^2	.09 [*]	.19 ^{**}
Step 2		
Social network health support	.30 ^{**}	.23 ^{**}
ΔR^2	.09 ^{**}	.05 [*]
Total R^2	.18	.24

*
p<.05.

**
p<.01.