Social Support and Religiosity as Coping Strategies for Anxiety in Hospitalized Cardiac Patients

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ABSTRACT

Background: Prospective studies have demonstrated that anxiety is associated with an increased risk of mortality and sudden cardiac death. There is therefore a need to understand what factors contribute to anxiety in patients with coronary heart disease (CHD). Purpose: This study examined whether social support and religiosity are individually or jointly associated with lower anxiety in cardiac patients. Methods: Anxiety, perceived social support, and religiosity were assessed in 228 (71% male, 29% female) hospitalized CHD patients aged 62 ± 11 years. Results: Higher levels of social support were related to lower levels of state and trait anxiety (state anxiety, r = −.26, p < .01; trait anxiety, r = −.30, p < .01;). Religiosity was related to lower state anxiety (r = −.27, p < .01) but only modestly related to lower trait anxiety (trait anxiety, r = −.18, p < .01). The relationship between religiosity and trait anxiety was no longer significant after controlling for social support (p = .26). Conclusions: These findings suggest that religiosity and social support provide a buffer against anxiety in CHD patients and that higher levels of social support may account for the relationship between religiosity and trait anxiety. These findings underscore the importance of social support and religiosity as buffers against distress, with possible implications for prognosis in a patient group where high levels of anxiety appear to confer increased risk of mortality.

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INTRODUCTION

Epidemiological studies have shown that symptoms of anxiety are predictive of subsequent fatal coronary heart disease

(CHD) events, independently of conventional medical risk factors (1–4). Further analyses of the effects of anxiety showed that the risk of fatal CHD events was largely confined to increased risk of sudden cardiac death; in contrast, anxiety did not increase the risk of nonsudden cardiac death (2,3). Anxiety has been postulated to increase risk of cardiac disease through its association with established risk factors such as smoking (5–8) and hypertension (9–11) as well as by its acute effects on the autonomic nervous system (12).

Religiosity has been linked to reduced symptoms of anxiety and depression in medically ill populations (13–16) as well as to reduced cardiovascular risk (17–20). For example, patients endorsing strength and comfort from religion are less likely to die following elective coronary artery bypass (CABG) surgery after controlling for other predictors of mortality (19). Despite evidence that religiosity is associated with improved mental and physical health, few studies to date have evaluated the relationship of religiosity and anxiety in cardiac patients. When evaluating the effects of religious involvement on anxiety among cardiac patients, it is important to consider the impact of social support, as religiosity is associated with increased social support including emotional support and instrumental support such as providing care during illness (15,21–25).

Social support has also been related to lower anxiety among cardiac patients (25,26) and, like anxiety, is related to reduced CHD risk (27–36). For example, higher self-reported social support has been related to reduced anxiety among patients assessed following myocardial infarction (MI) (26), and social support predicts reduced fear and anxiety among patients awaiting CABG surgery (25). Furthermore, a social support intervention administered by nurses has been shown to reduce anxiety among cardiac patients on the day of their cardiac catheterization (37). Social support from a spouse has been associated with more rapid recovery from CABG surgery (38), and low social support has also been demonstrated to be an independent risk factor for the development of CHD (27–31) and for mortality among cardiac patients (32–36).

The purpose of the study presented here was to explore both the independent and the interactive/mediational effects of social support and religiosity on anxiety in patients with documented CHD. We hypothesized that both higher levels of religiosity and social support would be associated with lower levels of anxiety.

METHODS

Patient Sample

The study sample consisted of 228 patients (162 men, 66 women), aged 29 to 90 years ($M = 64$, $SD = 10$), hospitalized for elective diagnostic cardiac catheterization between June 2001 and June 2002 at Duke University Medical Center. Patients in our study participated as part of a larger study investigating the effects of anxiety on mortality in CHD patients. A total of 2,088 patients were screened. The exclusion criteria for the larger study resulted in the exclusion of half the patients (11% for recent MI, 18% for current arrhythmias, 21% for recent or emergent revascularization, 14% for miscellaneous factors affecting self-report such as dementia). Some patients declined to participate (19%), and 3% were missing data in medical charts necessary for participation, resulting in a final enrollment rate of 14%. Patients were only enrolled if they showed evidence of current CHD based on occlusion of 75% or more of at least one coronary artery or had a documented history of CHD. The majority of the enrolled patients (88%) had significant stenosis of at least one coronary artery at the time of enrollment; the remaining 12% had a history of MI or coronary revascularization but no significant blockages in their coronary arteries at the time of catheterization. Following the catheterization, 20% of the patients underwent CABG surgery, 19% underwent angioplasty, and the remaining patients (61%) were prescribed medical management. Selected demographic and clinical characteristics of the sample are presented in Table 1.

Procedures

All patients were tested while taking their prescribed medications. Patients were excluded if they were not currently in normal sinus rhythm or if they were unable to complete the required diagnostic interview due to medical, physical, or psychiatric conditions that would impact the patient's ability to participate (e.g., ventilator-dependency, stroke-related aphasia, language conflict, acute psychosis). Patients were also excluded if they had experienced an MI or revascularization procedure in the previous 30 days. The Duke University Medical Center Institutional Review Board reviewed and approved the study procedures. All patients provided verbal and written informed consent before participating in the research protocol.

Patients were interviewed in the inpatient cardiac unit or cardiac catheterization outpatient holding area. A trained research assistant administered an interview, which included demographic information, psychosocial factors, and assessment of cardiac risk factors and CHD severity. Cardiovascular risk profile and CHD severity were evaluated from review of the medical chart and corroborated by patient interview. Cardiac catheterization results were used to estimate left ventricular ejection fraction (LVEF) and the number of coronary arteries with 75% or more stenosis.

TABLE 1
Clinical and Demographic Characteristics of Study Population

	All Patients	*Low Anxiety*	*High Anxiety*
N	228	117	111
Age	61 ± 13	64 ± 10	59 ± 11**
Gender (% male)	71%	73%	69%
Race (% White)	79%	79%	78%
Marital status (% married)	72%	74%	71%
Body mass index (kg/m^2)	30 ± 6	29 ± 6	31 ± 5
Education (% with high school or less)	57%	57%	56%
Hoge Intrinsic Religiosity[a]	39 ± 9	40 ± 9	37 ± 10*
Perceived Social Support Scale	54 ± 8	56 ± 8	53 ± 9*
LVEF (%)	55 ± 14	54 ± 13	56 ± 15
Revascularization procedure performed	38%	39%	40%
Prior MI	48%	46%	50%
Current smoker	17%	17%	24%
Coronary artery disease			
0-vessel	12%	12%	12%
1-vessel	26%	23%	29%
2-vessel	18%	18%	17%
3-vessel	45%	47%	42%

Note. Low and high anxiety groups defined using median split of Spielberger trait anxiety scores Where indicated, values represent $M \pm 1\ SD$. LVEF = left ventricular ejection fraction; MI = myocardial infarction.
[a]Higher scores on the Hoge scale reflect higher levels of religiosity.
*Contrasted with low anxiety group, $p < .01$. **Contrasted with low anxiety group, $p < .001$.

Psychosocial Measures

Anxiety. The 40-item Spielberger State–Trait Anxiety Inventory (39) was used to measure anxiety symptoms. Participants responded on a 4-point Likert-type scale to anxiety-relevant self-descriptions, yielding separate scores for state and trait anxiety ranging from 20 to 80. The mean state anxiety score for the sample was 30.4 (*SD* = 9.8) and the mean trait anxiety score was 31.3 (*SD* = 9.8). Internal consistency (Cronbach's alpha) for the State and Trait Anxiety scales ranged from .83 to .92 in the development samples, and test–retest reliabilities for the Trait Anxiety subscale ranged from .73 to .86 (39). Internal consistency for this sample was .90 for the Trait Anxiety scale and .91 for the State Anxiety scale.

Social Support. Perceived social support was measured using a modified version of the Perceived Social Support Scale (PSSS) (40). This 12-item questionnaire assesses perceived social support by having participants rate each item on a Likert-type scale from 1 (*very strongly disagree*) to 5 (*very strongly agree*). For example, a representative item is "I get the emotional help and support I need from my family." A 1- to 5-point scale was used, yielding a total score ranging from 12 to 60. Internal consistency is .85 or greater, and test–retest consistency exceeds .70 (55). Internal consistency for this sample was .92.

Religiosity. The 10-item Hoge Intrinsic Religious Motivation Scale was used to measure intrinsic religiosity (41), defined as religious practice motivated by deeply held spiritual beliefs and that extends to all facets of an individual's life (42). Internal reliability in the initial report was .90 (41), and scores correlated with ministers' judgments regarding people from their congregations (*r* = .59). In this sample, internal reliability was .87. Items are rated by participants on a 4-point Likert-type scale from 1 (*strongly agree*) to 4 (*strongly disagree*). The scale is summed to yield a single score ranging from 10 to 50. Although the items are written so that a low score indicates high intrinsic religious motivation, Hoge scores were reversed so that a high score indicates intrinsic religious motivation. Scores were reversed so that the direction of correlations can be interpreted intuitively to avoid confusion. That is, a negative correlation between Hoge score and anxiety indicates that patients higher in intrinsic religiosity have lower anxiety.

The measures of social support and religious belief and practice were related. Social support was correlated with both intrinsic religiosity (*r* = .30, *p* = .0001) and frequency of religious attendance (*r* = .20, *p* = .003), and intrinsic religiosity was correlated with frequency of attendance at religious services (*r* = .50, *p* = .0001).

Data Analysis

Statistical analyses were performed using SAS software (SAS, Cary, NC). All omnibus tests were considered statistically significant if *p* < .05. Pearson correlations were used to examine univariate associations between continuous variables. Analyses of variance were used to compare trait and state anxiety scores between groups. Where omnibus tests were significant, Tukey's honestly significant difference test was used to compare means. Educational level was divided into low (high school or less), medium (some college), and high (college degree or more) groups. Categorical demographic variables associated with anxiety were dummy-coded for inclusion in regressions. Multiple linear regression analyses were used to determine whether perceived social support or religious motivation predicted anxiety symptoms, independent of other patient characteristics associated with anxiety. The nature of the effect of social support on the religiosity–anxiety relationship was further evaluated in mediational models. A moderation effect of social support on the religiosity–anxiety relationship was evaluated by adding an interaction term created by multiplying PSSS score by Hoge score.

RESULTS

Demographic Predictors of Anxiety

Univariate correlations showed that trait anxiety was associated with younger age (*r* = –.26, *p* < .0001), greater body mass index (*r* = .15, *p* = .03), and higher state anxiety while in the hospital (*r* = .60, *p* < .0001). Trait anxiety also was associated with elevated cholesterol (*r* = .15, *p* = .048) and triglyceride levels (*r* = .22, *p* = .005). In addition, patients scheduled for CABG surgery on the basis of their diagnostic catheterization results reported greater trait anxiety compared to those prescribed angioplasty or medical management (CABG trait anxiety score = 33.9 ± 11.6; angioplasty = 28.7 ± 8.1; medical management = 31.3 ± 9.4, *p* = .04). State anxiety also was associated with younger age (*r* = –.24, *p* = .00003). State anxiety was associated with ethnicity (African American state anxiety score = 27.1 ± 6.8; Whites = 31.2 ± 10.3; *p* < .05), and patients prescribed CABG surgery reported greater state anxiety compared to those prescribed angioplasty or medical management (CABG trait anxiety score = 35.0 ± 13.1; angioplasty = 29.7 ± 9.1; medical management = 29.0 ± 8.3, *p* = .0014). Trait and state anxiety were not significantly related to gender, marital status, educational status, prior MI history, ejection fraction, or CHD severity.

The Relationship Between Social Support and Anxiety

Univariate correlations revealed that perceived social support was inversely related to trait anxiety (*r* = –.30, *p* = .0001) and state anxiety (*r* = –.26, *p* = .0001). To determine whether perceived social support was associated with reduced anxiety independently of other known predictors of anxiety, separate hierarchical regressions were conducted for trait and state anxiety (see Tables 2 and 3, respectively). The relationship between social support and anxiety was maintained after adjusting for the effects of established predictors of anxiety (i.e., age and planned CHD treatment). Perceived social support accounted for 8.3% of the variance in trait anxiety scores and significantly improved prediction of trait anxiety, *F*(1, 220) = 22.11, *p* < .0001. Perceived social support accounted for 6.7% of the variance in state anxiety scores and significantly improved prediction of state anxiety, *F*(1, 218) = 17.73, *p* < .0001. Social support remained a significant predictor of both trait and state anxiety after controlling for religiosity (see Model 3 in Step 2 of Tables 2 and 3, respectively).

TABLE 2

Regression Coefficients for Predicting Trait Anxiety Scores

Predictors	b	p	Adjusted R^2	ΔR^2	Step F	Step p
Step 1. Initial model			.086		10.53	.0001
Age	−.26	.0006				
Treatment	.13	.04				
Step 2. Social support and religiosity						
Model 1: PSSS score			.165	.080	21.37	.0001
Age	−.22	.002				
Treatment	.16	.007				
PSSS score	−.29	.0001				
Model 2: Hoge score			.096	.022	5.62	.02
Age	−.25	.0001				
Treatment	.12	.06				
Hoge score	−.15	.02				
Model 3: Mediation			.155	.004	1.22	.26
Age	−.22	.0001				
Treatment	.15	.01				
PSSS score	−.27	.0001				
Hoge score	−.07	.26				

Note. For each step and model, variable added is in italics. Treatment is dummy-coded as elective coronary artery bypass surgery versus medical management and angioplasty. b = standardized beta weight; PSSS = Perceived Social Support Scale.

TABLE 3

Regression Coefficients for Predicting State Anxiety Scores

Predictors	b	p	Adjusted R^2	ΔR^2	Step F	Step p
Step 1. Initial model			.107		14.31	.0001
Age	−.24	.0002				
Treatment	.24	.0002				
Step 2: Social support and religiosity						
Model 1: PSSS score			.170	.067	17.73	.0001
Age	−.20	.0001				
Treatment	.27	.0001				
PSSS score	−.26	.0001				
Model 2: Hoge score			.150	.049	12.85	.0004
Age	−.22	.0006				
Treatment	.22	.0005				
Hoge score	−.22	.00004				
Model 3: Mediation			.189	.023	6.18	.01
Age	−.19	.002				
Treatment	.25	.0001				
PSSS score	−.21	.001				
Hoge score	−.16	.01				

Note. For each step and model, variable added is in italics. Treatment is dummy-coded as elective coronary artery bypass surgery versus medical management and angioplasty. b = standardized beta weight; PSSS = Perceived Social Support Scale.

**The Relationship Between Religiosity
and Anxiety**

Univariate correlations showed that intrinsic religiosity was modestly related to lower trait anxiety ($r = -.18$, $p = .005$) and more strongly related to lower state anxiety ($r = -.27$, $p = .0001$). The relationship between religiosity and anxiety was maintained after adjusting for the effects of age and planned CHD treatment; including Hoge score in this model showed that religiosity accounted for about 2.4% of the variance in trait anxiety scores ($p = .01$) and 4.9% of the variance in state anxiety scores ($p = .0004$).

To explore the possibility that the relationship between intrinsic religiosity and anxiety is moderated by social support, the interaction of intrinsic religiosity and social support was added to a regression model containing control variables, religiosity, and social support. The interaction of Hoge scores and social support scores explained an additional 1.3% of the variance in trait anxiety, but the interaction term was only marginally significant for the prediction of trait anxiety ($\Delta R^2 = .015$), $F(1, 218) = 4.10$, $p = .06$, and nonsignificant in the prediction of state anxiety, ($\Delta R^2 = .008$), $F(1, 216) = 2.06$, $p = .15$, suggesting that social support is not a significant moderator of the religiosity–anxiety relationship.

To explore the relative independent contributions of social support and religiosity in predicting trait anxiety, both social support and the Hoge score were added to a model that included age and CHD treatment. Social support remained a significant predictor of trait anxiety after controlling for religiosity ($\Delta R^2 = .063$), $F(1, 220) = 16.57$, $p = .0001$ (see Model 3 in Step 2 of Table 2), whereas religiosity did not significantly predict trait anxiety after controlling for social support ($\Delta R^2 = .005$), $F(1, 220) = 1.22$, $p = .26$. These results suggest that social support may mediate the relationship between religiosity and trait anxiety. Parallel analyses testing the independent contribution of social support and religiosity to state anxiety showed that both social support and religiosity remained significant predictors of state anxiety: social support, $\Delta R^2 = .04$, $F(1, 217) = 10.99$, $p = .001$; religiosity, $\Delta R^2 = .023$, $F(1, 217) = 6.18$, $p = .01$, suggesting that that social support and religiosity are independent predictors of state anxiety among patients with CHD undergoing diagnostic catheterization.

DISCUSSION

Previous studies have found that social support buffers the deleterious effects of psychological distress (42–45) and appears to protect against the increased risk of mortality conferred by depression following MI (46). In addition, a relationship between the presence of social support and lower anxiety has been documented in elderly populations (25,47) and in cardiac patients (25,26). We found that level of perceived social support was related to both lower trait and state anxiety in patients with CHD. Furthermore, this relationship was maintained after adjusting for other predictors of anxiety, including age, the type of planned treatment of CHD (surgery vs. medical), and level of intrinsic religiosity.

Our study also found a relationship between intrinsic religiosity and lower trait anxiety. However, the relationship between religiosity and trait anxiety was eliminated following adjustment for the higher levels of social support found with religiosity, suggesting that social support may be a mediator of the effects of religiosity on trait anxiety. Intrinsic religiosity was more strongly related to state anxiety in this patient population, and this effect persisted after adjusting for differences in social support. These findings suggest that although social support is an important determinant of anxiety in hospitalized CHD patients and may be largely responsible for the lower trait anxiety found in CHD patients with high religiosity, religiosity is also a significant contributor to lower state anxiety in this population of patients.

This study also evaluated the role of social support as a moderator of the religiosity–anxiety relationship. Although there was no significant contribution of social support level, there was a tendency for social support to act as a moderator of the relationship between religiosity and trait anxiety, with patients low in social support showing a tendency to have a stronger relationship between religiosity and anxiety than those higher in social support. The current conceptualization of social support as a moderator of the effects of religiosity on anxiety is based on the evidence that social support provides protection from stress (42). However, it is also possible that religiosity could serve as a moderator of the effects of social support on anxiety.

Several previous studies have shown that religiosity is related to lower anxiety and depression in medically ill patients (13–16). These findings extend the earlier findings by showing that religiosity is associated with reduced anxiety among cardiac patients undergoing diagnostic catheterization. These findings also underscore the importance of social support as a buffer against distress. The magnitude of the correlation between state anxiety and social support we observed ($r = -.26$) is similar to that reported in a study of patients assessed following MI ($r = -.25$) (26).

Although the precise mechanism through which anxiety increases risk of mortality is unclear, several studies have found that anxiety increases risk of sudden cardiac death but not of nonfatal MI (2,3). In addition, anxiety has been associated with reduced baroreceptor sensitivity among cardiac patients (48) and healthy individuals (49,50), which is also consistent with a deleterious effect of anxiety on myocardial stability. In addition, mood disturbances characterized by increased anxiety have been shown to independently predict arrhythmic events after controlling for relevant medical factors (e.g., LVEF, medication use) among cardiac patients with implanted internal cardioverter defibrillators (51). Combined with evidence that anxiety is associated with risk of cardiac disease and poorer prognosis among cardiac patients (2,4,26,52,53), these findings suggest that reductions in anxiety associated with social support may be particularly beneficial for CHD patients.

A number of limitations must be noted. Because the study was added on to a larger study evaluating autonomic mechanisms underlying anxiety-related risk of mortality, a number of patients were excluded if they presented with conditions that are known to be associated with effects on heart rate variability. Al-

though exclusion of patients who present with these conditions (current arrhythmias, acute myocardial infarction, and recent revascularization procedures) results in a population different from that found on a typical cardiac service, these patients are similar to the population at large who have CAD. Nevertheless, the generalizability of these results has been limited by the recruitment procedures. In addition, patients were not all enrolled at the same time with respect to their cardiac catheterization. Some (41%) were enrolled while waiting to go to the cardiac catheterization lab. The rest were tested after catheterization (33% within several hours of the catheterization and the remaining 26% during the remainder of the hospitalization). Although there were no differences in anxiety, religiosity, or social support in the group of patients tested before versus those tested after catheterization, it is possible that some individuals may have experienced and reported higher levels of anxiety while waiting for cardiac catheterization. It is also possible that knowledge of their disease severity may affect anxiety levels; however, including the type of treatment received by the patients in the models may have helped to control for this possibility.

In conclusion, higher levels of social support were related to lower trait anxiety among hospitalized CHD patients. Although higher intrinsic religiosity also was associated with lower trait anxiety, this relationship was secondary to higher social support. In contrast, social support and religiosity independently contributed to lower state anxiety in hospitalized CHD patients. These findings suggest that either social support or religiosity provide an effective coping strategy for combating potentially anxiety-provoking medical events such as elective diagnostic cardiac catheterization but that the trait of anxiety is more strongly linked to inadequate social support than to a lack of religiosity. Prospective studies are needed to evaluate whether reduced anxiety associated with higher levels of social support or religiosity improves prognosis.

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