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Private Prayer and Quality of Life in Cardiac Patients: Pathways of Cognitive Coping and Social Support

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Private Prayer and Quality of Life in Cardiac Patients: Pathways of Cognitive Coping and Social Support

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Despite the growing evidence linking faith with health and well-being, national leaders noted the need to explore the mechanism underlying these linkages. The goal of this prospective study was to investigate the psychosocial mechanisms involved in the preoperative use of private prayer for coping and the effects of such act on short-term quality of life (SPQOL) in 294 patients following open-heart surgery. Using established instruments, three interviews were conducted with middle-aged and older patients (average age 62) at two

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weeks and two days preoperatively, then 36 days postoperatively. The endpoints were assessed with levels of distress (e.g., depression and anxiety) and fatigue symptoms. Structural equation modeling was used to test a theoretical model. The final model showed the indirect influence of using prayer for coping on SPQOL through the mediation of cognitive coping and perceived social support. However, this mediation was not observed for behavioral, anger, and avoidant coping. Psychosocial factors may explain the potential role of using prayer for coping on short-term postoperative quality of life.

KEYWORDS *cognitive coping, using prayer for coping, distress, fatigue, cardiovascular disease and surgery*

Population aging will inevitably increase the cardiac disease burden on populations served by social workers in health care (Ai & Carrigan, 2007). However, little is known in social work education concerning the interface of mental health measures and outcomes in cardiac diseases as the leading public health problem and the number one killer in the United States (American Heart Association, 2005). Further, there is a resurgence of interest in the role of religion and spirituality in social work practice (Nelson-Becker & Canda, 2008), and empirically based knowledge is needed to guide practice. "A growing body of evidence points to the powerful impact of spiritual/religious beliefs and practices on promoting health and well-being and influencing the course of illness" (Corley, 2002, 88), and in the fields of gerontology and geriatrics this work will lead to enhancements in the quality of life of older adults, especially those with chronic conditions. Self-empowering practices such as prayer are becoming recognized in strengths and resiliency-based models in social work.

As an advanced treatment, 709,000 open-heart surgery procedures were performed in 2002 at high costs to individuals, families, and society (American Heart Association, 2005). Having increased by 470% over the past two decades, cardiac surgery and procedures mark a life-altering crisis in middle and late age. Growing evidence shows that mental health comorbidities (e.g., depression and anxiety) predict poorer postoperative long-term quality-of-life, new cardiac events, and mortality (Pignay-Demaria, Lesperance, Demaria, Frasure-Smith, & Perrault, 2003). Multi-center clinical trials have failed to support the survival advantage of either antidepressants or cognitive-behavioral treatment (CBT) in patients following myocardial infarction, one condition leading to cardiac surgery, despite CBT benefits on depression and low social support (The ENRICHD Investigators, 2003; Lichtman et al., 2008). As a result, researchers have encouraged investigation of other predictive factors, especially the coping strategies of these patients (The ENRICHD Investigators, 2003).

Clinical studies have documented benefits of certain faith factors, especially those of an intrinsic nature, in patients who underwent cardiac surgery (Contrada et al., 2004; Oxman, Freeman, & Manheimer, 1995). In a retrospective study, Ai, Dunkle, Peterson, and Bolling (1998) found better adjustment one year after cardiac surgery among patients who used prayer during the postoperative period. However, how a faith-based act (i.e., using private prayer for coping) may help some patients get through this medical crisis remains under-investigated. No research has clarified potential pathways underlying the function of this coping act, for example, through the mechanism of internal and external means (i.e., various coping strategies and perceived social support). In an *American Psychologist* special issue, leaders on a panel organized by the National Institutes of Health underscored the need to identify mechanisms that may explain the faith–health interaction, a frontier area of research today (Miller & Thoresen, 2003; Powell, Shahabi, & Thoresen, 2003). In particular, they noted the use of causal modeling to avoid “covariance fallacy”; that is, an A–C association could result from their shared associations with an unchecked B. Accordingly, this prospective study examined the functional role of preoperative prayer in short-term postoperative quality-of-life (SPQOL) of 294 middle-aged and older patients using this modeling tool. The endpoints assessed were levels of distress (e.g., depression and anxiety) and fatigue symptoms.

NEW PARADIGMS OF PRACTICE IN SOCIAL WORK INCORPORATING SPIRITUALITY AND STRENGTHS

Identifying and utilizing strengths of individuals internally (including their resilience) and in their external environments are increasingly included in models promoting deeper understanding human behavior and broader implementation of theory-based practice in social work (Chapin, Nelson-Becker, & MacMillan, 2006; Greene, 2002). For example, in contrast to traditional medical/rehabilitative models of helping, the strengths conceptual model is based in the value of human potential (rather than problem resolution), and focuses on solutions that are consumer/environmentally determined rather than professionally driven (Fast & Chapin, 2002).

Individuals and families who are seen in health and mental health settings may incorporate approaches to healing that fall outside of the “medical model” (Corley, 2003). Therefore, including the exploration of spiritual beliefs, behaviors, and values (as well as other domains of spiritual assessment) can enhance social work practice in clinical settings (Canda & Furman, 1999; Nelson-Becker, Nakashima, & Canda, 2007). Spirituality can be seen as “an effective coping strategy that provides mental and social support and the ability to derive meaning from everyday lives. Such findings are consistent with the relationships between religiousness and health, since many of

the private forms of religious participation (e.g., prayer, meditation, personal rituals) are similar . . ." (Hooyman & Kiyak, 2008, 507).

PRAYER IN COPING AND IN CARDIAC SURGERY

Despite a common belief in self-reliance, nine out of ten persons in the United States pray (Gallup & Jones, 1989; Gallup & Lindsay, 1999). In responding to a question in the Gallup survey concerning types of support that they sought in crisis, Americans rated prayer (80%), a faith-based coping means, as the second most-commonly used category, surpassed only by family support. When social and health resources decline, seeking spiritual support could be as important as seeking social support in adversity, especially among the disadvantaged. Ai, Tice, Peterson, and Huang (2005), in a study of social work students after the September 11, 2001 terrorism attack, showed that prayer coping contributed to better adjustment through the pathway of spiritual support and optimistic expectations. However, the effect of faith on health, especially such individual practices as private prayer, remain poorly understood, in contrast to an established protector, social support, which has been examined in numerous studies including those on cardiac surgery (Brummett et al., 1998; Burker et al., 1995; Jenkins, Jono, & Stanton, 1996; Kulik & Mahler, 1993; Oxman, Freeman, Manheimer, & Stukel, 1994; Pirraglia, Peterson, Williams-Russo, Gorkin, & Charlson, 1999). One recent cross-sectional, regression analysis found that the desirable linkage of intrinsic religious motivation with trait anxiety in cardiac patients was entirely mediated by perceived social support (Hughes, Sketeh, & Watkins, 2004).

In his well-known lecture on religion one century ago, William James (1901/1902/1958), offered a psychological perspective of prayer as "the very movement of the soul, by putting itself in a personal relation of contact with the mysterious power of which it feels the presence" (p. 352). To him, prayer was at the core of an intrinsic aspect of religion, as "religion in act" (p. 351) and "as an inner fact . . . in the consciousness which individuals have an intercourse between themselves and higher powers with which they feel themselves to be related" (p. 353). Both James and more contemporary researchers have noted that illness or other crises tend to intensify prayer usage, whether the act was for coping with despairing distress or for reassuring self-efficacy (Rippentrop, Altmaier, Chen, Found, & Keffala, 2005; Saudia, Kinney, Brown, & Young-Ward, 1991; Welford, 1947). The month before cardiac surgery is highly stressful, especially because many cardiac patients do not consider themselves as sick persons according to a cardiac surgeon who operated on this patient sample (Ai, Peterson, Bolling, & Koenig, 2002; Ai, Peterson, Tice, Bolling, & Koenig, 2004). Using a half of this sample, Ai et al.'s (2002, 2004) analysis of preoperative data indicated

that the risk related to this major operation can lead to existential anxiety that drives patients to their higher power for spiritual support or comfort. Given this context, use of private prayer preoperatively may simultaneously be tied to both a sense of comfort on one hand, and distress patients experienced in a time of crisis on the other hand.

In the general population, unsurprisingly, prayer is more commonly practiced by people with fewer resources, lower control, and more distress, or by those from disadvantaged social strata (e.g., women, older adults, minority populations, and those with less education) and lower income (Levin & Taylor, 1997; Poloma & Gallup, 1991). A previous retrospective study nonetheless did not find any influence of demographics or illness on the use of prayer among cardiac surgery patients who were mostly from more advantaged social strata (Ai et al., 1998). In a clinical case, such absent effects may be attributable to a shared life-altering procedure that somewhat equalized their disadvantages that led to using a faith-based act for coping with an uncontrollable crisis. The earlier study nonetheless found better adjustment one year after cardiac surgery among those who used private prayer, controlling for the negative role of non-cardiac chronic conditions (Ai et al., 1998). The analysis of the preoperative data of the current sample indicated the high prevalence of using prayer coping for surgery-related difficulties (Ai et al., 2002), as shown in the literature (Ai et al., 1998; Saudia, Kinney, Brown, & Young-Ward, 1991). However, a question remained: What factors may explain the protective effect of this faith-based coping?

One possibility is that pursuing spiritual support through prayer may indicate a strong survival intention based on an internally secure, sacred relationship (Ai et al., 2002). Patients would not have prayed, if they had entirely given up hope for their future in the face of major cardiac surgery. As depicted by James (1901/1902/1958), they would not have done so if they had not already established some form of intrinsic faith-based life upon which they could rely in a time of medical crisis. Indeed, a study on another crisis, the 9/11 attacks, found a close link between prayer coping and perceived spiritual support, which was in turn related to better adjustment (Ai et al., 2005). Also, a survival intention, as indicated in prayer, may have led patients to mobilize other more tangible forms of resources (e.g., social support, beyond a higher power). Hughes et al.'s study (2004) has exhibited this pathway; namely, that the mediation of perceived social support explained religious coping effects in cardiac surgery patients. The conclusion in this study is yet to be supported by research using prospective designs.

Another possibility is that, before such a medical crisis, private prayer users might have engaged in active coping strategies to deal with difficulties, based on their survival intention and faith. To explore this individual difference and psychological mechanisms underlying the faith effect, the present study followed a sample of patients before and after cardiac surgery.

No previous study has documented the hypothetical pathway of coping and prayer effects.

CONCEPTS OF COPING AND THE EFFECT OF ACTIVE COPING ON CARDIAC HEALTH AND RELATED QOL

To justify this linkage, it is necessary to review the transactional model of stress and coping, the best-known theoretical treatment in this regard, introduced by Lazarus (1966, 1982, 1991; Lazarus & Folkman, 1984). It was argued that stressful events and their impact must be understood in terms of how the individual perceives or evaluates them, involving two types of appraisal. In primary appraisal, the individual asks what is at stake in the event. Events take on altogether different significance depending on their implications for the individual. In secondary appraisal, the individual takes stock of the resources at his or her disposal for meeting the demands of the event. Again, events differ drastically depending on whether the person believes he or she can handle them, and how. An emotional stress response tends to occur when the situation is out of control by available means (Lazarus, 1968).

There are varied ways to classify strategies in coping with stress. Problem-focused coping refers to attempts to meet the stressful event head on and remove its effects (Lazarus & Folkman, 1984). Emotion-focused coping is more indirect, referring to attempts to moderate one's own emotional response (e.g., acceptance) to an event that itself cannot be altered. Lazarus pointed out that no strategy of coping is always preferred. Different events demand different coping styles. Cardiac surgery is a complex event that demands a complex mixture of coping styles. Choosing a good surgeon and following advice are probably best regarded as instances of problem-focused coping, but patients additionally try to cope with the stress of surgery by controlling their emotions (Whitmarsh, Koutantji, & Sidell, 2003). One way to do this is through prayer to blunt anxiety (Eliassen, Taylor, & Lloyd, 2005).

In the secondary control theory, Heckhausen and Schulz (1995) suggested that in an uncontrollable situation, individuals who lose primary control would focus on internal cognitive processes, namely secondary control, and use such strategies to accommodate to change. Prayer, classified as "vicarious control," is one of these strategies for protecting oneself from threats when tangible means (e.g., surgical procedures) are out of patients' primary control. In this theory, prayer may be regarded as problem-focused coping (Bacchus & Holley, 2004). James's (1901/1902/1958) concept of distress-related prayer, however, led us consider this act as emotion-focused coping and therefore examined its relation to SPQOL. Seeking spiritual support through prayer may at least provide a sense of emotional comfort. Complicating cross-sectional investigations of prayer as emotion-focused coping is that crisis may intensify both stress and coping. This fact could make coping

appear detrimental because of its association with distress, and for this reason longitudinal design is needed (cf. Austenfeld & Stanton, 2004).

Wills (1996) distinguished between active coping, in which a person recognizes stress-producing problems and tries to solve them or reduce the stress they created, and maladaptive coping, in which a person does not deal with problems or the stress they create. Active coping includes behavioral and cognitive coping strategies (in effect, the problem-focused and emotion-focused distinction of Lazarus), whereas maladaptive coping includes anger, distraction, wishful thinking, and helplessness. Factor-analytic studies support the relative distinctiveness of four coping styles (behavioral, cognitive, anger, and general avoidance), and the items used by Wills (1996) to measure these four styles were employed in the present study. In general, Wills (1996) found that behavioral coping had stronger relationships to positive outcomes than the other coping styles. In our study, however, we expected that cognitive coping might be more important because of the highly stressful nature of the event (the pending surgery) and the inability of patients to do anything other than reframe its import. According to the secondary control theory (Heckhausen & Schulz, 1995), we assumed a pathway between prayer and active coping.

Only a handful of cardiac surgery studies have examined the relationship of coping with outcomes, using different concepts and measures. An earlier experiment in 60 male coronary artery bypass graft (CABG) patients showed reduced postoperative anxiety and hypertension in patients assigned to preoperative information-only and information-plus-coping interventions than those assigned to a control group with only contact (Anderson, 1987). No difference was found between the two interventions. A recent follow-up study of 330 CABG patients used depression, anxiety, and vital exhaustion (a proxy for fatigue) as three QOL indicators (Boudrez & Backer, 2001). Sensitive coping styles (defined as the awareness of internal feelings, similar to Wills' cognitive-coping, 1996) predicted better QOL, but no medical and cardiac factor affected QOL. A cross-sectional study on 50 heart transplant candidates linked maladaptive coping styles (e.g., denial and venting of emotion) with emotional distress (Burker et al., 2005). Likewise, a structural equation modeling (SEM) analysis of 138 cardiac rehabilitation patients related low social support and maladaptive coping to poor QOL (Shen, Myers, & McCreary, 2006). A caveat with respect to that study is that it used data from a small sample to estimate the model. More solid evidence is needed to better present the role of active coping in this population.

THE PRESENT STUDY

In accordance with the aforementioned *American Psychologist* special issue (Miller & Thoresen, 2003; Powell et al., 2003), this prospective study used

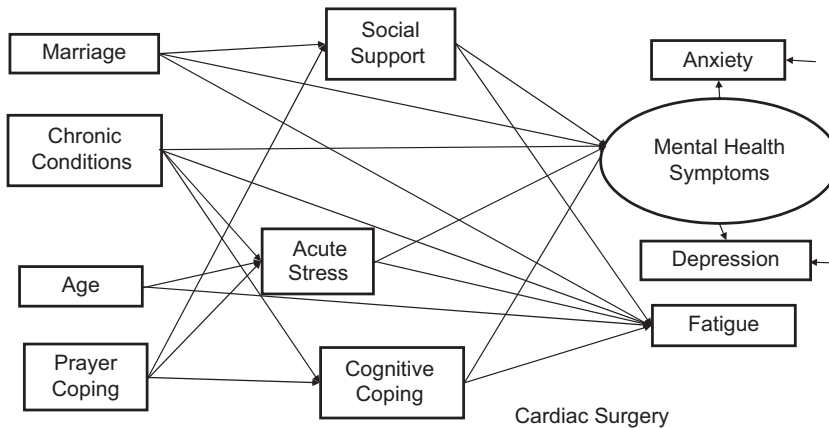


FIGURE 1 A hypothetical model.

structural equation modeling (SEM) to estimate the pathways that may explain the effect of prayer on SPQOL (lower levels of distress and fatigue symptoms) (Figure 1). We estimated four separate models corresponding to four coping strategies (Wills, 1996), assessed right before surgery to reflect preoperative coping, as potential pathways in this faith effect. Also, we included an established positive pathway, perceived social support (Hughes, Sketeh, & Watkins, 2004; Shen et al., 2006), as a cardiac QOL protector (Burker et al., 1995; Jenkins et al., 1996; Oxman et al., 1994; Oxman & Hull, 1997; Pirraglia et al., 1999). In particular, we hypothesized that preoperative prayer coping (Ai et al., 2002) would contribute to better SPQOL, and that effect would be explained by greater use of active coping strategies (i.e., cognitive and behavior coping) and perceived social support.

Accordingly to James's notion of prayer in crisis (1901/1902/1958), a negative pathway between prayer and SPQOL, acute stress, was also assessed as a control factor within each model. This concept reflects a peritraumatic form of negative emotions related to panic attack, distressing anticipatory anxiety, and acute post-traumatic stress disorder symptoms (PTSD) (Jaycox, Marshall, & Orlando, 2003; Pollack & Marzol, 2000; Thabet, Abed, & Vostanis, 2002). Earlier, PTSD had been considered as acute stress disorder in a revised version (Ehrenreich, 2003). Cardena, Lewis-Fernandez, Bear, Pakianathan, and Spiegel (1996) actually suggested adding acute stress to the psychiatric diagnostic armamentarium. Research has identified stress, including acute stress, as a risk factor in cardiac prognosis (Gallo & Matthews, 2003). European interdisciplinary scholars have found that PTSD in cardiac surgery patients predicted poor postoperative outcomes (Stoll et al., 2000), similar to our QOL measures. In this study, however, acute stress was operationalized as acute stress symptoms, not as the PTSD diagnosis.

Further, the number of chronic conditions, a risk predictor of adjustment in the retrospective study (Ai et al., 1998), was included in this model. We anticipated its undesirable direct and indirect roles, through acute stress, on SPQOL measures but also its association with intensified coping. Age, as a risk factor of postoperative mortality and poor QOL (Jarvinen, Saarinen, Julkunen, Huhtala, & Tarkka, 2003; Ramsay et al., 2005), was also included in the model. We expected age to be positively associated with fatigue but negatively associated with acute stress, and unrelated to postoperative distress (Ai & Peterson, in press; Plach, Napholz, & Kelber, 2003). Finally, marital status, as a source of social support and better SPQOL, was taken into account (Kiecolt-Glaser & Newton, 2001). Several pathways among constructs were intentionally excluded from the model, due to either the lack of previous evidence or the lack of any theoretical and logical justification therein.

METHODS

Participants

Participants were recruited by nurses and trained interviewers from patients at the Cardiac Clinic of the University of Michigan Medical Center for three sequential interviews between 1999 and 2002. Eligibility criteria included (a) aged 35 years or older, (b) scheduled for admission to the University of Michigan Health System (UMHS) for nonemergent, nontransplant cardiac surgery within the subsequent 8 weeks, (c) able to speak fluently and understand the English language, (d) cognitively and physically capable of providing informed consent, (e) not pregnant, (f) having provided informed consent, and (g) permitted to participate in the study by the surgeon.

Of 707 patients approached, 481 (61%) were recruited for the first face-to-face preoperative interview. Attrition analysis found no statistically significant difference in major demographics between consenters and non-consenters, although the consent rate of females was marginally higher than that of males ($p = .06$). The majority of the sample was Caucasian (90%), male (58%), married with spouse present (72%), and Judeo-Christian (87%). The average age was 62 (range, 35–89). Of the initial sample, 426 responded to the second preoperative telephone interview (89%), and 335 finished the third postoperative interview (70%). No demographic differences were found between those who completed the follow-up and those who did not.

Procedure

Nurses and trained interviewers recruited subjects scheduled for non-emergency, non-transplant cardiac surgery at the cardiac clinic at the

University of Michigan Medical Center between 1999 and 2002. Consenting participants were then interviewed by trained interviewers. All procedures (e.g., CABG, aneurysm repairs, and valve repair or replacement) required the use of a heart–lung machine that enables the bypass of blood through synthetic material circuits for cardiac repair. About two weeks prior to the cardiac surgery, the initial interview was conducted to collect information about (a) sociodemographic backgrounds, (b) the use of private prayer for coping, and (c) noncardiac chronic conditions. About two days prior to surgery, the second interview addressed (a) four types of coping strategies, (b) perceived social support, and (c) acute PTSD symptoms. Approximately 36 days after surgery, the third interview assessed SPQOL measures (depression, anxiety, and fatigue symptoms).

Measures

Fatigue was measured with the 14-item Fatigue Scale, including seven physical symptoms (e.g., “Do you have problems with tiredness?”) and seven mental symptoms (e.g., “Do you have difficulty concentrating?”), respectively (Chalder et al., 1993). Participants responded to each item on a 4-point scale (1 = better than usual, 4 = much worse than usual). Cronbach’s coefficient alpha for total fatigue score was .93.

Depression was measured with the 20-item Center for Epidemiologic Studies Depression Scale (CES-D) (e.g., “I could not get ‘going’”; Radloff, 1977). Each of the 20 items was scored on a 4-level Likert scale [0 = rarely or none of the time (< 1 day), 3 = most or all of the time (5–7 days)]. Coefficient alpha was .88. Anxiety was assessed with the Trait Anxiety Inventory (STAI Form X-2, e.g., “I am inclined to take things hard”; Spielberger, 1983). Each of the 20 items was scored on a 4-level Likert scale (1 = almost never, 4 = almost always). Cronbach’s alpha was .91.

Coping was measured with the Multidimensional Coping Scale (Wills, 1996), which contains 27 items that assess behavior coping (12 items, e.g., “make a plan for action and follow it”), cognitive coping (10 items, e.g., “remind self that things could be worse”), anger coping (3 items, e.g., “blame others for problem”), and avoidant coping (2 items, e.g., “avoid being with people”). To shorten the length of the survey, we eliminated items on the basis of avoiding redundancy. Retained items included six for behavior, eight for cognitive, two for anger, and two for avoidant coping. Participants responded to each item on a 5-point scale (1 = never, 5 = always) concerning how often you did on each item “when facing a problem regarding your cardiac surgery.” Cronbach’s alphas were .68, .69, .49, and .52, respectively.

Perceived Social Support was measured with the 12-item Multidimensional Scale of Perceived Social Support (MSPSS; Zimet, Dahlem, Zimet, & Farley, 1988). The MSPSS assessed perceived support from family, friends, and significant others at the time of participant’s surgery (e.g., “My family

really tried to help me"). Patients responded to each statement on a 6-point scale (1 = very strongly disagree, 6 = very strongly agree). Cronbach's coefficient alpha was .90.

Acute PTSD Symptoms were assessed with a 9-item measure from the Diagnostic Interview Schedule (DIS), a standardized structured interview based on the *Diagnostic and Statistical Manual of Mental Disorders (Third Edition)* (DSM-III) diagnosis (American Psychiatric Association, 1980; Saunders, 1994). Some items were altered to fit this study (e.g., "Dreams or nightmares about the surgery"). The original format of the DIS requests a YES or NO answer. To make it more reliable, a 4-point scale (0 = never, 3 = OFTEN) was used. Cronbach's alpha was .76.

Prayer Coping was measured with the three items of Using Private Prayer as a Means for Coping, assessing appraisal, efficacy, and intention to use [e.g., "Private prayer is important in my life"; and "Prayer does not help me to cope with difficulties and stress in my life"; "I will use private prayer to cope with difficulties and stress associated with my cardiac surgery"; Ai et al., 2002]. Participants responded to each item on a 4-point scale (1 = strongly agree, 4 = strongly disagree). The first and third items were reverse-coded and the total of the three items was used as the prayer coping score. The three items were assessed by both the first and postoperative interview. Cronbach's alpha was .87, respectively, and test-retest reliability was .77 between assessments implemented in the first and postoperative interviews.

The number of chronic conditions was ascertained using questions about the presence or absence of each of 15 noncardiac chronic conditions commonly seen in geriatric units (e.g., hypertension, chronic lung disease, diabetes, asthma, arthritis, Parkinson disease).

Age was measured in years.

Marital status was coded as two categories (1 = married with spouse present, 0 = other).

Statistical Analysis

Both univariate and multivariate normality of the data were examined for the assumptions of the SEM estimation. The results showed no need for data transformation. We then computed zero-order correlations among constructs in the theoretical model shown in Figure 1. Because the four coping strategies may not be completely mutually exclusive, four SEM analyses were employed to test the hypothetical pathway of them, respectively, along with two other pathways among all constructs (presumably perceived social support and acute stress). Using maximum-likelihood estimation with a robust tool, M-PLUS version 3 (Muthen & Muthen, 2004), SEM models allow all structural paths to be estimated simultaneously with measurement models. Meanwhile, all path coefficients are estimated while taking account of measurement errors in observed variables. This analysis included all

paths and effects of prayer coping and other preoperative exogenous variables (MacKinnon, Lockwood, Hoffman, West, & Sheets, 2002; Shrout & Bolger, 2002). The final model includes only statistically significant standardized path coefficients ($p < .05$).

There was one latent factor: postoperative mental health (absence of symptoms indicated by depression and anxiety). Because of the high quality of the data, no missing values were imputed. The final sample size was 294 after listwise deletion. This SEM estimation enabled simultaneous estimation of all effects of prayer coping, as well as age, gender, marital status, and chronic conditions, on SPQOL measures (Figure 1). This also included the pathways of all exogenous variables on outcomes through two mediating factors (i.e., coping strategy and perceived social support), along with the measurement model specified for latent factors.

Apart from the chi-square statistic that is sensitive to assumptions of normality and sample size, other goodness-of-fit indices were used (Bollen & Long, 1993). These included the standardized root mean residual (SRMR) index (with a value below .08 or the lower bound of the 90% CI under .06 indicating an adequate fit), the residual mean squared error of approximation (RMSEA), the Comparative Fit Index (CFI), and the Tucker-Lewis Index (TLI; values above .90 indicating an adequate fit; Bentler, 1995; Browne & Cudeck, 1993; Tucker & Lewis, 1973).

RESULTS

Normality Analysis and Correlation

Table 1 presents zero-order correlations, means, and standard deviations of all constructs estimated in the hypothetical model. Signs of significant coefficients were mostly consistent with our expectations. Not surprisingly, acute stress was positively correlated with both types of all poor SPQOL indicators (both fatigue and mental health symptoms), with maladaptive strategies (anger and avoidant coping), and negatively with social support at only a marginal level ($p = .06$). Social support was negatively correlated with depression and anxiety. It was also correlated positively with behavioral and cognitive coping strategies and negatively with maladaptive strategies. Cognitive strategies were correlated inversely with fatigue and depression, as well as marginally with anxiety ($p = .10$). Behavioral strategies were not significantly related to any outcomes. Anger strategies were correlated with both distress indicators (depression and anxiety), whereas avoidant strategies were correlated with both distress and fatigue symptoms.

Depression and anxiety were highly correlated with each other. Cognitive and behavior coping strategies were correlated with each other, as were anger and avoidant coping strategies, but these two pairs of coping strategies were not significantly related to each other. Prayer coping was

TABLE 1 Means, Standard Deviations, and Zero-Order Correlations Among Estimated Constructs

	1	2	3	4	5	6	7	8	9	10	11	12	13
1. Prayer	.065												
2. Age	.101*	.154***											
3. Chronic conditions	.027	-.106*	-.149**										
4. Marriage	.095	-.034	-.116*	.236***									
5. Social support	.094	-.199***	.269***	-.049	-.060								
6. Acute stress	.185***	-.046	.132**	-.004	.147**	.009							
7. Cognitive coping	.110*	-.059	.004	.014	.243***	.092	.272***						
8. Behavior coping	.011	-.095	.124*	-.065	-.217***	.257***	-.057	-.026					
9. Anger coping	.040	-.141**	.256***	-.110*	-.234***	.572***	-.033	.007	.404***				
10. Avoidant coping	.092	.059	.237***	-.187**	-.179**	.382***	-.114*	-.037	.222	.370***			
11. Depression	.048	-.030	.181***	-.134*	-.226***	.394***	-.090	-.027	.274***	.422***	.783***		
12. Anxiety	.026	.004	-.006	-.134*	.031	.176**	-.120*	.019	.024	.107	.431***	.396***	
Mean	9.99	62.17	2.74	.76	61.50	8.61	31.94	20.68	3.38	4.60	13.19	34.86	30.95
SD	2.34	11.69	2.22	.43	8.55	4.63	4.73	4.26	1.15	1.68	9.25	9.97	6.94

* $p < .05$, ** $p < .01$, *** $p < .001$.

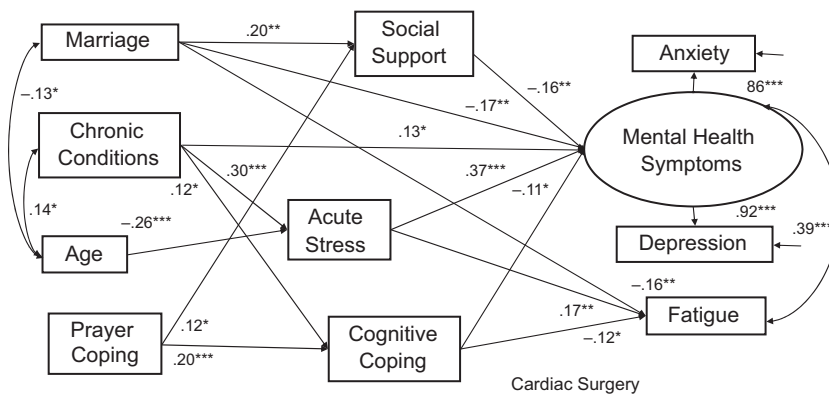


FIGURE 2 A final structural model with standardized solution.

positively correlated with cognitive and behavioral strategies, as well as perceived social support at a marginal level ($p = .07$). However, it was related neither to acute stress response, nor to any of the postoperative SPQOL measures. As for exogenous variables (Figure 2), age was negatively correlated with acute stress, and avoidant coping strategies. Chronic conditions were positively correlated with acute stress, cognitive, anger, and avoidant strategies, and postoperative distress indicators. Marital status was correlated positively with perceived social support and negatively with both distress indicators and fatigue symptom measures. Age was also correlated negatively with marital status but positively with the number of noncardiac chronic conditions. In addition, the count of chronic conditions was negatively correlated with marriage at a marginal level ($p = .06$).

PATHWAYS

Among four SEM models, only one confirmed the mediation of cognitive strategies with good model fit, as shown in Figure 2. Two indicators, depression and anxiety, appropriately measured the latent factor, postoperative mental health symptoms. The four indices of model fit were within acceptable ranges: $2(df = 18, n = 294)$ was 26.375; CFI was .98 and TLI was .97; RMSEA was .04 (90% confidence interval 0.00 to 0.07); and SRMR was .03. Squared multiple correlations indicated that this model accounted for approximately a quarter of the variance in mental health ($R^2 = .25$) and 7% of that in fatigue ($R^2 = .07$) postoperatively.

The significant paths shown in Figure 2 are only partially consistent with those in our hypothetical model. Path coefficients indicated that cognitive strategies were significantly inversely related to both fatigue and distress symptoms. Perceived social support was negatively related only to distress symptoms, but not fatigue symptoms, whereas acute stress was positively

related to both distress and fatigue symptoms. Prayer was positively related to both cognitive strategies and social support but not to acute stress. In addition, age had a negative association with acute stress whereas chronic conditions had a positive effect on cognitive strategies, acute stress, and distress measures. Marital status was related positively to perceived social support but negatively to both SPQOL measures. Fatigue and distress symptoms were modestly correlated with one another, indicating that patients who reported distress also experienced more fatigue.

None of the three other models demonstrated the mediating effect of behavior, anger, and avoidance strategies in the potential prayer effect on postoperative outcomes (not shown). However, behavioral strategies were significantly positively related to prayer ($b = .13$, $SE = .05$), although it had no association with either outcome. By contrast, prayer was unrelated to either of the maladaptive strategies, anger and avoidant coping. Anger coping was positively related to distress ($b = .13$, $SE = .04$) but not fatigue symptoms postoperatively, whereas avoidant strategies were positively related to both distress ($b = .31$, $SE = .03$) but not fatigue symptoms. All other paths in these three models were essentially similar to those in Figure 1.

DISCUSSION

The purpose of this study is to better understand the influence of coping strategies in patients undergoing cardiac surgery. Our findings replicate and extend the limited research on this topic, which document the harmful effects of maladaptive coping (anger and avoidant strategies) and the favorable role of active coping (Anderson, 1987; Boudrez & Backer, 2001; Burkert et al., 2005; Shen et al., 2006). The present study, however, expands the existing literature by linking these strategies with other research that suggests the protection of faith factors in this population (Ai et al., 1998; Contrada et al., 2004; Oxman et al., 1995). The investigation was driven by the theories of Lazarus and Folkman (1966, 1982, 1991; Lazarus & Folkman, 1984), James (1901, 1902, 1958), and Heckhausen and Schulz (1995) on stress, coping, prayer, and control. Specifically, this multi-wave survey demonstrates the mediation of one form of active coping (cognitive strategies) that may explain the potential beneficial role of preoperative prayer coping in SPQOL of middle-aged and older patients.

These findings provide support for the adaptive faith-based coping in cardiac patients. Moving beyond the previous evidence (Ai et al., 1998; Contrada et al., 2004; Oxman et al., 1995), this study also offers information on how the use of prayer coping may affect outcomes (Miller & Thoresen, 2003; Powell et al., 2003). The act of turning to a higher power, such as God, can itself function as secondary control (vicarious control) of crisis (Heckhausen & Schulz, 1995). In the attempt to understand the origin of

positive expectancies, Peterson (2000) argued that religion could serve as a source for putting a personal crisis into a large context, thereby nurturing optimism. Indeed, our preoperative analysis associated the faith-based pathway only with the more generally positive aspects of expectations (i.e., agency of the hope concept and optimism of the LOT measure) while the secular pathway affected all subconstructs (i.e., agency, pathway, optimism, and hope) in that study (Ai et al., 2004). This pattern suggests an inspirational aspect of using private prayer for coping, in comparison with the concrete support of secular resources. Faith-based involvement, such as prayer, often sheds a bright and unwavering light into a promising future in the presence of adversity. This study further implies that adaptive faith-based coping may embrace adaptive secular coping strategies which could turn a distressful event into positive perception and provide emotional comfort.

Interestingly, two forms of active coping are both related to preoperative prayer. However, only cognitive, but not behavioral, coping strategies have desirable influences on SPQOL measures, contrary to Wills's (1996) finding. This association needs to be interpreted within the context of cardiac surgery. Informed with the life-altering nature of this operation preoperatively, older adults would have little choice concerning the immediate outcome but leave it to a medical team under the auspices of the cardiac surgeon (Ai et al., 2004). Behavior strategies, measured by Wills's (1996) scale, are more likely to function as striving for primary control and therefore to act in vain under this extraordinary circumstance. By contrast, cognitive strategies primarily target the changing perception of a difficult situation toward a positive orientation. Through accepting the lost primary control and taking a different attitude, a sense of secondary control could then prevail, curbing postoperative distress and preventing energy exhaustion from surgery related difficulties. This finding should have clinical implications for medical and psychosocial interventions with preoperative patients.

The study reveals nothing new about the protective benefits of social support for patients undergoing cardiac surgery (Brummett et al., 1998; Burker et al., 1995; Jenkins et al., 1996; Kulik & Mahler, 1993; Oxman et al., 1994; Pirraglia et al., 1999). As we expected, in the face of a life-altering crisis, patients appear to mobilize their concrete resources beyond spiritual support of their faith. The mediation of social support in the effect of intrinsic faith on better outcomes has also been shown by Hughes et al. (2004). The current analysis offers additional evidence using a prospective design and SEM, which has the advantage of simultaneously estimating a theory-based structure among constructs with measurement errors taken into account. David Wilson (2002) has put faith-based coping in the large perspective of human history, documented with diverse belief legacies. Within an adaptive social unit that shares the same faith, a spiritual approach to coping is likely to generate "reciprocal altruism" among its members. In the case of our study, they are family, friends, and significant others in patients' networks.

In addition, we find a direct benefit of marriage on SPQOL apart from its influence on perceived social support. Yet, it should also be noted that married patients are also likely to have an age advantage. Inconsistent with our expectations, however, older persons did not have more fatigue symptoms but had fewer acute PTSD symptoms, which were in turn related to poor SPQOL. In the preoperative analysis, greater generally optimistic expectations were also demonstrated among older patients (Ai et al., 2004). Both cases may shed some positive light on age-related wisdom in dealing with stress. Alternatively, older patients are more likely to be survivors of or to have grown out of other drastic experiences in their lives. Chronic conditions, as a correlate to age, contribute to poor SPQOL, directly and indirectly. As shown by the bivariate analyses, these conditions were associated with both active (cognitive) and maladaptive (anger and avoidant) coping strategies. Likely, those who had more illnesses, in addition to their cardiac conditions, have to use all available means to deal with an uncontrollable situation (e.g., a major medical operation). Finally, consistent with the retrospective study (Ai et al., 1998), none of the exogenous factors we examined were related to prayer coping.

LIMITATIONS AND IMPLICATIONS

Self-reported health and mental health conditions may not be as reliable as clinical evaluation. Wills's (1996) scale has an advantage of simplicity given the health condition of the current sample. However, the Cronbach's alphas of the two maladaptive coping scales were low. One possibility may be the few items used in this study. Items of anger and avoidant coping may somewhat overlap with distress symptoms. However, cognitive and behavior coping strategies measures are unlikely to have such caveat. Therefore, although this scale may be less ideal than some other coping measures, the findings on cognitive coping should be convincing. Further, the validity of prayer coping will need to be evident in future study. Alternative approaches to measure coping strategy, social support, faith-based coping, and QOL should also be informative and deserve future investigation.

Because prayer coping was not associated with distress and fatigue symptoms in bivariate analysis, this fact may raise questions about test of mediation in a Baron and Kenny (1986) paradigm, established over 20 years ago. It assumed that if A is related to both B and C and introducing C leads to the diminishing A–B association, then C is considered to be the mediator of A. Although this paradigm still holds, its limitations can be noted after causal modeling has been used as a better tool for mediation testing. First, regression analysis sometimes has “covariance fallacy,” as noted by national leaders in the aforementioned special issue of the *American Psychologist* (Miller & Thoresen, 2003). Second, regression analysis does not have the advantage of simultaneous estimation of the aforementioned A–B–C associations

at the beginning of this article. In SEM, putting already associated A–B, A–C, and B–C links in one analysis may not always be ended with a fit model, detectably by multiple model-fit indexes. Third, an insignificant bivariate correlation can sometimes cover complex relationships between A and C if there is an undetected counterbalancing pathway running through them. For these reasons, SEM is a more appropriate solution for testing these multilinear associations.

Although the mediation of psychosocial factors, such as active coping strategies and social support, was demonstrated, the effect size was modest. SEM has the advantage of estimating mediations and pathways with measurement errors tested. It nonetheless does not function as experimental design and leaves out un-measured confounding factors. Nor does it eliminate alternative models. The present analysis did not include cardiac data. The retrospective survey (Ai et al., 1998) and several other studies (Boudrez & De Backer; 2001; Contrada et al., 2004) on similar patients, however, have not found the impact of medical or cardiac factors on QOL or short-term postoperative outcomes (i.e., hospital length of stay). Oxman and Hull (1997) thus suggested that reversibility of functional impairment from the same types of surgical intervention is more important than conditions underlying cardiac surgery. Especially in the month immediately following operation when postoperative mortality is at its peak, severe surgery wounds themselves could overshadow some other impacts of postoperative factors. Furthermore, findings from a convenience sample may not be generalizable to other populations. Replication of the model on these theoretical associations in other diverse populations is needed.

Despite these limitations, the current findings provide valuable information on the preoperative use of faith-based coping with a life-altering event. The final model supports Pargament, Magyar-Russell, and Murray-Swank's (2005) recent argument that faith factors may serve as a source for coping with distress and contributor to health. The study may offer the first evidence that these effects may be explainable by the addition of psychosocial factors (e.g., cognitive coping and social support). The present study may therefore also help fill a few gaps in cardiac and mental health research on the faith–health linkage as recommended in the aforementioned special issue. Theoretically, it can help researchers to better understand the psychology perspective of James's (1901/1902/1958) notion on prayer in distress and the coping strategies of patients in the face of a life-altering surgery.

Further, the results may have some implications for psychosocial interventions with middle-aged and older cardiac patients with respect to what strategies should be used for coping with adverse conditions beyond personal control. These strategies, however, should be more effectively considered and constructed within the sociocultural and faith-based context of individuals striving for a better life postoperatively. Specifically, the study suggests that health and mental health professionals, including social workers

in health care, can focus on adaptive coping and on social support, in relation to cardiac patients' faith, in order to enhance the outcomes of an expensive major medical procedure.

Finally, the results of this study have implications for the role of strengths/resilience in relation to coping with chronic illnesses and medical procedures. As noted earlier, for example, optimism was positively associated with age among cardiac patients, and this outlook in the face of potential adversity (e.g., surgical complications) may also have a spiritual component. In sum, coping with uncertainty and surrendering control during a major medical intervention such as cardiac surgery has multiple components. Existing models of coping are better understood by incorporating perspectives that include identifying strengths such as optimism and spirituality, as well as support from family (in this case, via marriage) and spiritual forces (e.g., invoked through prayer). Evidence-based practice is therefore enhanced through the integration of data-driven and conceptual models. "As team members, gerontological social workers may need to educate older patients and other health care professionals about the importance of a contextual biopsychosocial-spiritual approach to cardiac care" (Ai & Carrigan, 2006, 25).

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