Does Who You Marry Matter for Your Health? Influence of Patients’ and Spouses’ Personality on Their Partners’ Psychological Well-Being Following Coronary Artery Bypass Surgery

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Research suggests that presurgical personality attributes influence postsurgical well-being in both patients and their spouses in the context of coronary artery bypass grafting (CABG) surgery. The authors hypothesized that a spouse’s characteristics would influence a partner’s psychological well-being, regardless of whether he or she was the patient or the caregiver. In this study, 111 male patients and their caregiver spouses completed measures of neuroticism, optimism, perceived marital satisfaction, and depression prior to elective CABG. Follow-up was conducted at 18 months. As expected, higher caregiver presurgical neuroticism predicted higher patient depressive symptoms at follow-up, with caregiver’s concurrent 18-month affect controlled for. Likewise, higher patient presurgical neuroticism predicted higher caregiver depressive symptoms at follow-up. Additionally, higher patient presurgical depressive symptoms and lower presurgical optimism contributed to greater caregiving burden. Relationship satisfaction moderated these effects. These results suggest that partners’ personality traits are important determinants of both patients’ and their caregiving spouses’ well-being.

Keywords: marital satisfaction, neuroticism, optimism, depression, coronary artery bypass grafting

Coronary heart disease is the leading cause of death in the United States and most industrialized Western nations (American Heart Association, 2002). With more than 570,000 procedures performed annually, coronary artery bypass grafting (CABG) is the most common invasive treatment with a procedural mortality rate of 1%–2% (American Heart Association, 2002). A host of factors including age at time of surgery, left ventricular function, time of intervention, number of grafts, and comorbid medical conditions are predictive of subsequent morbidity and mortality (Eagle et al., 1999).

Health quality of life following CABG is significantly improved in the majority of patients (Eagle et al., 1999; Herlitz et al., 2001; Wahrborg, 1999). Although distress is common prior to surgery, with nearly half of all patients reporting moderate to severe levels of fear and anxiety (Koivula, Paunonen-Ilmonen, Tarkka, Tarkka, & Laippala, 2001), psychological well-being is understandably improved following successful intervention (Brorsson, Bernstein, Brook, & Werko, 2001; Herlitz et al., 2001). Despite these improvements, clinically significant levels of depressive symptoms are reported in 20%–30% of patients 6 months following surgery (Boudrez & DeBacker, 2001; Pirraglia, Peterson, Williams-Russo, Gorkin, & Charlson, 1999). Depression is increasingly recognized as an important risk factor for cardiac morbidity and all-cause mortality (Smith & Ruiz, 2002; Suls & Bunde, 2005). For example, prospective research has demonstrated that following myocardial infarction, depressive symptoms are predictive of future myocardial infarction and mortality (Bush et al., 2001; Carney et al. for the ENRICHD Investigators, 2004; Frasure-Smith, Lesperance, & Talajic, 1993; Ladwig, Kieser, Konig, Breithardt, & Borggrefe,
1991). In addition, CABG patients who report more depressive symptoms after surgery appear to be at higher risk of mortality than those patients reporting fewer symptoms (Blumenthal et al. for the NORG Investigators, 2003; Borowicz et al., 2002; Connerney, Shapiro, McLaughlin, Bagnella, & Sloan, 2001; Peterson et al., 2002; Ruiz, Matthews, Scheier, Wortman, & Schulz, 2005). Hence, postsurgical depressive symptoms are an important measure of quality of life as well as risk of future morbidity and mortality.

Influence of Patients’ Presurgical Characteristics on Their Own Postsurgical Well-Being

Patients’ premorbid emotional status is increasingly recognized as an important predictor of mental and physical outcomes after CABG. Presurgical distress and poor quality of life prior to surgery predict increases in postsurgical depressive symptoms, lower quality of life, greater functional impairment, and slower return to work at follow-up (Duits, Boeke, Taams, Passchier, & Erdman, 1997; Perski et al., 1998; Rumsfeld et al., 1999; Soderman, Lister, & Sundin, 2003). Presurgical depressive symptoms are particularly relevant to postsurgical cardiovascular health, as measured by subsequent cardiac events (Burg, Benedetto, Rosenberg, & Soufer, 2003; Perski et al., 1998; Saur et al., 2001) and postsurgical mortality (Baker, Andrew, Schrader, & Knight, 2001; Burg, Benedetto, & Soufer, 2003). In addition to premorbid emotional status, patients’ presurgical personality traits, particularly neuroticism, are associated with higher levels of presurgical distress and with increases in depression and anxiety over a 6-month postsurgical follow-up (Duits et al., 1999). Moreover, neuroticism also appears to moderate the strength of the relationship between presurgical anxiety and later depressive symptoms, such that people with more neuroticism experience greater acute distress, which predicts later depression (Duits et al., 1999). In contrast to negative personality traits, higher optimism is associated with lower rehospitalization rates following difficult medical procedures such as CABG (Scheier et al., 1999). Hence, patients’ neuroticism, optimism, and distress appear to be important determinants of presurgical emotional distress as well as postsurgical physical and psychological outcomes. These relationships are noted in Figure 1, Pathway A.

Spouse Adaptation to CABG Surgery

The emotional impact of illness extends beyond patients to include close social network members, particularly spouses (Delon, 1996; Fengler & Goodrich, 1979; Han & Haley, 1999). Spouses routinely experience significant emotional distress in re-

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![Figure 1](image-url)

**Figure 1.** The transitive model illustrates three types of effects. First, individuals’ own presurgical traits influence their own postsurgical well-being (within-person effects; Pathways A and B). Second, the current affect of one spouse influences the current affect of the partner (Pathway C). Third, caregivers’ presurgical traits influence their partners’ postsurgical well-being (transitive effects; Pathways D and E). Finally, presurgical marital satisfaction is hypothesized to moderate the within-person and transitive effects of presurgical personality traits (Pathway F).
spouse to patients’ CABG (Artinian, 1991, 1992; Karmilovich, 1994; Langeludecke, Tennant, Fulcher, Barid, & Hughes, 1989; Stanley & Frantz, 1988). Spouses commonly report anxiety, depressive symptoms, increased irritability, and difficulties with sleep prior to CABG (Bengtson, Karlsson, Wahrborg, Hjalmarson, & Herlitz, 1996; Langeludecke et al., 1989) and experience significant distress during the acute rehabilitation phase (O’Farrell, Murray, & Hotz, 2000). Moreover, spousal distress often remains elevated 12 months postsurgery while perceived caregiving burden increases during the 1st year (Artinian, 1992). Spouses report worries about prognosis, follow-up care, patient distress, changes in roles, changes in social relationships, financial concerns, sexual concerns, and patient helplessness or apathy (Artinian, 1992; Bengtson et al., 1996; Cozac, 1988; O’Farrell et al., 2000).

Influence of Spouses’ Presurgical Characteristics on Their Own Postsurgical Well-Being

Like patients, spouses’ personality traits influence their own presurgical distress as well as postsurgical adaptation to patients’ CABG surgery (Patrick & Hayden, 1999). Numerous studies across illness domains support that spouses’ trait neuroticism predicts their own caregiving burden and distress (Bookwala & Schulz, 1998; Hooker, Monahan, Shifren, & Hutchinson, 1992; Nijboer, Tempelaar, Triemstra, van den Bos, & Sanderman, 2001; M. F. Reis, Gold, Andres, Markiewicz, & Gauthier, 1994; Vedhara, Shanks, Wilcock, & Lightman, 2001). Conversely, more optimistic spousal caregivers report greater resilience to the demands of caregiving including less depressive symptoms over time (Given et al., 1993; Hooker et al., 1992; Kurtz, Kuritz, Given, & Given, 1997). These relationships are noted in Figure 1, Pathway B.

Influence of One Spouse’s Affect on Partner’s Concurrent Affect

In addition to within-person effects, spouses may also influence the experience of one another. Relationship experts suggest not only that interpersonal influences occur between individuals but that the frequency and magnitude of these effects are greater between people who share a close relationship such as with marital couples (i.e., interdependence theory; cf. Rusbuldt & Van Lange, 2003). For example, research supports the idea that the current affect of one spouse may influence the current affect of his or her partner—so-called contagion effects (Nieboer et al., 1998; Schulz, Bookwala, Knapp, Scheier, & Williamson, 1996). In a study of 1,040 older couples, Bookwala and Schulz (1996) found that the current affect of one spouse was associated with the partner’s affect. These results suggest that if one spouse is distressed following CABG surgery, the partner is likely to be distressed as well. Although the mechanisms for this phenomenon are not clear, contagion effects may be an additional important determinant of post-CABG depressive symptoms in both patients and their spouses. These relationships are noted in Figure 1, Pathway C.

Transitive Influence of Couples’ Presurgical Characteristics on Their Partners’ Adaptation

Although contagion effects support a cross-sectional influence of one spouse on the partner’s experience, spousal influences may also take place longitudinally. However, less is known about the potential influence of one person’s presurgical personality on the spouse’s postsurgical well-being. We propose the transitive model to illustrate these potential cross-sectional and longitudinal interpersonal influences among couples in the context of illness (see Figure 1).

Derived from the clinical and interpersonal literature, the term transitive refers to the influence one person has on a second person (Benjamin, 1996; Kiesler, 1996; Sullivan, 1953). For example, someone smiling at us may shift our mood from neutral to positive. The person’s smile is transitive in that it causes our change in mood. Moreover, if that person’s positive personality motivated the smile, we might say that the person’s personality had a transitive influence on our experience. It is notable that this transitive model does not abandon the traditional within-person relationship whereby we expect that our affect and experience are influenced by our own personality (see Figure 1, Pathways A and B). Rather, the transitive model emphasizes an interpersonal framework in which each individual also influences the experience of the other dyad member (see Figure 1, Pathways D and E).

Support for the Transitive Perspective

Research examining transitive interpersonal effects is sparse in the health literature and more generally. Despite interest in interpersonal processes among social psychologists, few prospective studies independently assess both an individual and members of the social network. Rather, researchers often rely on structural measures of social environments (e.g., size of one’s social network or marital status) and a perception of interpersonal attributes and influence (e.g., perceived characteristics, perceived support and support quality). However, the few studies that have examined such relationships appear to support the transitive hypothesis. For example, Beach and colleagues found that lower marital satisfaction in one spouse predicted later depressive symptoms in the partner (Beach, Katz, Kim, & Brody, 2003), although a similar study of newlyweds did not find such a relationship (Fincham, Beach, Harold, & Osborne, 1997). In another line of research, Agnew, Loving, and Drigotas (2001) found that in a sample of college-age couples, individual perceptions of relationship closeness predicted future relationship breakups. In the context of caregiving and health, a literature review of caregivers of patients with Alzheimer’s disease concluded that patient depression was strongly associated with distress and depression in their caregivers (Teri, 1997). Subsequent findings across several illness domains also support patient distress as a significant source of caregiver burden (Dyck, Short, & Vitaliano, 1999; Fang, Manne, & Pape, 2001; Northouse, Templin, & Mood, 2000; Scholte op Reimer, de Haan, Rijnders, Limburg, & van den Bos, 1998). However, we found no prospective studies examining spousal characteristics as predictors of patients’ health and well-being; no studies examining these relationships in the context of a discrete event such as CABG surgery (vs. longitudinal studies of cancer or dementia), and no studies looking at dispositional characteristics such as personality, as opposed to disease severity or emotional distress.

Marital Satisfaction as a Potential Moderator

Presurgical relationship quality is an important predictor of postsurgical well-being for couples facing CABG (Kulik &
Mahler, 1989, 1993; Lindsay, Hanlon, Smith, & Wheatley, 2000; Pirraglia et al., 1999). For example, Elizur and Hirsh (1999) found that patients who reported higher preoperative marital quality displayed better psychological recovery 2 months following CABG procedures. Allen, Young, and Xu (1998) found that female patients who reported better marital quality prior to CABG displayed better functional status 6 and 12 months post-CABG. Because of a lack of research examining both constructs as simultaneous predictors, it is not clear that marital satisfaction predicts health independent of personality. Interpersonal theories along with supporting evidence suggest that personality traits impact trajectories of marital quality (cf. Karney & Bradbury, 1997; Kiecolt-Glaser & Newton, 2001). This evidence suggests that personality supersedes marital satisfaction with implications for health. A plausible alternative to both as predictors is that marital satisfaction may moderate the relationship between personality and health. H. T. Reis and Collins (2004) and H. T. Reis, Collins, and Berscheid (2000) hypothesized that the relational context of interpersonal behavior influences the impact of such behavior on the interpersonal target. For example, in two studies of couples coping with kidney transplants, Frazier, Tix, and Barnett (2003) demonstrated that unsupportive spousal-caregiver behaviors were associated with higher patient distress but only when the patient was less satisfied with the relationship. Thus, we hypothesized that the degree to which a person is satisfied or dissatisfied with his or her relationship moderates the extent to which that person is influenced by the spouse’s personality (Figure 1, Pathway F). That is, the impact of one person’s personality on the partner’s outcomes may be more or less strong depending on the level of satisfaction that the person experiences.

In summary, CABG surgery is an efficacious intervention for advanced coronary heart disease. However, the stress of the procedure and the underlying disease is associated with significant distress in both patients and caregivers. Characteristics such as neuroticism, optimism, presurgical distress, and relationship quality predict adjustment in both patients and their caregivers. In addition, interpersonal theories coupled with sparse evidence suggest that presurgical characteristics may have transitive interpersonal effects such that the characteristics of one person affect the partner’s adaptation, particularly when illness occurs in the context of close relationships such as marriage. However, no published studies have prospectively examined these relationships in a discrete medical event context such as CABG surgery nor have studies examined these relationships as a function of dispositional characteristics. In addition, we are unaware of any published studies having examined both marital satisfaction and personality traits as concurrent predictors or studies examining marital satisfaction as a possible moderator of transitive relationships between personality and health. Given the importance of close relationships such as marriage, particularly during an individual’s time of need, transitive interpersonal effects of personality may be a fundamental part of adjustment to major life stressors.

**Current Study**

One hundred and eleven male patients and their caregiver spouses completed measures of neuroticism, optimism, depressive symptoms, and perceived marital satisfaction prior to elective CABG surgery. Follow-up was conducted at 18 months postsurgery. For the current study, postsurgical well-being was conceptualized as depressive symptoms for both patients and caregivers, and caregivers’ well-being also encompassed caregiving burden and strain. Our major expectations were as follows: We expected patients’ depressive symptoms at follow-up to be associated with (a) higher presurgical depressive symptoms and neuroticism as well as lower optimism; (b) higher caregiver presurgical depressive symptoms, higher neuroticism, and lower optimism; and (c) the interaction between patients’ presurgical marital satisfaction and their caregivers’ personality.

Caregiver-spouse predictions were analogous to patient hypotheses. In addition, caregivers completed measures of caregiving burden and strain. Thus, we expected caregivers’ postsurgical burden to be associated with (a) higher presurgical burden, neuroticism, and depressive symptoms as well as lower optimism; (b) higher patient presurgical depressive symptoms, higher neuroticism, and lower optimism; and (c) the interaction between caregivers’ presurgical marital satisfaction and patients’ personality. Parallel predictions were made for caregiver strain.

**Method**

**Sample**

Participants for this study were drawn from a larger pool of patients participating in the Pittsburgh Bypass Project. Participants were recruited from 528 consecutive patients scheduled for elective CABG surgery at Allegheny General Hospital in Pittsburgh, Pennsylvania, between June 1992 and January 1994 (Scheier et al., 1999). Eligibility criteria were (a) first-time referral for coronary artery bypass surgery with no concurrent procedures, (b) no acute chest pain at the time of the initial interview, (c) 1-day minimum between time of scheduled procedure and actual procedure, (d) not admitted to the intensive care unit, (e) English speaking, and (f) residence within 125 miles (201.17 km) of Allegheny General Hospital. The baseline patient sample consisted of 309 participants (215 men, 69.6%).

The caregiver was identified by the patient as someone who would help or take care of him when he returned home. Of the original patient sample, 287 reported having a caregiver, of whom 206 were contacted, with 144 (128 women, 88.9%) participating at baseline.

Participants for the present study consisted of the 111 married couples in which the husband was the patient and the wife participated as the caregiver. There were insufficient numbers of female patients/husbands as caregiver dyads to perform any meaningful analyses (n = 13). Husbands were generally older than their wives (see Table 1). Of the original 111

<table>
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<th>Variable</th>
<th>Patient</th>
<th>Caregiver</th>
</tr>
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<tbody>
<tr>
<td>N</td>
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<td>Age (years)</td>
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</tr>
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<tr>
<td>&lt;HS diploma</td>
<td>25</td>
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<td>HS diploma or some college</td>
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<td>75</td>
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<td>College degree</td>
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<tr>
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<td>46</td>
<td>47</td>
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<tr>
<td>No</td>
<td>65</td>
<td>64</td>
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</table>

*Note. Difference between patient and caregiver mean baseline age was significant, t(110) = 8.31, p < .001. HS = high school.*
husband/patient couples, 97 participated in the 18-month data collection (11 couples either could not be located or declined further participation, and 3 patients had died, resulting in the loss of the dyad).

**Procedure**

The office of the cardiothoracic surgeon made all referrals. Face-to-face baseline interviews were scheduled and conducted by trained interviewers between 1 and 20 days before the scheduled surgery. During the course of this study, surgical practices changed so that elective surgeries were scheduled within 1 or 2 days of diagnosis as opposed to 7–10 days, accounting for the variability in time for administration of the presurgical interviews. In all cases, informed consent was obtained prior to conducting the interviews. Follow-up interviews were conducted at 6–8 days, 6 months, and 18 months postoperatively. Caregivers were followed up at 6 months and 18 months postoperatively.

**Psychosocial Measures**

All participants completed measures of dispositional optimism, depressive symptoms, neuroticism, and relationship satisfaction. Optimism was measured with the 6-item Revised Life Orientation Test (Scheier, Carver, & Bridges, 1994). Higher total score was interpreted as greater trait optimism. Neuroticism was measured with a 10-item version of the Neuroticism scale of the Eysenck Personality Questionnaire (Eysenck, 1958; Goh, King, & King, 1982). Depressive symptoms were measured with a 10-item version of the Center for Epidemiologic Studies Depression Scale (Radloff, 1977). The current version excluded somatic symptoms because these could be influenced by differences in cardiac/medical symptoms. These exclusions limit interpretation of scores with respect to their clinical significance. However, the measure is useful as an index of depressive symptoms. Alpha reliabilities for this version have been reported in the range of .82–.93 (Nieboer et al., 1998; Scheier et al., 1999). Finally, the Dyadic Relationship Scale (Skinner, Steinbauer, & Santa-Barbara, 1983) is a 14-item self-report measure of relationship satisfaction with a specific other. Individuals rate the degree to which they agree with statements regarding their partner’s communication, affective expression, and affective involvement. Example items include “Even if this person disagrees, he or she listens to my point of view” and “When I am upset, I know this person really cares.” Items are rated on a 4-point Likert scale (1 = strongly disagree, 4 = strongly agree) and are totaled to yield an overall score. In the current study, husbands and wives completed the measure with respect to each other, which was interpreted as a measure of marital satisfaction. Alpha reliabilities for patients and spouses ranged from .88 to .90.

Caregivers also completed measures of caregiver burden and strain prior to surgery and at 6 and 18 months post-CABG. The Burden scale is based on the Zarit Burden Interview (Zarit, Reever, & Bach-Peterson, 1980) and assesses how often the individual feels oppressed by various aspects of caregiving. Participants responded using a 3-point Likert scale ranging from 1 (never) to 3 (often). Example items include “I feel useful in my interactions with this person” and “I feel resentful of other relatives who could but who do not do things with or for this person.” Alpha reliabilities were .81 for presurgical burden and .84 at the 18-month follow-up. The Zarit Burden scale assesses the frequency with which spouses experience certain feelings. To complement this frequency scale, a 20-item Caregiver Strain Scale was developed for this project to assess the magnitude of burden associated with common aspects of caregiving. Participants were given the stem “Please indicate how much strain each of these has caused for you in the past month” and asked to respond to 20 items on a 3-point Likert scale (1 = none, 3 = a great deal). Items included “lack of gratitude,” “social isolation,” and “insurance concerns.” Alpha reliabilities were .90 for presurgical strain and .94 at the 18-month follow-up. Pearson correlations between the Burden and strain scales were .77 (p < .001) prior to surgery and .69 (p < .001) at the 18-month follow-up.

**Medical Information**

Medical information was gathered from several sources including the cardiac catheterization report, the operative report, and inpatient medical records. The catheterization report yielded the following information: (a) number of grafts, (b) number of coronary vessels occluded 50% or more, and (c) ejection fraction less than 40%. Hospital medical records yielded (a) current smoking status (smoker or not), (b) history of hypertension, (c) history of diabetes mellitus, and (d) presurgical serum cholesterol. A separate record contained the patient’s preoperative New York Heart Association classification as well as current or immediately preoperative episodes of acute myocardial infarction, congestive heart failure, or unstable angina.

**Analysis Strategy**

Linear regression was used to test hypotheses regarding the influence of each person’s presurgical traits (optimism, depressive symptoms, neuroticism, and relationship satisfaction) on the spouse’s 18-month well-being (e.g., depressive symptoms). First, simple correlations were performed between presurgical and postsurgical outcome variables. Second, we calculated partial correlations in order to identify candidate presurgical predictors for inclusion in the overall multivariate analyses. Postsurgical outcomes were correlated with each patient and spouse presurgical predictor, with presurgical values of the outcome controlled for. For patients, none of the eight medical (five preoperative and three postoperative) or two demographic (age and income) variables were associated with 18-month depressive symptoms and, thus, were not included in the regression models. Similar null results were found for patient medical covariates and spouse-caregiver demographics on caregivers’ 18-month depressive symptoms and measures of caregiving burden.

In the third analysis phase, we regressed each significant presurgical predictor to emerge from the second phase of analysis onto the 18-month postsurgical outcome. Linear regressions were conducted in steps. First, the outcome-matched presurgical term along with any of the individual’s own significant presurgical predictors were regressed simultaneously. This approach allowed us to account for as much variance in the postsurgical outcome as could be predicted by the individual’s own presurgical characteristics prior to examining any additional variance explained by the spouse’s presurgical characteristics. In the second step, any significant spouse presurgical predictors were entered in a stepwise manner to determine the best partner predictors of additional variance. In describing the analyses, we report the unstandardized (B), standard error, and standardized (β) regression coefficients. We also report the overall multiple correlation squared (R²) for the final model as well as the ΔR² for the model reflecting the individual’s own predictors and the ΔR² for each additional model.

In separate analyses, linear regression was used to examine marital satisfaction as a potential moderator of transitive relationships on both patient and caregiver outcomes. First, all predictors were entered. Next, four sets of interaction terms were created, two for examining caregiver effects on patients’ well-being (patients’ perceived marital satisfaction with caregiver traits and caregivers’ perceived marital satisfaction with their own traits) and two for examining patient effects on caregivers’ well-being (caregivers’ perceived marital satisfaction with patient traits and patients’ marital satisfaction with their own traits). Consistent with the preceding

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1 One medical/demographic covariate was correlated with caregiver outcomes. Partial correlations revealed that higher caregiver age was associated with lower 18-month perception of burden when we controlled for presurgical burden (r = −.22, p < .05). Caregiver age was entered into the first step of the regression model but did not remain significant when additional caregiver traits were added. Thus, caregiver age was dropped from the final model.
analytic methodology, patient and caregiver predictors were identified through partial correlations. Centered terms were created for these analyses. Regressions were performed in three steps: (a) the individual’s own traits, (b) the partner’s traits, and (c) the interaction terms entered stepwise. Variables in the first two steps were forced in using the “enter” method in order to account for their variance before the interaction terms were examined (Aiken & West, 1991). Significant interactions were plotted and examined using Aiken and West’s (1991) approach.

Results

Spousal Comparison on Traits and Outcomes

Table 2 reports the means and standard deviations for the psychosocial measures at baseline and at 18 months for patients and spouse-caregivers. Table 2 also reports the results of paired-sample t tests conducted to assess whether significant differences existed between dyad pairs on these measures as well as the correlations between the dyad pairs on the measures assessed. As shown, patient and caregiver traits were similar, with the exception of depressive symptoms. Prior to surgery, caregivers reported significantly more depressive symptoms as compared with their patients but reported similar levels of optimism, neuroticism, and marital satisfaction. After surgery, couples reported similar levels of depressive symptoms. Finally, with the exception of optimism, for each of the variables assessed, a significant positive correlation existed between the ratings made by the dyad pairs.

Patient Outcomes

We hypothesized that patient and caregiver traits measured prior to surgery would predict patients’ postsurgical depressive symptoms. In univariate analyses, patient’s presurgical and postsurgical depressive symptoms were positively correlated ($r = .47, p < .001$). However, patients’ depressive symptoms did not change significantly between presurgical levels and the 18-month follow-up (see Table 2). Partial correlations controlling for presurgical depressive symptoms revealed significant associations between patient 18-month depressive symptoms and both patient and caregiver presurgical predictors. Specifically, higher patient 18-month depressive symptoms were significantly associated with lower patient presurgical optimism, lower marital satisfaction, and higher neuroticism (see Table 3). In addition, lower caregiver presurgical optimism and higher presurgical neuroticism were also significantly associated with higher patient 18-month depressive symptoms. Hence, these patient and caregiver predictors were included in the overall regression model.

Multivariate analyses showed that higher 18-month depressive symptoms were predicted by patients’ higher presurgical depressive symptoms and lower presurgical optimism, accounting for 34% of the variance in scores. As expected, higher caregiver presurgical neuroticism accounted for an additional 6% of the variance (Table 4, Model 1). Thus, we found some support for the transitive hypothesis for patient depressive symptoms. Next, we examined patient and caregiver presurgical marital satisfaction as potential moderators of caregiver traits on patient depressive symptoms. Multivariate analyses showed that patient but not caregiver presurgical marital satisfaction emerged as a moderator of caregiver presurgical neuroticism on patient postsurgical depressive symptoms (Table 4, Model 2; see Figure 2A). Post hoc analyses revealed that postsurgical depressive symptoms were higher among patients who were less satisfied in their marriage prior to surgery and whose caregiving spouse was higher in presurgical neuroticism ($B = 1.13, p < .001$).

Caregiver Outcomes

For caregivers, we hypothesized that patient and caregiver traits measured prior to surgery would predict caregivers’ postsurgical depressive symptoms and caregiving burden and strain. Depressive symptoms. In univariate analyses, caregivers’ presurgical and postsurgical depressive symptoms were positively correlated ($r = .52, p < .001$). In contrast to patient findings, caregivers reported a significant improvement in depressive symptoms over time, $t(83) = 5.96, p < .001$ (see Table 2). Partial correlations controlling for postsurgical depressive symptoms revealed significant associations between spouse 18-month depressive symptoms and both caregiver and patient presurgical predictors. Specifically, higher caregiver 18-month depressive symptoms were significantly associated with lower caregiver presurgical optimism and marital satisfaction and higher caregiver neuroticism (see Table 3). Higher patient presurgical neuroticism, higher de-

Table 2

<table>
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<th>Time of assessment and measure</th>
<th>Scale</th>
<th>Patient $\bar{x}$</th>
<th>Caregiver $\bar{x}$</th>
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<th>r</th>
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<td></td>
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<tr>
<td>Depressive symptoms</td>
<td>CES-D</td>
<td>16.5 ($5.9$)</td>
<td>19.8 ($6.7$)</td>
<td>99</td>
<td>$4.13^{***}$</td>
<td>.23*</td>
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<tr>
<td>Marital satisfaction</td>
<td>DRS</td>
<td>45.2 ($5.8$)</td>
<td>45.4 ($6.6$)</td>
<td>100</td>
<td>$-0.22$</td>
<td>.30***</td>
</tr>
<tr>
<td>Optimism</td>
<td>LOT</td>
<td>21.9 ($3.6$)</td>
<td>21.9 ($3.7$)</td>
<td>104</td>
<td>$-0.04$</td>
<td>.17</td>
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<tr>
<td>Neuroticism</td>
<td>Eysenck</td>
<td>2.6 ($2.5$)</td>
<td>2.9 ($2.4$)</td>
<td>102</td>
<td>$-1.11$</td>
<td>.31***</td>
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<tr>
<td>18-month follow-up</td>
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<td></td>
<td></td>
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<tr>
<td>Depressive symptoms</td>
<td>CES-D</td>
<td>15.1 ($5.4$)</td>
<td>15.6 ($5.4$)</td>
<td>86</td>
<td>$-0.90$</td>
<td>.37***</td>
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</table>

Note. Standard deviations are in parentheses. CES-D = Center for Epidemiologic Studies Depression Scale; DRS = Dyadic Relationship Scale; LOT = Life Orientation Test; Eysenck = Eysenck Personality Questionnaire.

*a Comparison between patients’ presurgical and 18-month depressive symptoms, $t(90) = 1.54, ns.$  
*b Comparison between caregivers’ presurgical and 18-month depressive symptoms, $t(83) = 5.96, p < .001$.  
$p < .05.$  
$^{***} p < .001.$
Presurgical and postsurgical caregiving burden were positively correlated with lower marital satisfaction. Surgical depressive symptoms was not moderated by either patient or relationship between patients’ presurgical traits and caregivers’ post-surgical depressive symptoms was predicted by their own higher presurgical depressive symptoms and higher neuroticism, accounting for 47% of the variance in scores. Consistent with our hypotheses, higher patient depressive symptoms were predicted by higher presurgical burden, accounting for 38% of the variance. Finally, lower patient optimism also emerged as a significant predictor, accounting for an additional 5% of the variance in caregivers’ 18-month burden scores.

Caregiving burden. In univariate analyses, caregivers’ presurgical and postsurgical caregiving burden were positively correlated (r = .60, p < .001). No significant change was found between presurgical and 18-month postsurgical burden. Partial correlations controlling for presurgical burden revealed no significant associations between caregiver 18-month burden and any other of their own presurgical predictors. Higher caregiver 18-month burden was significantly associated with higher patient depressive symptoms, higher neuroticism, and lower optimism (see Table 3). Hence, these patient predictors were included in the overall regression model.

Multivariate analyses showed that higher caregiver 18-month depressive symptoms were predicted by their own higher presurgical depressive symptoms and higher neuroticism, accounting for 47% of the variance in scores. Consistent with our hypotheses, higher patient presurgical neuroticism accounted for an additional 12% of the variance in caregivers’ 18-month burden scores. Consistent with expectations, higher patient presurgical depressive symptoms emerged as a significant predictor, accounting for an additional 13% of the variance. Finally, lower patient optimism also emerged as a significant predictor, accounting for an additional 5% of the variance in caregivers’ 18-month burden scores.

Multivariate analyses showed that both patient (Table 5, Model 3; see Figure 2B) and caregiver (Table 5, Model 4; see Figure 2C)

Table 3
Partial Correlations Between Patient and Caregiver Presurgical Traits and 18-Month Patient and Caregiver Outcomes, Controlling for Presurgical Levels of the Outcome Variable

<table>
<thead>
<tr>
<th>Variable</th>
<th>Patient depressive symptoms</th>
<th>Caregiver depressive symptoms</th>
<th>Caregiver burden</th>
<th>Caregiver strain</th>
</tr>
</thead>
<tbody>
<tr>
<td>Patient presurgical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>.24* (77)</td>
<td>.48*** (78)</td>
<td>.42*** (77)</td>
<td></td>
</tr>
<tr>
<td>Optimism</td>
<td>−.38*** (87)</td>
<td>−.09 (78)</td>
<td>−.43*** (80)</td>
<td>−.07 (79)</td>
</tr>
<tr>
<td>Marital satisfaction</td>
<td>−.24* (84)</td>
<td>−.23* (76)</td>
<td>−.15 (78)</td>
<td>−.23* (77)</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>.37*** (86)</td>
<td>.47*** (77)</td>
<td>.38*** (78)</td>
<td>.30** (77)</td>
</tr>
<tr>
<td>Caregiver presurgical</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Depressive symptoms</td>
<td>.16 (85)</td>
<td>.05 (79)</td>
<td>−.05 (78)</td>
<td></td>
</tr>
<tr>
<td>Optimism</td>
<td>−.27** (87)</td>
<td>−.34** (80)</td>
<td>−.14 (82)</td>
<td>−.25* (82)</td>
</tr>
<tr>
<td>Marital satisfaction</td>
<td>−.06 (86)</td>
<td>−.25* (80)</td>
<td>−.13 (81)</td>
<td>−.35*** (80)</td>
</tr>
<tr>
<td>Neuroticism</td>
<td>.30** (85)</td>
<td>.46*** (78)</td>
<td>.14 (80)</td>
<td>.24* (79)</td>
</tr>
</tbody>
</table>

Note. Numbers of couples are in parentheses.
* p < .05. ** p < .01. *** p < .001.

Table 4
Multiple Regression Models Predicting Patient 18-Month Well-Being by Patient and Caregiver Presurgical Traits

<table>
<thead>
<tr>
<th>Model and patient 18-month depressive symptoms</th>
<th>B</th>
<th>SE B</th>
<th>β</th>
</tr>
</thead>
<tbody>
<tr>
<td>Model 1a</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient presurgical depressive symptoms</td>
<td>0.34</td>
<td>0.09</td>
<td>.36***</td>
</tr>
<tr>
<td>Patient presurgical optimism</td>
<td>−0.51</td>
<td>0.15</td>
<td>−.33**</td>
</tr>
<tr>
<td>Caregiver presurgical neuroticism</td>
<td>0.57</td>
<td>0.20</td>
<td>.25**</td>
</tr>
<tr>
<td>Model 2b</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Patient presurgical depressive symptoms</td>
<td>0.41</td>
<td>0.10</td>
<td>.41***</td>
</tr>
<tr>
<td>Patient presurgical optimism</td>
<td>−0.44</td>
<td>0.17</td>
<td>−.29**</td>
</tr>
<tr>
<td>Patient presurgical neuroticism</td>
<td>−0.09</td>
<td>0.28</td>
<td>−.04</td>
</tr>
<tr>
<td>Patient presurgical marital satisfaction</td>
<td>−0.14</td>
<td>0.10</td>
<td>−.15</td>
</tr>
<tr>
<td>Caregiver presurgical neuroticism</td>
<td>−0.04</td>
<td>0.16</td>
<td>−.03</td>
</tr>
<tr>
<td>Caregiver presurgical marital satisfaction</td>
<td>0.46</td>
<td>0.26</td>
<td>.20</td>
</tr>
<tr>
<td>Caregiver presurgical marital satisfaction</td>
<td>0.16</td>
<td>0.09</td>
<td>.19</td>
</tr>
<tr>
<td>Caregiver Presurgical Neuroticism × Patient Presurgical Marital Satisfaction</td>
<td>−0.12</td>
<td>0.04</td>
<td>−.31***</td>
</tr>
</tbody>
</table>

Note. Only models demonstrating a significant transitive effect are shown. All coefficient values reflect the final regression model.

a Overall \( R^2 = .40 \); patient predictors, \( R^2 = .34 \); caregiver predictor, \( \Delta R^2 = .06, p < .01 \). b Overall \( R^2 = .47 \); interaction term, \( \Delta R^2 = .08, p < .001 \).

** p < .01. *** p < .001.
marital satisfaction emerged as moderators of patient traits on caregiver burden. Post hoc analyses revealed that caregiving burden was higher among caregivers who were less satisfied in their marriage prior to surgery and who were caring for a patient-spouse higher in presurgical neuroticism ($B = 0.56$, $p < .05$). Caregiving burden was also higher among caregivers who were caring for patient-souses who themselves were less satisfied in their marriage and who reported higher presurgical depressive symptoms ($B = 0.43$, $p < .001$).

Caregiving strain. Univariate analyses revealed caregivers’ presurgical and postsurgical strain were positively correlated ($r = .65$, $p < .001$). No significant change was found between presurgical and 18-month postsurgical strain. Partial correlations controlling for presurgical strain revealed significant associations between caregivers’ 18-month strain and both caregiver and patient presurgical predictors. Specifically, higher 18-month strain was significantly associated with lower caregiver presurgical optimism, lower marital satisfaction, and higher neuroticism (see Table 3). Higher patient presurgical depressive symptoms and neuroticism as well as lower marital satisfaction were also associated with higher caregiver strain at 18-month follow-up. Hence, these caregiver and patient predictors were included in the overall regression model.

Multivariate analyses showed that higher 18-month caregiving strain scores were predicted by higher caregiver presurgical strain, higher neuroticism, and lower marital satisfaction, accounting for 56% of the variance in scores (Table 5, Model 5). In addition, higher patient presurgical depressive symptoms also predicted...
higher caregiver strain at 18 months, accounting for an additional 10% of the variance. Finally, patient presurgical neuroticism interacted with caregivers’ presurgical marital satisfaction, suggesting that among caregivers who reported higher presurgical marital satisfaction, higher patient presurgical neuroticism was associated with lower post-CABG caregiving strain (Table 5, Model 6; see Figure 2D). Post hoc analyses revealed a paradoxical relationship such that caregiving strain was higher among caregivers who were more satisfied in their marriage prior to surgery and who were caring for a patient-spouse lower in presurgical neuroticism ($B = -0.85, p < .05$).

**Spouses’ Current Versus Prospective Factors in Predicting Partner Depressive Symptoms**

Current affect of one spouse may influence the current affect of the partner—contagion effects (Figure 1, Pathway C). Contagion effects argue for congruent affective experiences among dyad
members. Hence, as an alternative to our prospective findings, we examined the possibility that 18-month outcomes were better accounted for by partners’ 18-month depressive symptoms.2

In univariate analyses, patients’ and caregivers’ 18-month depressive symptoms were positively correlated \( r = .37, p < .001 \). In addition, partial correlations revealed significant associations between patients’ and spouses’ 18-month depressive symptoms when either patients’ \( r = .27, p < .05 \) or caregivers’ \( r = .29, p < .01 \) presurgical depressive symptoms were controlled for. These findings are consistent with Figure 1, Pathway C.

Linear regression was used to test concurrent affect versus prospective factors of one spouse on the partner’s 18-month depressive symptoms. The regression model, including predictors and order of entry, was identical to those previously used for patient and caregiver 18-month depressive symptoms. To test whether the presurgical factors or concurrent affect of one spouse was a better predictor of the partner’s 18-month depressive symptoms, we also entered the predictor spouse’s concurrent 18-month depressive symptoms in the first step of the regression model. Concurrent affect was not a significant predictor for either patient or caregiver outcomes and did not significantly alter previously observed prospective findings. These findings suggest that presurgical factors and not concurrent affect are the stronger predictors of partner 18-month depressive symptoms among couples facing CABG surgery.

Discussion

The current study supports the hypothesis that personality characteristics are important prospective risk factors for the well-being of both individuals and their spouses. First, the findings demonstrate the importance of presurgical personality traits as within-person predictors of postsurgical adaptation. For patients, lower presurgical optimism predicted higher postsurgical depressive symptoms. For caregiver spouses, higher presurgical neuroticism predicted more postsurgical depressive symptoms and, along with lower presurgical marital satisfaction, contributed to greater postsurgical caregiving strain. Second, and perhaps more interesting, the current study demonstrates the importance of personality traits as independent predictors of partner’s adaptation in the context of marriage and illness. As predicted, partner’s presurgical neuroticism predicted higher postsurgical depressive symptoms for both patients and caregivers after we accounted for the individual’s own personality characteristics. It is important that we demonstrated that these transactional effects were not better explained by the concurrent affect of the spouse. In addition, higher patient presurgical depressive symptoms predicted higher caregiver postsurgical burden and strain, whereas higher patient optimism was associated with lower postsurgical caregiver burden. Together, these findings suggest that over and above a patient’s own risk factors, spouses’ psychosocial characteristics contribute unique risk to patient well-being.

Consistent with expectations, marital satisfaction emerged as a consistent moderator of transitive neuroticism effects. We generally found that the more dissatisfied people were with their marriage prior to surgery, the more damaging was their spouses’ neuroticism to their own well-being after surgery. These findings suggest that for couples who are less happy in their marriage and who are facing CABG surgery, higher neuroticism in one spouse is predictive of more postsurgical difficulties in the partner. Curiously, we found one exception to this pattern: Caregivers who were more satisfied in their marriage and who were caring for more neurotic patient-spouses reported less postsurgical strain. Future research should investigate whether this is a replicable finding or simply an anomaly in the data. Despite this finding, higher neuroticism emerged as an important interpersonal risk factor, either alone or as moderated by lower marital satisfaction, for all patient and caregiver outcomes examined here. These findings also clarify the role of presurgical marital satisfaction as a moderator of transitive personality influence rather than as a unique predictor of later well-being. Finally, analyses revealed that the prospective effects of personality remained significant after concurrent affect was accounted for. This finding suggests that personality is a more important predictor of partner depressive symptoms, at least in this data set, perhaps due to the stability of personality traits compared with the more transitive nature of mood variables such as depressive symptoms. In the absence of prior examples comparing such effects, our finding is somewhat exploratory. However, our rationale for the prediction was based on the idea that in established relationships, personality represents not only a consistent pattern of overt affect and behavior but a history of interacting with that pattern. This is not to say that transient mood is not important, but, at least in these data, experience outweighed the episodic.

Our results support a broader transitive conceptualization of the patient/caregiver-spouse relationship and, particularly, the role of personality traits within the model. Extending findings of neuroticism as an important predictor of individual depressive symptoms, the quality of caregivers’ neuroticism appears to be a critical contributor to their partners’ well-being for both patients and their caregivers in the context of a stressful event such as CABG surgery. Prior research suggests that more distressed individuals have more difficulty adapting. Perhaps neuroticism activates or exacerbates partner distress through greater interpersonal expressions of worry, communicating cause for concern, and pulling for greater attention from the caregiver. Higher patient depression prior to surgery was associated with more within-person depressive symptoms at follow-up and also with greater perceived burden and strain among caregiving spouses. It is conceivable that patient depressive symptoms may communicate to the caregiver cause for concern and pull for the spouse to assist in the patient’s recovery. Future research should attempt to explicate these factors. Regardless of the transitive mechanism, clinical interventions aimed at reducing depressive symptoms are likely to benefit the health and well-being of both spouses.

We should note that these findings also speak to the controversy regarding dispositional optimism and neuroticism as possibly two sides of the same coin (Scheier et al., 1994; Smith, Pope, Rhode- walt, & Poulton, 1989). Previously, Scheier et al. (1994) demonstrated that optimism accounted for a significant amount of variance in depressive symptoms, when they controlled for neuroticism. Our findings broaden this support by demonstrating

\[ r = .001, p \].

2 Analyses focused only on 18-month depressive symptoms because of the clear partner-matched variable (concurrent 18-month depressive symptoms). Caregiver burden and strain were not examined because of the lack of a patient-matched variable.
that when examined together, optimism and neuroticism display unique as opposed to redundant interpersonal effects, at least within the context of marital relationships and health.

More broadly, these findings support the transitive interpersonal model as an important concept for studying close relationships in the context of illness. This model has the potential to advance understanding of the complexities of individual health and well-being outcomes by considering the common social context in which they occur. The explicit emphasis on the transitive properties of personality traits may yield far more accurate predictions about patient–caregiver relationships than reliance on traditional assumptions of caregiver spouses as inherently supportive and patients as burdensome and instead suggests that each individual can improve as well as make more difficult the experience of his or her dyadic partner. Finally, in addition to considering the individual attributes of two people, the model also emphasizes the importance of relationship quality, with our findings supporting its role as a moderator of partner’s attributes on future well-being.

Despite these advances, the current study is not without its limitations. Although sufficient for demonstrating the interpersonal properties of personality traits in coping with illness, future research should use a wider taxonomy of traits or target traits with known interpersonal consequences such as hostility (McCrae & Costa, 1987; Trapnell & Wiggins, 1990; cf. Smith, Glazer, Ruiz, & Gallo, 2004). In addition, the current study was limited to dyads in which the patient was the husband, leaving open the question as to whether the observed effects are truly representative of patient/spouse-caregiver relationships, an effect of gender, or the interaction between gender and illness roles. Although unlikely, it is also possible that our findings are a result of a shared reporting style specific to couples facing a crisis such as CABG surgery. Comparisons with a control group not facing a crisis may have helped to examine this issue. We also used a number of nonindependent tests, which although based on a priori hypotheses may have inflated the risk of Type I error.

Finally, it is unclear whether transitive processes are specifically a health phenomenon, a shared-challenge phenomenon, or a more general relationship phenomenon. It is possible that health challenges motivate couples to interact more intensely in order to meet shared goals and responsibilities and that these acute interaction periods expose couples to more (frequent, duration) transitive effects. However, most couples are faced with various shared challenges at one time or another that require greater interaction (Karney & Bradbury, 1995; Kiecolt-Glaser & Newton, 2001). Hence, it may be the case that any period of heightened interaction increases exposure to transitive effects. Alternatively, established relationships represent repeated interpersonal interactions with the same person that may extingu cumulative effects independent of any specific challenge. Clearly, these issues were beyond the scope of the current study but warrant future research to explore the generalizability of transitive processes.

These qualifications aside, this study supports the transitive model as an important step in understanding adaptation to disease. In addition to addressing the aforementioned limitations, future research should examine the interpersonal influence of a wider range of caregivers. For example, the patient’s primary physician, surgeon, and health care staff may engender confidence or worry with implications for the trajectory of physical and emotional recovery of both the patient and the spouse. Similar attention should also be given to important social network members including family, friends, and coworkers as each group may influence the individual’s self-perception of recovery and a return to normal life or a need for continued concern. In addition, transactional processes also deserve more direct attention. For example, do patients higher in neuroticism transactionally create their own depression by overburdening their caregivers, causing them to be less supportive? Additional research on the transitive processes may facilitate a more complete understanding of psychosocial influences in the illness process and guide the development of appropriate interventions.

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