MARITAL ADJUSTMENT AMONG COPD PATIENTS PARTICIPATING IN
EXERCISE REHABILITATION

DISSERTATION

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Previous research suggests that marriage and marital satisfaction is associated with morbidity and mortality across various chronic diseases. However, no studies have examined marital adjustment in the context of patients with chronic obstructive pulmonary disease (COPD) participating in exercise rehabilitation, despite evidence suggesting that COPD may lead to marital distress. Fifty-two patients with COPD and their partners were evaluated on measures of marital adjustment before and after an 8-week exercise rehabilitation program. Patients were evaluated on measures of psychological well-being, pulmonary function, functional capacity, dyspnea, and quality of life. Specific hypotheses tested included: 1) marital adjustment and quality of life among COPD patients and their partners will be poor compared to a healthy normative sample, 2) depression and anxiety will mediate the relationship between marital adjustment and quality of life, 3) dyspnea will mediate the relationship between marital adjustment and quality of life, 4) marital adjustment will moderate the relationship between functional capacity and quality of life, 5) anxiety, depression, dyspnea, functional capacity, quality of life, and marital adjustment will improve over time among patients participating in an 8-week exercise rehabilitation program, and 6) baseline marital adjustment will predict changes in dyspnea, functional capacity, quality of life,
depression, and anxiety over an 8-week rehabilitation program. Results indicated several findings including: 1) contrary to expectations, patient and partner marital adjustment was high, 2) socioeconomic status was associated with patient functioning but not marital adjustment, 3) marital adjustment was associated with psychological well-being, functional capacity, and quality of life, 4) depression and anxiety mediated the relationship between marital adjustment and quality of life except when controlling for social support, 5) quality of life, functional capacity, and marital adjustment improved over time, and 6) drop-out from rehabilitation was associated with baseline levels of well-being and quality of life. These results suggest that marital adjustment is a relevant variable associated with patients suffering from COPD. However, measures of marital functioning beyond marital adjustment and a revised model of COPD may lead to a better understanding of the disease.
This effort is dedicated to my Father
He has been a source of endless encouragement and support
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CHAPTER 1

INTRODUCTION

Chronic obstructive pulmonary disease (COPD) is a progressive and debilitating condition typically occurring in men and women over the age of 60. Studies have documented the negative effects of COPD in several areas of functioning including physical performance, psychological well-being, social functioning, and overall quality of life. The physical disability resulting from COPD is associated with increased medical costs, reduced ability to engage in activities of daily living, and increased dependence. These changes may lead to financial strain, shifts in marital roles and responsibilities, decreases in social and sexual activities, and increased caregiving responsibilities for the spouse or family member (Cannon & Cavanaugh, 1998; Rabinowitz & Florian, 1992). Caregiving and shifts in marital roles may disrupt the normal course of marital development in old age. Indeed, the onset of late-life stressors has been implicated in declines in marital adjustment among older populations (Gagnon, Hersen, Kabacoff, & Van Hasselt, 1999; Melton, Hersen, Van Sickle, & Van Hasselt, 1995). Past studies have not addressed in a comprehensive manner the effect of COPD on marital adjustment and the reciprocal influence of marital adjustment on health and well-being.

Although there is an extensive literature on marriage and health, there is a paucity of research addressing the COPD population. Prior reviews of the marriage and health
literature included only one study specific to pulmonary disease, but this study was limited to six asthma patients (Burman & Margolin, 1992; Kiecolt-Glaser & Newton, 2001; Schmaling et al., 1996). Other published works that address marital relations in COPD tend to be reviews or theoretical manuscripts (Cannon & Cavanaugh, 1998; Rabinowitz & Florian, 1992). The only published empirical report evaluated 84 elderly COPD patients and their spouses in Finland (Isoaho, Keistinen, Laippala, & Kivela, 1995). Results indicated that COPD patients did not differ from healthy controls on measures of depression, but women tended to be more dissatisfied in their marriages than men or healthy controls. In addition, COPD was associated with dissatisfaction with life and marriage among women. One major problem with the Finnish study was that the measure of marital adjustment was not reliable, and marital adjustment was assessed with two questions. The few studies that have evaluated marriage among COPD patients suggest an important association, but studies need to utilize validated measures of marital adjustment, and evaluate marriage in the context of relevant COPD variables (e.g., dyspnea, psychological well-being, quality of life). This study was designed to address these issues by utilizing validated measures and by studying the relationships between dyspnea, anxiety, depression, quality of life, and marital adjustment.

**Definition and Diagnosis of COPD**

Chronic Obstructive Pulmonary Disease (COPD) is a medical term used to describe several pulmonary disorders characterized by obstructed airflow. It is the fourth leading cause of death and one of the leading causes of disability in the United States (LaPlant, 1989). Typically, COPD encompasses only chronic bronchitis and emphysema,
but asthma is sometimes included as well (Mahler, Barlow, & Matthy, 1986). Each pulmonary condition (i.e., chronic bronchitis, emphysema, and asthma) has a unique pathophysiology but shares a number of common physical symptoms, including impaired expiratory airflow, dyspnea, weakness, fatigue, and excessive cough. These diseases are commonly labeled COPD because patients typically are diagnosed with more than one of the three conditions.

Millions of Americans suffer from COPD and many die from the condition each year. In 1994 there were an estimated 14 million men and women with chronic bronchitis, 2 million with emphysema, and 14 million with asthma (Hurd, 2000). Estimates in 1996 reported that 106,146 deaths were caused by COPD (Hurd). A 1993 estimate indicated that direct and indirect costs related to medical care, loss of work and productivity, and premature mortality were $23.9 billion (Sullivan, Ramsey, & Lee, 2000).

The diagnosis of COPD is usually based on dyspnea, physical exam, radiography, and pulmonary function testing (Mahler, Barlow, & Matthy, 1986). The first sign of COPD is often dyspnea, but dyspnea as a diagnostic marker is not reliable because it is subjective and often a symptom of other disorders, such as heart disease. Unfortunately, physical exams and X-rays detect only the most severe cases of COPD, making early diagnosis difficult. Thus, the standard diagnostic assessment of COPD is pulmonary function testing. A spirometer is used to measure forced expiratory volume in 1 second (FEV$_1$), a measure of the volume of air expelled from the lungs during the first second of maximal expiration, and forced vital capacity (FVC), a measure of the total amount of air
expired during maximal expiration. FEV\textsubscript{1} of 79\% or less of the predicted value (based on age, height, gender, and race) indicates at least mild pulmonary impairment, while a ratio of FEV\textsubscript{1} / FVC less than 70\% indicates significant airflow obstruction and warrants a diagnosis of COPD (Mahler, et al.). Currently, there is no cure for COPD or its debilitating effects on pulmonary functioning. As a result, health care professionals have shifted their focus from reversing the disease process to reducing disability and improving quality of life (ACCP/AACVPR, 1997; Weaver, Richmond, & Narsavage, 1997). Physical symptoms and psychological correlates of COPD and their relationship to quality of life have received increased attention.

Clinical Manifestations of COPD

Dyspnea. Shortness of breath (dyspnea) is the most prominent physical symptom of COPD and is most likely to bring patients with COPD to seek medical care (Mahler et al., 1992; Mahler & Wells, 1988). Dyspnea has been described by COPD patients as breathing that “requires effort” or a feeling of being “out of breath” (Mahler, Harver, & Lantine, 1996). Although dyspnea is associated with pulmonary functioning (Mahler, Weinberg, Wells, & Feinstein, 1984; Mahler et al., 1987), it has been shown to be a better predictor of health-related quality of life and functional status than pulmonary functioning among patients with COPD (Jones, Baveystock, & Littlejohns, 1989; Lee, Graydon, & Ross, 1991; Mahler et al., 1992). Indeed, Mahler and Mackowiak (1995) demonstrated that pre-rehabilitation scores on the Baseline Dyspnea Index (BDI; an indicator of breathlessness) correlated with scores on the Short-Form 36 (SF-36, a measure of health-related quality of life) among 50 male COPD patients participating in
an exercise rehabilitation program. In addition, it was found that BDI scores predicted health-related quality of life while pulmonary functioning measures did not.

**Psychological Well-Being.** The experience of dyspnea and the resulting thoughts of suffocation or death can become a source of anxiety among COPD patients (Sandhu, 1986). It has been estimated that up to 96% of COPD patients suffer from some level of anxiety (Agle & Baum, 1977). A more recent study of 50 COPD patients found that 34% of the subjects met the diagnostic criteria for an anxiety disorder (Yellowlees, 1987). In another study assessing the prevalence of anxiety disorders among COPD patients, Karajgi, Rifkin, and Doddi (1990) found that 8% of their sample exhibited symptoms indicative of panic disorder. Earlier studies utilizing the Minnesota Multiphasic Personality Inventory also have demonstrated elevations in anxiety-related subscales among COPD patients (Prigatano, Wright, & Levin, 1984). Based on these findings, it appears that dyspnea may trigger anxiety. Anxiety results in increased ventilatory demands on the body which, in turn, can increase the experience of dyspnea, thus creating a circular relationship between anxiety and dyspnea among patients with COPD (Emery & Lebowitz, 2000).

Although anxiety is associated with the symptom of dyspnea, several studies have demonstrated that anxiety does not directly predict quality of life or functional status (Emery & Lebowitz, 2000). In one study of 126 COPD patients, Anderson (1995) found that anxiety did not predict quality of life as measured by a 16-item version of the Quality
of Life Scale, but that anxiety influenced quality of life indirectly by increasing dyspnea. Thus, it appears that dyspnea may mediate the relationship between anxiety and quality of life.

Depression has been described as the most commonly reported emotional consequence of COPD, and it appears to have a direct negative impact on quality of life among COPD patients (Agle & Baum, 1977; Anderson, 1995; Sandhu, 1986). Depression in patients with COPD is characterized by feelings of pessimism, hopelessness, and worthlessness. Weaver and Narsavage (1992) suggested that depression is a consequence of the loss of self-esteem that often results when COPD patients become disabled. In a study of 45 patients with moderate to severe COPD, 42% of the patients had elevated scores on the Beck Depression Inventory (Light, Merrill, Despars, Gordon, & Mutalipassi, 1985). Likewise, Ries, Kaplan, Limberg, and Prewitt (1995) found that 24% of 119 COPD patients had elevated scores on the Center for Epidemiological Studies-Depression Scale. However, others have reported that the prevalence of depression among COPD patients is no higher than that of a physically healthy population (Sandhu, 1986). Diagnosing depression among patients with COPD is often difficult because symptoms of COPD and depression may overlap. For example, non-depressed COPD patients often lose their appetite, experience sleep disturbances, and become easily fatigued.

Despite discrepancies among epidemiological studies of depression in COPD patients, it appears that depression has profound negative consequences in this population. In fact, subclinical levels of depression may affect functioning (Hayes,
Wells, Sherbourne, & Williams, 1995). Depression predicts behavioral, social, and mental functioning, and higher levels of depression have been associated with increased physical impairment among COPD patients (Emery & Lebowitz, 2000). Pre-exercise depression scores predicted change in mental health quality of life over time in a study of 77 older COPD patients participating in an exercise rehabilitation program, (Emery et al., 1999). These data suggest that depression is not only associated with quality of life, but pre-rehabilitation levels of depression also may indicate who will benefit most from rehabilitation.

Marriage and Health

Physical Associations. It has become widely accepted that marriage and marital adjustment are negatively associated with morbidity and mortality across various acute and chronic illnesses (Burman & Margolin, 1992; Kiecolt-Glaser & Newton, 2001). Married couples tend to have better health, use the health-care system less frequently, and live longer than their non-married counterparts in the United States and other industrialized countries (Hu & Goldman, 1990). In the research literature, marital variables tend to be grouped on three dimensions, including marital status (married or not married), marital adjustment (perceptions of relationship), and marital interaction (objective samples of behavior). The terms marital adjustment, marital satisfaction, and marital quality are usually used synonymously despite ongoing debate regarding differences among them (Heyman, Sayers, & Bellack, 1994).

Burman and Margolin (1992) reviewed over 40 studies published in the 1980s that examined the association between marital relationships and health. Results of their
review suggested that being married was associated with decreased mortality and morbidity across a variety of medical conditions including coronary heart disease, cerebral vascular disease, spinal cord injuries, hypertension, cancer, rheumatoid arthritis, and chronic pain. Their findings also suggested that the effect of marriage on health is indirect, and that few studies have examined marital quality and marital interaction as independent variables. Since the Burman and Margolin review, over 60 studies on this topic have been published. It appears that marital quality and marital interactions, in addition to marital status, affect health outcomes directly and indirectly as measured by mortality, morbidity, and immune functioning (Kiecolt-Glaser & Newton, 2001).

Most prior studies of health and marital status have focused on young or middle-aged couples, but the positive effects of marriage have also been found among older adults. Goldman, Korenman, and Weinstein (1995) studied a sample of married and non-married adults between the ages of 70-90. Their findings suggested that being married was associated with better health, longer survival, and less disability in older adults. In a study of 156 healthy couples, Levenson, Carstensen, and Gottman (1992) studied the differences between middle-aged couples (40-50 years in age and married for at least 15 years) and older couples (60-70 years in age and married for at least 30 years) on measures of conflict, pleasure, and health. Results indicated that older couples had less conflict related to matters of money, religion, recreation, and children; more pleasure when talking about children, things done together, dreams, and vacations; but no differences in reported health. However, when the sample was dichotomized into maritally satisfied and dissatisfied groups, the dissatisfied group tended to report more
conflict and disagreement, reduced pleasure, and poorer health regardless of age. In a study of 36 couples in which one spouse received a heart transplant, it was found that marital adjustment (as measured by the Dyadic Adjustment Scale, DAS) for patient and spouse was below published norms, and the scores remained consistently low over time (Konstam et al., 1998). This study was unusual in that it assessed marital adjustment across four time points: 1 and 4 months after being approved for heart transplantation, and 1 and 4 months after heart transplantation surgery. The average time between acceptance of the transplant and receiving the transplant was 12 months. The adjustment and consensus subscales of the DAS for both patient and spouse predicted health-related quality of life as measured by the Sickness Impact Profile (SIP) at 1 month pre transplantation. These findings suggest that marital adjustment has important implications for health-related quality of life and that marital adjustment tends to be stable over time among an older chronically ill population. In addition, the health of older couples may be associated with marital distress despite generally better adjustment among older couples.

**Psychological Associations.** There is growing evidence that marital status and marital adjustment may be important correlates of psychological well-being (Burman & Margolin, 1992; Gove, Hughes, & Styles, 1983). Individuals who report higher levels of marital adjustment tend to report fewer psychological symptoms, and this association can be seen across various medical conditions (Gagnon, Hersen, Kabacoff, & Van Hasselt, 1999). Meana, Binik, Khalife, and Cohen (1997) found that marital adjustment (as measured by the Marital Adjustment Test) was negatively correlated with depression and
anxiety in a sample of 76 women suffering from dyspareunia, a condition characterized by pain during intercourse. In the same study, marital adjustment, depression, and anxiety accounted for 21% of the variance in predicting patients’ pain ratings. Similarly, Rodrique and Park (1996) studied 86 married cancer patients and found that poorly adjusted couples had higher scores on indicators of depression and anxiety.

Other studies have demonstrated that marital adjustment predicts change in the psychological well-being of patients over time. Weihs, Enright, Howe, and Simmens (1999) studied 44 married patients with stage II or III breast cancer. Data were collected on measures of marital adjustment (as measured by the DAS) and emotional distress (as measured by the Profile of Mood States) 15 and 34 months after initial diagnosis. Patients whose cancer recurred were not included in the study. Analyses indicated that 32% of the patients and 23% of the husbands reported marital adjustment as being below the norm. In addition, results indicated that patients with low marital adjustment did not show the same improvements over time on indicators of emotional distress as did patients with high marital adjustment.

It has been thought that the relationship between marital status and psychological well-being was mediated by social support. That is, marriage was believed to be a form of social support. However, recent data suggest that marriage may provide more than social support (Pistrang & Barker, 1995). In a study of 113 breast cancer patients, high levels of partner support were associated with lower levels of psychological distress among patients. However, when partner support was low, the presence of other sources
of social support was not associated with improved patient well-being. These data suggest that marriage is an important contributor to psychological well-being independent of other sources of social support.

**COPD and Marital Adjustment**

Several lines of evidence suggest that COPD may negatively influence marital adjustment. Disability resulting from dyspnea can lead to loss of social, vocational, and recreational opportunities which, in turn, can result in impaired marital adjustment because couples are no longer able to engage in the activities they once enjoyed (Thompson & Pitts, 1992).

Many patients with COPD suffer from cognitive deficits (Emery, 1993). It is suspected that cognitive deficits are associated with low levels of blood oxygenation and that even mild hypoxemia can lead to impairment in higher cerebral functioning in COPD patients (Grant, Heaton, McSweeny, Adams, & Timms, 1987; Prigatano, Wright, & Levin, 1983). Grant et al. (1987) found that hypoxemia among COPD patients was associated with impaired problem solving, psychomotor speed, and motor functioning. A study by Crews et al. (2001) found that over 50% of patients with advanced COPD demonstrated clinically significant verbal storage and retrieval deficits. Although no study has investigated the relationship between cognitive decline in COPD patients and marital adjustment, studies among older couples suggest cognitive impairment may disrupt functioning which, in turn, may decrease marital adjustment. Moritz, Kasl, and Berkman (1989) studied 318 non-institutionalized couples residing independently. Results indicated that lower scores on the Mental Status Exam, a general indicator of
cognitive functioning, predicted decreased capacity for independent living and decreased social activities for the individual with impairment. Likewise, cognitive impairment predicted depression, decreased social support (emotional and instrumental), and decreased out-of-home leisure activities in the caregiving spouse.

Disability resulting from cognitive impairments or poor functional capacity (e.g., weakness, fatigue, dyspnea) also reportedly leads to sexual inactivity in COPD patients (Conine & Evans, 1981). In addition, chronic coughing, urinary incontinence during coughing, excessive phlegm production, and physical changes in appearance (e.g., excessive weight loss) can also have a negative impact on sexual functioning among patients with COPD (Selecky, 1987). It has been reported that up to 74% of patients who suffer from COPD experience some decline in sexual functioning (Keller & Buchannan, 1993). Impotence or suspended intercourse due to dyspnea in men has been estimated to be 35% (McSweeny, 1988). As expected, sexual adjustment has been associated with marital adjustment (Crane, 1996), and sexual problems among healthy populations are one of the top three complaints couples report in marital therapy (Michael, Gannon, Laumann, & Kolata, 1994). Thus, it appears that sexual dysfunction resulting from COPD may influence marital adjustment.

**Exercise Effects among Patients with COPD**

Studies of exercise rehabilitation indicate that psychological functioning and quality of life may improve following a rehabilitation intervention. Indeed, exercise rehabilitation has become standard care for COPD patients, and research has reliably demonstrated its positive benefits (ACCP/AACVPR, 1997). Rehabilitation typically
involves strength training, aerobic exercise, respiratory muscle training, education about the disease, and stress management. Although pulmonary rehabilitation does not improve pulmonary functioning, studies have consistently demonstrated reductions in dyspnea, increases in exercise capacity, and improved psychological well-being (Emery, 1993). Exercise rehabilitation also has been found to improve health-related quality of life (as measured by the SF-36) among patients with COPD (Benzo, Flume, Turner, & Tempest, 2000; Boueri, Bucher-Bartleson, Glenn, & Make, 2001).

A study of 31 married COPD patients participating in an exercise rehabilitation program found that patients’ scores on the DAS were correlated with pre-exercise measures of mental health quality of life, global health quality of life, dyspnea, anxiety, and depression (Ashmore, Emery, Hauck, Wilson, & MacIntyre, 2001). More importantly, pre-exercise marital adjustment predicted change in psychological well-being following rehabilitation as indicated by scores on the Affect Balance Scale. However, this study only assessed pre-exercise rehabilitation marital adjustment. Marital adjustment may influence the outcome of exercise rehabilitation and exercise may influence psychological functioning and quality of life among patients with COPD, but no study has examined the influence of exercise rehabilitation on marital adjustment.

Taken together, the extant literature suggests that a chronic illness such as COPD may be associated with marital dissatisfaction due to the effect of the condition on physical, cognitive, and psychological functioning. Physical and psychological symptoms, in turn, may be associated with quality of life and outcome among patients participating in exercise rehabilitation. Indeed, studies testing multivariate models of
COPD repeatedly demonstrate that quality of life among patients suffering from COPD is influenced more by psychological variables and physical symptoms than by disease severity as indicated by pulmonary functioning tests (Anderson, 1995; Moody, McCormick, & Williams, 1989; Weaver, Richmond, & Narvasage, 1997). Thus, the aim of this study is to evaluate the relationship among marital adjustment, psychological well-being, dyspnea, functional capacity, and quality of life. In addition, the study was designed to determine if pre-rehabilitation levels of marital adjustment predict change among indicators of psychological and physical functioning as well as determine if change in marital adjustment is an outcome of exercise rehabilitation among patients with COPD.

A conceptual model based on the literature reviewed above (see Figure 1) was developed to guide the development of the following research hypotheses:

1. Marital adjustment and quality of life among COPD patients and their partners will be poor compared to a healthy normative sample.
2. Depression and anxiety will mediate the relationship between marital adjustment and quality of life.
3. Dyspnea will mediate the relationship between marital adjustment and quality of life.
4. Marital adjustment will moderate the relationship between functional capacity and quality of life.
5. Anxiety, depression, dyspnea, functional capacity, quality of life, and marital adjustment will improve over time among patients participating in an 8-week exercise rehabilitation program.
(6) Baseline (T1) marital adjustment will predict changes in dyspnea, functional capacity, quality of life, depression, and anxiety over an 8-week rehabilitation program.
CHAPTER 2

METHODS

Participants

One hundred seventy-one prospective participants were identified among patients who were referred to an outpatient exercise rehabilitation program at the Ohio State University Center for Wellness and Prevention. Forty-four of the patients were participants in the National Emphysema Treatment Trail, 95 were participating in the Ohio State University Pulmonary Rehabilitation Program, and 32 had previously participated in the Ohio State University Pulmonary Rehabilitation Program. Criteria for inclusion in the study were: (1) referral to an 8-week exercise rehabilitation program held at the OSU Center for Wellness and Prevention, (2) married or living with a life-partner, (3) a diagnosis of emphysema, chronic bronchitis, or COPD. Subjects were ineligible if their only diagnosis was another medical condition associated with pulmonary dysfunction (e.g., cystic fibrosis, asthma), they were diagnosed with alpha-1-antitrypsin deficiency or lung cancer, or they were younger than 40 years of age. Of the 171 patients identified as potential participants, 52 were eligible for participation (see Figure 2). Reasons for exclusion included age less than 40 years (n=3), refusal to participate in the study (n=35), not married (n=54), drop-out of the rehabilitation program after initial orientation (n=20), dementia (n=1), and illiteracy (n=1). Out of the 52
patients assessed at baseline, 29 were not assessed at T2 because they dropped-out of the rehabilitation program \(n=7\), were past rehabilitation patients \(n=8\), or were required to drop-out of rehabilitation due to health complications \(n=14\).

Participants with COPD ranged in age from 41 to 84 (mean=63.8 ± 8.7) and partners ranged in age from 41 to 83 (mean=62.6 ± 10.6). There was no age difference between COPD patients and their partners. All couples were reportedly married, and length of marriage averaged 31.6 years (±16.5). Medical records indicated that all patients had a primary diagnosis consistent with COPD. Pulmonary and physical functioning of the COPD group was poor as indicated by a mean FEV\(_1\) % predicted of 30.6 (±29.4), a mean FVC % predicted of 66.2 (±23.9), a mean FEV\(_1\) / FVC ratio of .48 (±.18), and mean 6-minute walk test of 1170 feet (±348.8). In addition, blood gases in the COPD group were lower than normal as indicated by a mean PaO\(_2\) of 69.8 (±18.8) and a mean SaO\(_2\) of .93 (±4.3). Almost half of the patients (46.9%) used oxygen daily. Additional demographic information is summarized in Table 1.

**Procedures**

All patients in the study participated in an 8-week exercise rehabilitation program at the OSU Center for Wellness and Prevention. The program consisted of three 3-hour sessions per week for a total of 24 sessions. Sessions were divided into exercise and education components. Exercise was individualized and graded for each patient with gradual increases over the 8-week period. During the exercise component, patients walked on a treadmill or pedaled a stationary bicycle for lower-body aerobic exercise. An arm cycle ergometer or Schwinn Airdyne Dual Action Exerciser was used for upper-
body aerobic exercise. Nautilus weight training equipment was used for lower and upper body strength training including leg extension, leg press, lateral raise, overhead press, pec fly, and bench press machines. Each exercise session began with a 10-minute warm-up and ended with cool-down stretching exercises. Patients kept written records of exercise performed at each session and were monitored by a rehabilitation technician. During the education component, patients attended lectures on topics relevant for COPD patients, such as lung anatomy and physiology, breathing techniques, and medication use. Patients participated in five 1-hour stress management sessions that addressed relaxation techniques and emotional coping with COPD. Participation was good as indicated by patients attending over 75% of all exercise sessions.

During the first week of pulmonary rehabilitation, patients were asked to participate in the study. Participants completed assessments during the first week of the rehabilitation program (T1) and during the last week of the program (T2). Assessments were conducted in a room at the OSU Center for Wellness and Prevention or were sent home with the patient in an envelope to be returned to the researchers on the next day of rehabilitation. Partners’ assessments were sent home with the patient in an envelope and returned at the next exercise session. Patients and partners were instructed to fill out questionnaires alone and return them in sealed envelopes to ensure confidentiality. Partnered patients were given $50 when they returned T1 assessments and $50 when they returned T2 assessments.

An additional cohort of past exercise rehabilitation patients was recruited to provide additional data addressing hypotheses 1-4. Each participant was contacted by
telephone, and questionnaire packets were mailed to those who agreed to participate in
the study. Patients and partners were instructed to fill out questionnaires alone and return
them by mail in separately sealed envelopes to ensure confidentiality. Participants were
mailed $100 after the study center received the completed questionnaires.

Measures

All subjects completed the following battery of assessments at baseline (T1) and
after 8-weeks of exercise rehabilitation (T2). A subset including patients that previously
participated in exercise rehabilitation (n=8) completed measures only for baseline
assessment and analyses.

Pulmonary Functioning

Pulmonary functioning was assessed by a licensed pulmonary technician using a
Sensor Medic spirometer to obtain values of FEV$_1$, percentage of FEV$_1$ (based on norms
adjusted for age, sex, race, height), and FVC. Pulmonary function values were used as
indicators of disease severity. A ratio of FEV$_1$/FVC less than .70 is consistent with a
diagnosis of COPD. During pulmonary function assessment, the patient’s nose was
clamped closed and the patient was instructed to perform a maximum inspiration
followed by a forced maximum expiration into a mouthpiece connected to the spirometer.
Data from the spirometer was downloaded into a computer, and lung functioning values
were calculated by Med-Graphics software.

Functional Capacity

Functional capacity was assessed by a 6-minute walk test. This test is a
frequently used and reliable measure of exercise capacity among COPD patients (Guyatt,
Thompson, & Berman, 1985; Hodkins & Petty, 1987). The number of feet the patient walked on level ground in 6 minutes was recorded for two separate trials. The higher of the two values was then recorded as an indicator of functional capacity.

**Psychological Well-Being**

**Anxiety.** Anxiety was assessed with the State-Trait Anxiety Inventory (STAI) (Spielberger, Gorsuch, & Lushene, 1970). This 40-item scale measures immediate (state) and long-standing (trait) symptoms of anxiety. Each of the two subscales consists of 20 items written in a 4-point Likert format with responses ranging from (1) “not at all” to (4) “very much so.” Scores on each subscale range from 20 to 80, and higher scores indicate greater symptoms of anxiety. This measure has been used in previous studies with COPD patients, and its validity and reliability are well established (Emery et al., 1998; Stanley, Beck, & Zebb, 1996).

**Depression.** Depression was assessed with the Center for Epidemiological Studies-Depression Scale (CES-D, Radloff, 1977). The CES-D is a 20-item scale written in a 4-point Likert format. Scores range from 0 to 60 with higher scores indicating greater symptoms of depression. A cut off score of 16 is used as an indicator of clinically relevant depression. The CES-D has demonstrated reliability (Cronbach’s alpha=.87) and construct validity (Comstock & Helsing, 1976; Radloff, 1977).

**Dyspnea**

Dyspnea was assessed with the UCSD Shortness of Breath Questionnaire (SOBQ). The scale consists of 24-items that assess self-reported breathlessness (Eakin, Resnikoff, Prewitt, Ries, & Kaplan, 1998). Twenty-one questions assess level of dyspnea
while the patient performs activities of daily living such as walking, eating, or bathing, and 3 questions ask about limitations, fear, and harm due to breathlessness. Items are written in a 6-point Likert scale format with anchors ranging from “not at all” to “maximal or unable to do because of breathlessness.” Scores range from 0 to 120 with higher scores indicative of more severe dyspnea. The scale has demonstrated internal consistency (Cronbach’s alpha=.96) and validity (Eakin et al. 1998).

Quality of Life

Health related quality of life was assessed with the Medical Outcomes Study 36-Item Short Form Health Survey (SF-36) (Ware & Sherbourne, 1992). The SF-36 is a self-report measure providing 8 subscales: physical functioning, social functioning, physical role limitations, emotional role limitations, mental health, vitality, pain, and general health perceptions. Two composite scores also can be calculated. These provide an aggregated overall score that represents physical and emotional related quality of life. Each subscale score ranges from 0 to 100 with lower scores indicative of poorer quality of life. The SF-36 has demonstrated validity and reliability (Kopjar, 1996), and it has been shown to be sensitive to change following exercise rehabilitation among COPD patients (Benzo, Flume, Turner, & Tempest, 2000; Boueri, Bucher-Bartelson, Gleen, & Make, 2001; Mahler & Mackowiak, 1995).

Marital Adjustment

Marital adjustment was assessed with two self-reported measures: the Revised Dyadic Adjustment Scale (RDAS) and the Marital Adjustment Test (MAT). The RDAS is a shortened version of the original Dyadic Adjustment Scale (DAS) (Busby,
Christensen, Crane, & Larson, 1995; Spanier, 1976). The scale was designed to assess relationship adjustment in distressed and non-distressed dyads. The measure consists of 14 items that provide a total score as well as three subscale scores: consensus, adjustment, and cohesion. Total score on the RDAS ranges from 0 to 69, with lower scores indicating poorer adjustment. A cutoff score of 48 has been proposed to discriminate between non-distressed and distressed couples (Crane, Middleton, & Bean, 2000). The RDAS has a demonstrated total score reliability (Cronbach’s alpha=.90) and subscale score reliabilities ranging from .80 to .85 (Busby et al., 1995). High correlations among the RDAS, DAS, MAT, and Kansas Marital Adjustment Scale suggest good construct validity (Busby et al., 1995; Crane, et al., 2000).

The MAT is a 15-item measure used to assess degree of agreement on marital issues, degree of companionship experienced, and ability to resolve conflict in married couples (Locke & Wallace, 1959). Items on the scale are differentially weighted, and scores range from 2-158 with lower scores indicative of more distress. A cutoff score of 100 discriminates between non-distressed and distressed couples. A Spearman-Brown reliability coefficient of .90 suggests that the MAT is reliable, and studies have demonstrated its validity (Sabatelli, 1988).

Social Support

Social support was assessed with the Interpersonal Support Evaluation List-Short Form (ISEL-SF) which is a shortened version of the ISEL (Cohen & Hoberman, 1983). The ISEL-SF consists of 16 items that provide a total score as well as four sub-scale scores: tangible, appraisal, self-esteem, and belonging. The ISEL has a demonstrated
total score reliability (Cronbach’s alpha=.77) (Cohen & Hoberman, 1983). Factor structure was established with confirmatory factor analysis (Brookings & Bolton, 1988).

Data Analysis

**Preliminary Analyses.** Analysis of variance (ANOVA) was used to determine if there were differences between patients who completed rehabilitation and those who dropped-out. Patients included in the mailing (past exercise rehabilitation participants) were excluded from these analyses because they could not be considered drop-outs. Correlational analyses were used to determine the relationship among variables at baseline (T1). All participants who completed the T1 assessment were included in the correlational analyses. Patient and spouse data were analyzed as independent correlates.

**Hypothesis 1:** Patient and partner scores on the RDAS and MAT were analyzed independently. All participants who completed T1 assessment were included in these analyses. RDAS total scale scores below 48 and MAT total scale scores below 100 suggest distress. ANOVA was used to compare patient and partner marital adjustment scores.

**Hypothesis 2:** A series of hierarchical regression analyses was used to test the hypothesis that depression or anxiety mediates the relationship between marital adjustment and quality of life. All participants who completed the T1 assessment were included in these regression analyses. Following the criteria of Baron and Kelly (1986), three regressions were tested for each outcome variable. For the first regression model, marital adjustment scores were entered as the predictor of depression or anxiety scores. For the second model, marital adjustment scores were entered to predict quality of life.
scores. For the final mediation model, baseline depression or anxiety scores were first entered into the equation followed by the predictor variable (marital adjustment).

**Hypothesis 3:** A series of hierarchical regression analyses was used to test the hypothesis that dyspnea mediates the relationship between marital adjustment and quality of life. All participants who completed T1 assessment were included in these regression analyses. The same methods used to test hypothesis 2 were used in these analyses except that the mediating variable was dyspnea.

**Hypothesis 4:** A series of multiple regression analyses was conducted to evaluate the hypothesis that marital adjustment moderates the relationship between functional capacity and quality of life. All participants who completed T1 assessment were included in these regression analyses. Quality of life was used as the independent variable. Scores of functional capacity and marital adjustment were entered in the first step in the equation model followed by the interaction term for functional capacity by marital adjustment.

**Hypothesis 5:** Repeated measures ANOVA was used to determine if change occurred on all outcome measures. Participants who completed T1 and T2 assessments were included in these analyses.

**Hypothesis 6:** For outcomes in which significant change was observed, hierarchical regression analyses were used to evaluate the degree to which marital adjustment predicts change in functioning. In each model, T2 indicators of functioning (dyspnea, functional capacity, quality of life, depression, anxiety) were used as the
dependent variables. T1 dependent variable scores were entered into the model first to control for T1 variance. The predictor variable (marital adjustment) was then entered into the equation.
CHAPTER 3

RESULTS

Preliminary Analyses

Descriptive analyses were performed to provide information about the characteristics of the patient sample (N=52) among all outcome measures (see Table 2). ANOVA revealed statistically significant differences on baseline variables among patients who completed T1 and T2 assessments (n=23) and those who only completed T1 assessments, excluding past rehabilitation patients. These analyses evaluated baseline differences among patients who dropped-out of rehabilitation (n=7) and those who did not drop-out (n=23). Specifically, patients completing T1 and T2 assessments (non drop-outs) tended to report less state anxiety [M=35 (± 9.7) vs. M=50 (± 9.8)] and trait anxiety [M=35 (± 10.7) vs. M=47 (± 9.9)], as well as reported more social support [M=12 (± 2.2) vs. M=10 (± 2.8)] than those who did drop-out. In addition, patients completing both T1 and T2 assessments rated their quality of life better on indicators of vitality [M=49 (± 18.8) vs. M=24 (± 23.0)], mental health [M=70 (± 17.8) vs. M=47 (± 24.6)], and mental composite scores [M=50 (± 10.6) vs. M=37 (± 14.7)] than the drop-outs. The result of these drop-outs is a sample of higher functioning patients among indicators of psychological well-being, social support, and quality of life leading to a biased sample and restricted range.
Correlational analyses were conducted to determine the relationship between variables of interest at T1. As shown in Table 3, several patient demographic variables were correlated with quality of life, psychological functioning, functional capacity, dyspnea, and marital adjustment. More years of education were associated with less severe symptoms of dyspnea ($r = -0.39$, $p < 0.01$), more social support ($r = 0.27$, $p < 0.05$), and better quality of life on several dimensions including physical functioning ($r = 0.29$, $p < 0.05$), role-physical ($r = 0.28$, $p < 0.05$), social functioning ($r = 0.29$, $p < 0.05$), bodily pain ($r = 0.31$, $p < 0.05$), mental health ($r = 0.35$, $p < 0.01$), vitality ($r = 0.45$, $p < 0.01$), and mental composite ($r = 0.36$, $p < 0.01$). Higher income was associated with fewer symptoms of state anxiety ($r = -0.41$, $p < 0.01$), trait anxiety ($r = -0.34$, $p < 0.05$), depression ($r = -0.45$, $p < 0.01$), and dyspnea ($r = -0.54$, $p < 0.01$) as well as higher ratings on social support ($r = 0.37$, $p < 0.01$) and several dimensions of quality of life, including physical functioning ($r = 0.50$, $p < 0.01$), role-physical ($r = 0.46$, $p < 0.01$), social functioning ($r = 0.39$, $p < 0.01$), mental health ($r = 0.41$, $p < 0.01$), vitality ($r = 0.45$, $p < 0.01$), physical composite ($r = 0.46$, $p < 0.01$), and mental composite ($r = 0.46$, $p < 0.01$). Patients who were married longer tended to have fewer symptoms of state anxiety ($r = -0.38$, $p < 0.05$), trait anxiety ($r = -0.40$, $p < 0.05$), and depression ($r = -0.40$, $p < 0.01$). In addition, being married longer was associated with increased social support ($r = 0.48$, $p < 0.01$), higher ratings on the RDAS satisfaction subscale ($r = 0.47$, $p < 0.01$), MAT ($r = 0.39$, $p < 0.05$), and several indicators of quality of life, including role-emotional ($r = 0.38$, $p < 0.05$), bodily pain ($r = 0.41$, $p < 0.05$), mental health ($r = 0.40$, $p < 0.01$), and mental composite scores ($r = 0.48$, $p < 0.01$). Patients who used O2 tended to have poorer physical functioning quality of life ($r = -0.44$, $p < 0.01$) and
greater symptoms of dyspnea ($r = -0.37, p < 0.05$). Better pulmonary functioning, as measured by the ratio of FEV$_1$/FVC, was associated with better physical functioning quality of life ($r = 0.32, p < 0.05$) and fewer symptoms of dyspnea ($r = -0.32, p < 0.05$).

Patient marital adjustment was associated with patient quality of life, psychological functioning, functional capacity, and pulmonary functioning (Table 4). Higher ratings of overall marital adjustment as measured by the RDAS total scale score were associated with poorer performance on the 6-minute walk ($r = -0.36, p < 0.05$) and fewer symptoms of trait anxiety ($r = -0.28, p < 0.05$) and depression ($r = -0.35, p < 0.05$). In addition, higher scores on the RDAS total scale score were associated with higher scores on the role-physical ($r = 0.29, p < 0.05$), mental health ($r = 0.28, p < 0.05$), and general health perceptions ($r = 0.29, p < 0.05$) dimensions of quality of life. Patient RDAS subscale analyses indicated that higher satisfaction scores were associated with fewer symptoms of state anxiety ($r = -0.47, p < 0.05$), trait anxiety ($r = -0.58 p < 0.01$), and depression ($r = -0.66, p < 0.01$), as well as higher ratings of quality of life on the dimension of role-emotional ($r = 0.28, p < 0.01$), mental health ($r = 0.37, p < 0.05$), general health ($r = 0.29, p < 0.05$), and mental composite scores ($r = 0.44, p < 0.05$). Likewise, RDAS cohesion subscale scores were associated with fewer symptoms of state anxiety ($r = -0.28, p < 0.05$) and depression ($r = -0.36, p < 0.05$), while higher scores were associated with higher ratings of quality of life on the dimensions of role-physical ($r = 0.31, p < 0.05$), mental health ($r = 0.28, p < 0.05$), general health perceptions ($r = 0.35, p < 0.05$), and physical composite scores ($r = 0.33, p < 0.05$). The RDAS consensus subscale was not associated with any variable. Better overall marital adjustment as measured by the MAT was associated with fewer symptoms.
of trait anxiety ($r = -0.38, p < 0.05$) and depression ($r = -0.43, p < 0.01$), while higher scores were associated with higher ratings on indicators of general health perceptions ($r = 0.32, p < 0.05$) and mental composite score ($r = 0.32, p < 0.05$) quality of life.

Marital adjustment scores as reported by partners on the RDAS satisfaction subscale were associated with patient ratings of trait anxiety ($r = -0.28, p < 0.05$), depression ($r = -0.42, p < 0.01$), and mental composite quality of life scale scores ($r = 0.29, p < 0.05$). Partner ratings on other marital adjustment measures were not associated with other variables (see Table 5).

As seen in Table 6, quality of life was associated with psychological functioning and physical functioning. Specifically, fewer symptoms of state anxiety were associated with higher ratings of quality of life on several dimensions including physical functioning ($r = -0.29, p < 0.05$), role-physical ($r = -0.28, p < 0.05$), role emotional ($r = -0.56, p < 0.01$), social functioning ($r = -0.44, p < 0.01$), bodily pain ($r = -0.60, p < 0.01$), mental health ($r = -0.77, p < 0.01$), vitality ($r = -0.62, p < 0.01$), general health perceptions ($r = -0.45, p < 0.01$), and mental composite scores ($r = -0.76, p < 0.01$). Similarly, fewer symptoms of trait anxiety were associated with higher ratings of quality of life on several dimensions including physical functioning ($r = -0.38, p < 0.01$), role emotional ($r = -0.58, p < 0.01$), social functioning ($r = -0.52, p < 0.01$), bodily pain ($r = -0.58, p < 0.01$), mental health ($r = -0.78, p < 0.01$), vitality ($r = -0.61, p < 0.01$), general health perceptions ($r = -0.58, p < 0.01$), physical composite scores ($r = -0.30, p = 0.05$), and mental composite scores ($r = -0.78, p < 0.01$). Fewer symptoms of depression were associated with higher ratings on all
dimensions of quality of life, while physical functioning quality of life was associated with better performance on the 6-minute walk ($r = .39, p < .05$) and pulmonary function tests (FEV$_1$/FVC) ($r = .32, p < .05$).

Table 7 shows that higher patient ratings of social support were associated with fewer symptoms of state anxiety ($r = -.46, p < .01$), trait anxiety ($r = -.53, p < .01$), depression ($r = -.75, p < .01$), and higher ratings on several dimensions of quality of life including role emotional ($r = .28, p < .05$), bodily pain ($r = .43, p < .01$), mental health ($r = .47, p < .01$), vitality ($r = .54, p < .01$), general health ($r = .38, p < .01$), physical composite scores ($r = .30, p = .05$), and mental composite scores ($r = .51, p < .01$).

**Main Analyses**

**Hypothesis 1:** Marital adjustment among patients and partners will be lower than normative samples.

Fifty two participants were included in the baseline analyses (see Figure 2). ANOVA revealed no baseline differences in marital adjustment between patients and partners on RDAS total scale scores [patient, $M= 50.02$ (± 7.8) vs. partner $M=49.63$ (± 7.6)], RDAS consensus subscale scores [patient $M=23.6$ (± 3.6) vs. partner $M=23.2$ (± 3.8)], RDAS satisfaction subscale scores [patient, $M=15.5$ (± 2.1) vs. partner $M=15.7$ (± 2.1)], or RDAS cohesion subscale scores [patient, $M=11.4$ (± 3.1) vs. partner $M=10.7$ (± 3.7)]. Similar findings were found between patient and partner scores on the MAT [patient, $M=112.2$ (± 23.4) vs. partner $M=114.64$ (± 23.3)]. Scores on the RDAS total subscale and MAT were highly correlated ($r = .72, p <.01$) suggesting the scales measured a similar construct. Patient and partner scores on both marital adjustment
scales also suggested that no clinically significant marital distress was experienced as compared to healthy normative samples.

**Hypothesis 2:** Depression and anxiety will mediate the relationship between marital adjustment and quality of life.

A series of regression analyses was conducted to test the hypothesis that the relationship between marital adjustment and quality of life is mediated by psychological functioning. As proposed by Baron and Kenny (1986), mediation models were tested using the following criteria: 1) the independent variable (RDAS or MAT) must be significantly related to the mediator variable (depression or anxiety), 2) the independent variable (RDAS or MAT) must be significantly related to the dependent variable (SF-36 Quality of Life), and 3) the relationship between the independent variable and dependent variable must be reduced when the mediator is included in the regression equation. Sobel’s statistic was performed to test for mediation among models in which β decreased but the direct path between the I.V. and D.V. remained significant after controlling for the mediating variable (Sobel, 1982).

The first series of regression analyses evaluated the hypothesis that depression (CESD) mediates the relationship between marital adjustment (RDAS total score) and quality of life (SF-36 subscale scores). Following the criteria of Baron and Kelly, three regressions were tested for each outcome variable. For the first regression model, RDAS scores were entered as the predictor of depression scores. For the second model, RDAS scores were entered to predict SF-36 subscale scores. In the third model, depression was entered to predict SF-36 scores.
For the final mediation model, baseline CESD scores were first entered into the equation followed by the predictor variable (RDAS total score).

Figure 3 summarizes the results of the analyses and presents the standardized regression coefficients (β) for the pathways between variables being investigated. The dashed lines indicate a relationship that failed to meet criteria, thus mediational analyses were not conducted for these variables. For models that did qualify for mediational testing, analyses indicated that depression partially mediated the relationship between marital adjustment, as measured by the RDAS, and two dimensions of quality of life. When predicting role-physical quality of life, marital adjustment was reduced from β = .28, p < .05, to β = .14, p = .45 with the entry of depression β = – .49, p < .01. When predicting general health perceptions quality of life, marital adjustment was reduced from β = .29, p < .05, to β = .22, p = .73 with the entry of depression β= – .53, p < .01. When predicting mental health quality of life, marital adjustment was reduced from β = .28, p < .05, to β = .03, p = .73 with the entry of depression β = – .85, p < .01. However, the reduction for mental health was not significant (Sobel’s statistic = 1.53).

Figure 4 shows the second series of regression analyses, which evaluated the hypothesis that trait anxiety mediates the relationship between marital adjustment (RDAS total score) and quality of life (SF-36 subscale scores).1 Two models met the criteria for mediation. When predicting mental health quality of life, marital adjustment was reduced from β = .28, p < .05, to β = .03, p = .73 with the entry of anxiety β = – .78, p < .01.

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1 State anxiety was not analyzed as a mediator variable because it was not associated with RDAS and MAT total scale scores (see Table 4).
When predicting general health quality of life, marital adjustment was reduced from $\beta = .29$, $p < .05$, to $\beta = .11$, $p = .38$ with the entry of anxiety $\beta = -.58$, $p < .01$.

The third series of regression analyses tested the hypothesis that depression mediates the relationship between marital adjustment, as measured by the MAT and quality of life. Only one model met criteria for mediation (see Figure 5). When predicting mental composite quality of life, marital adjustment was reduced from $\beta = .32$, $p < .05$, to $\beta = .14$, $p = .22$ with the entry of depression $\beta = -.85$, $p < .01$.

The fourth series of regression analyses tested the hypothesis that anxiety mediates the relationship between marital adjustment (MAT) and quality of life. Two models met the criteria for mediation (see Figure 6). When predicting general health perceptions quality of life, marital adjustment was reduced from $\beta = .32$, $p < .05$, to $\beta = .09$, $p = .46$ with the entry of anxiety $\beta = -.58$, $p < .01$. When predicting mental composite quality of life, marital adjustment was reduced from $\beta = .32$, $p < .05$, to $\beta = .10$, $p = .36$ with the entry of anxiety $\beta = -.78$, $p < .01$.

Post-hoc analyses: Social Support

Given the number of associations found between social support and quality of life (see Table 7), a series of regression analyses was conducted with social support entered as a covariate in the significant mediation models. Specifically, among models where a direct and significant bivariate association was found between marital adjustment and quality of life indicators (Kenny and Baron Step 2), social support was entered as a covariate in the first step followed by the predictor variable (marital adjustment). Results indicated that the significant relationships found between RDAS total scale scores and
role-physical quality of life ($\beta = .28$, $p < .05$), general health perceptions quality of life ($\beta = .29$, $p < .05$), and mental health quality of life ($\beta = .28$, $p < .05$) were no longer significant when controlling for social support (see Table 8). Similarly, the significant associations found between MAT total scale scores and mental composite quality of life ($\beta = .32$, $p < .05$) and general health perceptions quality of life ($\beta = .32$, $p < .05$) were no longer significant when controlling for social support (see Table 9).

Furthermore, a series of regression analyses was conducted to test the post hoc hypothesis that depression and anxiety would mediate the relationship between social support and quality of life. Figure 7 shows that seven models met the criteria for mediation when testing depression as the mediator between social support and quality of life. When predicting bodily pain quality of life, social support was reduced from $\beta = .43$, $p < .01$, to $\beta = -.06$, $p = .79$ with the entry of depression $\beta = -.67$, $p < .01$. When predicting role-emotional quality of life, social support was reduced from $\beta = .28$, $p < .05$, to $\beta = -.09$, $p = .69$ with the entry of depression $\beta = -.58$, $p < .01$. When predicting mental health quality of life, social support was reduced from $\beta = .47$, $p < .01$, to $\beta = .22$, $p = .11$ with the entry of depression $\beta = -.85$, $p < .01$. When predicting vitality quality of life, social support was reduced from $\beta = .54$, $p < .01$, to $\beta = .21$, $p = .32$ with the entry of depression $\beta = -.68$, $p < .01$. When predicting general health perceptions quality of life, social support was reduced from $\beta = .38$, $p < .01$, to $\beta = -.12$, $p = .62$ with the entry of depression $\beta = -.53$, $p < .01$. When predicting physical composite quality of life, social support was reduced from $\beta = .30$, $p < .05$, to $\beta = .01$, $p = .97$ with the entry of depression $\beta = -.45$, $p < .01$. 

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When predicting mental composite quality of life, social support was reduced from $\beta = .51$, $p < .01$, to $\beta = .18$, $p = .24$ with the entry of depression $\beta = -.85$, $p < .01$.

The second series of post-hoc analyses evaluated the hypothesis that anxiety mediates the relationship between social support and quality of life. Figure 8 shows that six models met the criteria for mediation. When predicting bodily pain quality of life, social support was reduced from $\beta = .43$, $p < .01$, to $\beta = .18$, $p = .21$ with the entry of anxiety $\beta = -.58$, $p < .01$. When predicting role-emotional quality of life, social support was reduced from $\beta = .28$, $p < .05$, to $\beta = -.02$, $p = .91$ with the entry of anxiety $\beta = -.58$, $p < .01$. When predicting mental health quality of life, social support was reduced from $\beta = .47$, $p < .01$, to $\beta = -.78$, $p < .01$. However, the reduction in vitality was not significant (Sobel’s statistic = .88). When predicting general health perceptions quality of life, social support was reduced from $\beta = .38$, $p < .01$, to $\beta = -.14$, $p = .34$ with the entry of anxiety $\beta = -.58$, $p < .01$. When predicting physical composite quality of life, social support was reduced from $\beta = .30$, $p < .05$, to $\beta = .17$, $p = .36$ with the entry of anxiety $\beta = -.30$, $p < .05$. When predicting mental composite quality of life, social support was reduced from $\beta = .51$, $p < .01$, to $\beta = .14$, $p = .24$ with the entry of anxiety $\beta = -.78$, $p < .01$. 

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Hypothesis 3: Dyspnea will mediate the relationship between marital adjustment and quality of life.

The mediating effect of dyspnea on the relationship between marital adjustment and quality of life was evaluated using the same procedures outlined above and proposed by Baron and Kenny (1986). Two series of multiple regression analyses were conducted. Marital adjustment as measured by the RDAS was entered as the independent variable in the first series, while marital adjustment as measured by the MAT was used as the independent variable in the second series. Dyspnea was evaluated as the mediating variable in all series and subscales of the SF-36 quality of life were used as dependent variables. None of the models met criteria for mediation based on Step 1 (the independent variable must be significantly related to the mediator) as proposed by Baron and Kenny. Specifically, marital adjustment as measured by the RDAS and MAT was not associated with dyspnea (see Table 4). Similarly, post-hoc analyses revealed that social support was not associated with dyspnea (see Table 7).

Hypothesis 4: Marital adjustment will moderate the relationship between functional capacity and quality of life.

It was hypothesized that marital adjustment (DAS and MAT) would moderate the relationship between functional capacity (6-minute walk test) and quality of life (SF-36). That is, the effect of functional capacity on quality of life would vary as a function of the level of marital adjustment. As seen in Table 6, correlational analyses indicated that only physical functioning quality of life was significantly associated with functional capacity ($r = .39, p < .05$). A series of multiple regression analyses was conducted to test for
moderation with physical functioning quality of life used as the independent variable. Scores of functional capacity and marital adjustment were entered in the first step followed by the interaction term for functional capacity by marital adjustment. No significant moderating effect was found when the interaction term for the RDAS and 6-minute walk was tested as the moderator variable ($\beta = -1.8, p = .29$). Likewise, no significant effect was found when the interaction between the MAT and 6-minute walk was tested ($\beta = -.10, p = .94$).

**Hypothesis 5: Anxiety, depression, dyspnea, functional capacity, quality of life, and marital adjustment will improve over time.**

Repeated measures ANOVA was used to determine change on all outcome measures. As seen in Table 2, patient scores improved on the role-physical [$F (1,21) = 5.12, p < .05$] and social functioning [$F (1,21) = 8.55, p < .01$] dimensions of quality of life. Improvements also were observed on 6-minute walk performance [$F (1,22) = 9.75, p < .01$] indicating improved functional capacity. Marital adjustment improved over time as demonstrated by increased scores on the MAT [$F (1,21) = 9.50, p < .01$] and satisfaction subscale of the RDAS [$F (1,21) = 6.82, p = .01$]. Significant change was not found on other variables.

**Hypothesis 6: Baseline marital adjustment will predict changes over time.**

For outcomes in which significant change was observed, hierarchical regression was utilized to evaluate the degree to which marital adjustment predicted change in functioning. In each model, T2 indicators of quality of life and functional capacity were used as dependent variables. Baseline (T1) dependent variable scores were entered into
the first model to control for T1 variance. The predictor variable (RDAS or MAT) was then entered into the equation. In addition, social support was tested as a predictor variable for each outcome in post-hoc analyses. Results indicated that the RDAS (see Table 10), MAT, (see Table 11), and ISEL (social support) (see Table 12) did not predict change over time.

Power Analysis

Post hoc power analysis was conducted with GPower to determine whether non-significant findings were the result of small effects or lack of power (Faul & Erdfelder, 1992). An effect size of .03 was calculated from regression analyses that tested the relationship between marital adjustment and dyspnea (hypothesis 3). Further analyses revealed a power of .21 based on the calculated effect size (.03), one predictor variable (marital adjustment) entered into the regression equation, and a p of .05. Increasing the sample size likely would not lead to significant findings and may be too costly to justify given the small effect (Cohen & Cohen, 1983). Indeed, a priori analyses calculated with an effect size of .03, one predictor variable, and a p of .05 indicated that a sample size of 264 would be needed to achieve a power of .80. Further analyses revealed a medium to large effect size (.20) for regression analyses testing marital adjustment as a predictor of change over time on measures of quality of life (hypothesis 6). A power of .35 was found based on the calculated effect size (.20), two predictor variables (T1 measure of quality of life, marital adjustment) entered into the regression equation, and a p of .05. Given the medium to large effect size found and small power, increasing the sample size may produce enough power to find significant results (Cohen & Cohen, 1983). A priori
analyses calculated with an effect size of .20, two predictor variables, and a p of .05 indicated that increasing the sample size to an n of 52 would result in a power of .80. In these analyses, sample size (and power) was limited by participant drop-out from the rehabilitation program.
The purpose of this investigation was to enhance the understanding of psychosocial variables among patients with COPD participating in exercise rehabilitation. Specifically, the study was designed to assess the relationship between marital adjustment, quality of life, psychological well-being, functional capacity, dyspnea, and marital adjustment. Specific hypotheses tested included: 1) marital adjustment among COPD patients and their partners will be poor compared to a healthy normative sample, 2) depression and anxiety will mediate the relationship between marital adjustment and quality of life, 3) dyspnea will mediate the relationship between marital adjustment and quality of life, 4) marital adjustment will moderate the relationship between functional capacity and quality of life, 5) anxiety, depression, dyspnea, functional capacity, quality of life, and marital adjustment will improve over time among patients participating in an 8-week exercise rehabilitation program, and 6) baseline (T1) marital adjustment will predict changes in dyspnea, functional capacity, quality of life, depression, and anxiety over an 8-week rehabilitation program. Results indicated several findings including: 1) contrary to expectations, patient and partner marital adjustment was high, 2) socioeconomic status was associated with patient functioning but not marital adjustment,
3) marital adjustment was associated with psychological well-being, functional capacity, and quality of life, 4) depression and anxiety mediated the relationship between marital adjustment and quality of life except when controlling for social support, 5) quality of life, functional capacity, and marital adjustment improved following exercise rehabilitation, and 6) drop-out from rehabilitation was associated with lower scores of well-being and quality of life at baseline.

Couples in this study were relatively well-adjusted as compared to healthy normative samples (Crane et al., 2000; Locke & Wallace, 1959). Consistency between patient and spouse on the two indicators of marital adjustment, the RDAS and MAT, also were found. Although these findings were unexpected and deviate from the findings among studies assessing marital adjustment among other chronically ill samples (Isoaho et al., 1995; Konstam et al., 1998), they are consistent with the notion that a chronic illness may enhance communication and facilitate marital cohesion if partners work together to address lifestyle changes associated with the disease (Lichtman, Taylor, & Wood, 1987). According to family systems theory, a stressor such as COPD disrupts the homeostasis of the marital dyad. The dyad reorganizes in an attempt to reestablish homeostasis, and reorganization can result in maladjustment and impaired functioning or, alternately, improved adjustment and functioning (Rolland, 2003).

Previous studies have documented a positive association between years married and relationship quality. Participating couples were married on average for 36 years, and analysis of this sample indicated that length of marriage was positively associated with marital satisfaction, fewer symptoms of depression and anxiety, increased social support,
and a better health-related quality of life. Less education and family income were associated with poorer quality of life and increased symptoms of depression, anxiety, and dyspnea but, interestingly, not marital adjustment. This suggests that higher socioeconomic standing is not necessary for a satisfying marriage, but socioeconomic status may be associated with physical and psychological morbidity. Taken together, these data suggest that patients with COPD and their partners were able to reestablish or maintain positive marital functioning regardless of socioeconomic standing within the context of illness.

Correlational analyses of baseline measures indicated that patient ratings of overall marital adjustment were associated with indicators of quality of life, psychological well-being, and dyspnea, but partners’ ratings of overall marital adjustment were not associated with patient variables. In particular, poorer overall marital adjustment among patients was associated with lower ratings of quality of life, poorer functional capacity, and more symptoms of depression and anxiety. Similarly, reports of a less satisfying marriage (RDAS satisfaction subscale) and more disagreement on matters important to the relationship such as recreation, friends, and time spent together (RDAS cohesion subscale) were associated with poorer quality of life and more symptoms of depression and anxiety. Although overall partner marital adjustment was not associated with patient variables, partner dissatisfaction in the marriage (RDAS satisfaction subscale) was associated with greater psychological distress among patients. The association of patient marital adjustment and psychological functioning is consistent with data suggesting that marital status and marital adjustment may be important.
correlates of psychological well-being (Burman & Margolin, 1992; Gove et al., 1983). Individuals who report higher levels of marital adjustment tend to report fewer psychological symptoms, and this association has been observed across patient populations (Gagnon et al., 1999; Rodrigue & Park, 1996; Weihs et al., 1999). These data underscore the relevance of marital adjustment among patients with COPD, and suggest that marital adjustment may be associated with both physical and mental aspects of COPD. In addition, patient perceptions of marriage may be more important to quality of life and psychological well-being than are partners’ perceptions of the marriage.

Hierarchical regression analyses indicated that depression and anxiety mediates the association between marital adjustment and role-physical, general health perception, and mental health indicators of quality of life. The relationship between marital adjustment and quality of life was no longer significant when social support was controlled in regression analyses. This suggests that the association between quality of life and marital adjustment, as measured by the RDAS and MAT, may be largely due to the social support aspects of marriage. Indeed, additional post-hoc analyses indicated that the relationship between social support and quality of life is mediated by depression and anxiety. This suggests that low levels of social support are associated with feelings of depression and anxiety which, in turn, are associated with poorer mental and physical quality of life.

Results of this study also are consistent with previous data indicating the beneficial effects of exercise rehabilitation among patients with COPD (Emery et al., 1998; Ries et al., 1995). Significant improvements were observed on indicators of
quality of life and functional capacity. Most importantly, improvements were seen on
indicators of patient marital adjustment including the MAT and Satisfaction subscale of
the RDAS. Thus, it appears that exercise rehabilitation not only improves functional
well-being among patients but also contributes to improvements in marital functioning.

Although important information was obtained from these data, analyses failed to
support two of the proposed hypotheses. First, dyspnea was not shown to mediate the
relationship between marital adjustment and quality of life as indicated by the lack of an
association between dyspnea and marital adjustment. Post-hoc analysis also revealed no
association between dyspnea and social support. Given these findings and previous data
suggesting dyspnea is associated with quality of life, depression, and anxiety, an
alternative model to test the marital adjustment/dyspnea relationship may be needed. For
example, marital adjustment may moderate the relationship between dyspnea and quality
of life.

The second hypothesis not supported was that baseline marital adjustment would
predict changes on outcome variables over time. Post-hoc analyses entering social
support as the predictor variable also failed to predict change. These findings are
contrary to earlier findings in a similar sample which demonstrated that baseline scores
on measures of marital adjustment predicted changes in quality of life, psychological

Results of this study contribute to greater understanding of physical and mental
aspects of COPD, but the study is limited by the measure of marital adjustment, a
relatively small sample size, and recruitment procedures. It is possible that marital
adjustment, as a separate construct from social support, may account for only a small proportion of the variance associated with outcome variables. In addition, marital adjustment in this study was evaluated with a general assessment of marital adjustment or satisfaction across several dimensions without specific assessment of behavior. Behavioral interactions between couples may provide a better indicator of marital functioning and include important information independent of social support. Indeed, partner support is related to marital adjustment but has been considered a distinct construct (Acitelli, 1996). Partner support is conceptualized as an instrumental or emotional behavioral response, which can include behaviors such as active listening and help with activities of daily living. Negative partner support can include behaviors such as criticism, avoidance, and withdrawal from the patient. It may be that behavioral data among partners would provide additional important information beyond marital adjustment and non-spousal social support (Kiecolt-Glaser & Newton, 2001; Manne, Pope, Taylor & Dougherty, 1999).

A larger sample also may have increased statistical power and provided a sample of participants who fell within the upper and lower limits of marital adjustment, allowing for more variance in the regression models. Furthermore, with a larger sample it would be possible to control for potential confounds (e.g., severity of disease) that may influence the observed associations.

The unexpected finding that participants were satisfied in their marriage may be due to a biased sample. It is possible that patients with COPD seeking rehabilitation or those agreeing to participate in this study were generally more satisfied in their
marriages. In addition, patients that dropped-out of rehabilitation reported more psychological distress and lower quality of life than non drop-outs. Despite the resulting restricted range, statistically significant associations were found pointing to the importance and large effect of marital adjustment on indicators of quality of life and psychological functioning. Recruitment of patients with COPD not seeking rehabilitation services or specifically recruiting distressed couples may provide a more representative COPD sample.

Although these data suggest that patients participating in exercise rehabilitation are generally satisfied in their marriage, marital functioning may be an important variable to consider among patients with COPD. Indeed, marital adjustment was associated with quality of life and psychological functioning. Given these data and previous studies demonstrating the association between marital functioning and health, a revision of the conceptual model of COPD may be needed. For example, studies testing alternative models in which marital adjustment mediates or moderates the relationship between psychological well-being (anxiety and depression) and quality of life may provide relevant information. In addition, baseline ratings of marital adjustment may help identify patients who will need additional assistance during the rehabilitation process. That is, patients with poor marital adjustment also may be experiencing increased symptoms of depression and anxiety as well as poorer quality of life, all of which were associated with patient drop-out.

Future research in this area should implement focused recruitment procedures, utilize measures of partner support, and test alternative models of COPD. Recruitment
efforts should target patients in marital distress. This may be accomplished by specifically advertising to patients with COPD who are experiencing marital distress. Patient marital adjustment should be assessed, but behavioral data also should be evaluated. For example, the Communication Patterns Questionnaire (Christenson, 1988) and the Interactional Dimensions Coding System (Julien, Markham, Lindahl, Johnson, Van Widenfelt, 1989) may provide relevant information beyond marital adjustment and satisfaction (Cannon & Cavanaugh, 1998; Weihs et al., 1999).

Taken together, these data and previous research point to the relevance of marriage and marital functioning in the context of health and well-being. As such, marital functioning is an important variable to consider when treating patients with a chronic condition such as COPD. Despite limitations, these data warrant further investigation of the relationships between marital functioning and health among patients suffering from COPD and their spouses.
APPENDIX

TABLES AND FIGURES
Figure 1: Conceptual model of COPD.
Figure 2: Participant recruitment.

Assessed for eligibility (n=171)

Excluded (n=119)
  - Not meeting inclusion criteria (n=55)
  - Not interested (n=22)
  - Other reasons (n=42)

Available for baseline analyses (n=52)

Discontinued participation (n=21)
  - Rehabilitation drop out (n=7)
  - Health complications (n=14)

Available for post rehabilitation analyses (n=23)

Past rehabilitation patients (n=8)
<table>
<thead>
<tr>
<th>Variables</th>
<th>Patient (N=52)</th>
<th>Partner* (N=52)</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>n</td>
<td>%</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>35</td>
<td>67.4</td>
</tr>
<tr>
<td>Female</td>
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<td>32.7</td>
</tr>
<tr>
<td>Race</td>
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<td></td>
</tr>
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<td>Caucasian</td>
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</tr>
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<td>African-American</td>
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</tr>
<tr>
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<tr>
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</tr>
<tr>
<td>Employed part-time</td>
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<td>5.8</td>
</tr>
<tr>
<td>Retired</td>
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<td>65.4</td>
</tr>
<tr>
<td>Unemployed</td>
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</tr>
<tr>
<td>Unemployed on disability</td>
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<td>11.5</td>
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<td>&lt;$15,000 per year</td>
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<td>$60,000-$74,999</td>
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<td>$75,000 or greater</td>
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* Nineteen partners refused to provide demographic information.

Table 1: Demographic Characteristics of Sample.
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<th>Time 1 n=23</th>
<th>Time 2 n=23</th>
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<td>M (± SD)</td>
<td>M (± SD)</td>
<td>M (± SD)</td>
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<td></td>
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<td>33 (22.2)</td>
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</tr>
<tr>
<td>Role-Physical</td>
<td>15 (26.4)</td>
<td>15 (25.1)</td>
<td>32 (40.0)*</td>
</tr>
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<td>Role-Emotional</td>
<td>56 (45.5)</td>
<td>60 (46.1)</td>
<td>68 (41.3)</td>
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<td>Social Functioning</td>
<td>54 (27.6)</td>
<td>57 (22.8)</td>
<td>73 (22.1)**</td>
</tr>
<tr>
<td>Bodily Pain</td>
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<td>67 (26.6)</td>
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</tr>
<tr>
<td>Vitality</td>
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<td>54 (19.9)</td>
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<td>70 (17.2)</td>
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<td>40 (21.5)</td>
<td>48 (19.6)</td>
<td>47 (20.6)</td>
</tr>
<tr>
<td>Physical Composite</td>
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<td>30 (8.1)</td>
<td>34 (7.9)</td>
</tr>
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<td>Mental Composite</td>
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<td>50 (10.6)</td>
<td>52 (8.8)</td>
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<td>Psychological Variables</td>
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<td>13 (9.3)</td>
<td>12 (8.6)</td>
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<td>Trait Anxiety</td>
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<td>35 (10.7)</td>
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<td>1117 (360.1)</td>
<td>1285 (336.5)**</td>
</tr>
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<td>12 (2.1)</td>
<td>12 (2.3)</td>
</tr>
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<td>Patient Marital Adjustment</td>
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<td></td>
<td></td>
</tr>
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<td>DAS Total Score</td>
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<td>59 (8.3)</td>
<td>51 (9.1)</td>
</tr>
<tr>
<td>DAS Cohesion</td>
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<td>11 (3.0)</td>
<td>12 (3.2)</td>
</tr>
<tr>
<td>DAS Satisfaction</td>
<td>15 (2.1)</td>
<td>15 (2.1)</td>
<td>16 (2.3)**</td>
</tr>
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<td>DAS Consensus</td>
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<td>24 (3.8)</td>
<td>24 (3.9)</td>
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<td>MAT Total Score</td>
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<td>107 (23.9)</td>
<td>114 (27.1)**</td>
</tr>
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<td>Partner Marital Adjustment</td>
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<tr>
<td>DAS Satisfaction</td>
<td>15 (2.1)</td>
<td>16 (2.2)</td>
<td>16 (2.5)</td>
</tr>
<tr>
<td>DAS Consensus</td>
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<td>23 (3.8)</td>
<td>24 (3.3)</td>
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<td>MAT Total Score</td>
<td>114 (23.3)</td>
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<td>116 (21.9)</td>
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*p < .05

**p < .01

Table 2: Descriptive Statistics: Means and Standard Deviations for Sample (N=52) and Subsample Including Baseline and Time 2 Data.
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<th>Variable</th>
<th>Gender</th>
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<th>Work Status</th>
<th>Education</th>
<th>Income</th>
<th>O2 Use</th>
<th>Yrs Married</th>
<th>Ratio (FEV1/FVC1)</th>
<th>Attendance</th>
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</thead>
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<tr>
<td>6-min. Walk</td>
<td>.18</td>
<td>.33</td>
<td>.07</td>
<td>.29</td>
<td>.21</td>
<td>-.23</td>
<td>-.06</td>
<td>.14</td>
<td>-.35*</td>
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<tr>
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<td>-.16</td>
<td>-.14</td>
<td>-.27</td>
<td>-.41**</td>
<td>.15</td>
<td>-.38*</td>
<td>-.09</td>
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<td>STAX2</td>
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<td>-.11</td>
<td>-.24</td>
<td>-.34*</td>
<td>.15</td>
<td>-.40*</td>
<td>-.08</td>
<td>-.19</td>
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<tr>
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<td>-.19</td>
<td>.29*</td>
<td>.50**</td>
<td>-.44**</td>
<td>-.18</td>
<td>.32*</td>
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<td>-.11</td>
<td>.28*</td>
<td>.46**</td>
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<td>.19</td>
<td>.12</td>
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<td>.26</td>
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<td>.38*</td>
<td>.05</td>
<td>.01</td>
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<td>.08</td>
<td>.05</td>
<td>.29*</td>
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<td>.11</td>
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<td>.25</td>
<td>.23</td>
<td>.31*</td>
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<td>.04</td>
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<td>.40*</td>
<td>.12</td>
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<td>.45**</td>
<td>-.10</td>
<td>.32</td>
<td>.24</td>
<td>.21</td>
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* p < .05  
** p < .01

Continued

Table 3: Correlation Matrix of patient demographics, quality of life, psychological functioning, physical functioning, pulmonary functioning, and marital adjustment.
<table>
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<th>Variable</th>
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<th>Work Status</th>
<th>Education</th>
<th>Income</th>
<th>O₂ Use</th>
<th>Years Married</th>
<th>Ratio (FEV₁/FVC₁)</th>
<th>Attendance</th>
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<td>-.00</td>
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<tr>
<td>SF-36 Physical Composite</td>
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<td>.46**</td>
<td>-.32</td>
<td>.03</td>
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<td>-.20</td>
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<td>.25</td>
<td>.36**</td>
<td>.46**</td>
<td>-.04</td>
<td>.48**</td>
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<td>.37*</td>
<td>.25</td>
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<td>.37**</td>
<td>.26</td>
<td>.48**</td>
<td>.08</td>
<td>.17</td>
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* p < .05
** p < .01
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<th>RDAS Cohesion</th>
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* p < .05
** p < .01

Table 4: Correlation of Patient Martial Adjustment with Patient Ratings of Quality of Life and Psychological Functioning at Baseline.
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<th>RDAS Satisfaction</th>
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<td>.13</td>
<td>.19</td>
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<td>-.14</td>
<td>.03</td>
<td>.15</td>
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<tr>
<td>Bodily Pain</td>
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<td>.06</td>
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<td>.00</td>
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<td>.11</td>
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* p < .05  
** p < .01

Table 5: Correlation of Partner Martial Adjustment with Patient Ratings of Quality of Life and Psychological Functioning at Baseline.
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<th>Variables</th>
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<th>Trait Anxiety</th>
<th>Depression</th>
<th>6-Min. Walk</th>
<th>Ratio (FEV₁/FVC₁)</th>
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<tr>
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<td>-.41*</td>
<td>.39*</td>
<td>.32*</td>
</tr>
<tr>
<td>SF-36 Role-Physical</td>
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<td>-.24</td>
<td>-.49**</td>
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<tr>
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<td>-.58**</td>
<td>.26</td>
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<td>-.68**</td>
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<td>-.53**</td>
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<tr>
<td>SF-36 Mental Composite</td>
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<td>-.78**</td>
<td>-.85**</td>
<td>.14</td>
<td>.17</td>
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</tbody>
</table>

* p < .05
** p < .01

Table 6: Correlation Matrix of Quality of Life, Psychological Functioning, and Physical Functioning.
### Table 7: Correlation of Social Support, Quality of Life, Psychological Functioning, and Physical Functioning.

<table>
<thead>
<tr>
<th>Variables</th>
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<td>6-Min. Walk</td>
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<td>Ratio (FEV₁/FVC₁)</td>
<td>.08</td>
</tr>
<tr>
<td>SF-36 Physical Functioning</td>
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<tr>
<td>SF-36 Role Physical</td>
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<tr>
<td>SF-36 Role Emotional</td>
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</tr>
<tr>
<td>SF-36 Social Functioning</td>
<td>.16</td>
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<tr>
<td>SF-36 Bodily Pain</td>
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<tr>
<td>SF-36 Mental Health</td>
<td>.47**</td>
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<tr>
<td>SF-36 Vitality</td>
<td>.54**</td>
</tr>
<tr>
<td>SF-36 General Health</td>
<td>.38**</td>
</tr>
<tr>
<td>SF-36 Physical Composite</td>
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<td>SF-36 Mental Composite</td>
<td>.51**</td>
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<tr>
<td>Dyspnea</td>
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</table>

* *p < .05
** *p < .01
Figure 3: Results of regression analyses for depression as a mediator between patient marital adjustment (RDAS) and quality of life (SF-36). Standardized betas between parentheses indicate the effect of the predictor when the mediator is in the model. Coefficients outside the parentheses refer to the bivariate relations among variables. A dashed line indicates a relation that failed to meet the criteria for mediation.

Continued
Figure 3 continued.

![Diagram showing correlations between Depression, Marital Adjustment, Vitality, General Health, and Physical/Composite scales.]

- Depression to Marital Adjustment: -.35*
- Depression to Vitality: -.66**
- Depression to Mental Composite: -.35*
- Depression to Physical Composite: -.38**
- Marital Adjustment to Vitality: .16
- Marital Adjustment to General Health: .29* (.22)
- Marital Adjustment to Mental Composite: .27
Figure 4: Results of regression analyses for anxiety as a mediator between patient marital adjustment (RDAS) and quality of life (SF-36). Standardized betas between parentheses indicate the effect of the predictor when the mediator is in the model. Coefficients outside the parentheses refer to the bivariate relations among variables. A dashed line indicates a relation that failed to meet the criteria for mediation.
Figure 4 continued

- Anxiety
  - Marital Adjustment
    - -0.28*
  - Vitality
    - -0.55**
  - General Health
    - 0.29* (.11)
  - Physical Composite
    - 0.27

- Anxiety
  - Marital Adjustment
    - -0.28*
  - Mental Composite
    - -0.79**
  - Mental Composite
    - 0.27
Figure 5: Results of regression analyses for depression as a mediator between patient marital adjustment (MAT) and quality of life (SF-36). Standardized betas between parentheses indicate the effect of the predictor when the mediator is in the model. Coefficients outside the parentheses refer to the bivariate relations among variables. A dashed line indicates a relation that failed to meet the criteria for mediation.
Figure 5 continued

Depression

Marital Adjustment

Vitality

.14

Depression

Marital Adjustment

Physical Composite

.13

Depression

Marital Adjustment

General Health

.32* (.32*)

Depression

Marital Adjustment

Mental Composite

.32* (.14)

Depression

Marital Adjustment

-.43*

-.72**

-.43*

-.49**

-.43*

-.43**

-.77**
Figure 6: Results of regression analyses for anxiety as a mediator between patient marital adjustment (MAT) and quality of life (SF-36). Standardized betas between parentheses indicate the effect of the predictor when the mediator is in the model. Coefficients outside the parentheses refer to the bivariate relations among variables. A dashed line indicates a relation that failed to meet the criteria for mediation.

Continued
Figure 6 continued

Anxiety -> Marital Adjustment
Anxiety -> Vitality
Vitality -> Physical Composit
Marital Adjustment -> Physical Composit

Anxiety -> Marital Adjustment
Anxiety -> General Health
General Health -> Mental Composit
Marital Adjustment -> Mental Composit

Correlations:
- Anxiety and Marital Adjustment: -.38**
- Anxiety and Vitality: -.66**
- Marital Adjustment and Vitality: .14
- Marital Adjustment and Physical Composit: .13
- Marital Adjustment and General Health: .32* (.09)
- Marital Adjustment and Mental Composit: .32* (.10)

Note: ** indicates p < .01, * indicates p < .05.
Table 8: Regression Analyses for Marital Adjustment as Measured by the RDAS Total Scale Scores Predicting Quality of Life while Controlling for Social Support.

<table>
<thead>
<tr>
<th>Variable</th>
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<th>β</th>
<th>sr²</th>
<th>p</th>
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<td><strong>SF-36 Mental Health</strong></td>
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<td>Social Support</td>
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<td><strong>SF-36 Role-Physical</strong></td>
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*p < .05
**p < .01

Table 9: Regression Analyses for Marital Adjustment as Measured by the MAT Total Scale Scores Predicting Quality of Life while Controlling for Social Support.

<table>
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*p < .05
**p < .01
Figure 7: Results of regression analyses for depression as a mediator between patient Social Support (ISEL) and quality of life (SF-36). Standardized betas between parentheses indicate the effect of the predictor when the mediator is in the model. Coefficients outside the parentheses refer to the bivariate relations among variables. A dashed line indicates a relation that failed to meet the criteria for mediation.
Figure 7 continued

- Depression
  - Social Support
    - -0.75**
  - Vitality
    - -0.52**
    - 0.54** (.21)

- Depression
  - Social Support
    - -0.75**
  - Physical Composite
    - -0.40**
    - 0.30* (.01)

- Depression
  - Social Support
    - -0.75**
  - General Health
    - -0.65**
    - 0.38** (-12)

- Depression
  - Social Support
    - -0.75**
  - Mental Composite
    - -0.72**
    - 0.51** (.18)
Figure 8: Results of regression analyses for anxiety as a mediator between patient Social Support (ISEL) and quality of life (SF-36). Standardized betas between parentheses indicate the effect of the predictor when the mediator is in the model. Coefficients outside the parentheses refer to the bivariate relations among variables. A dashed line indicates a relation that failed to meet the criteria for mediation.
Figure 8 continued

- Anxiety
- Vitality
- Social Support
  - .54** (.29*)
  - -.53**

- Anxiety
- Physical Composite
- Social Support
  - .30* (.17)
  - -.24*

- Anxiety
- General Health
- Social Support
  - .38** (.14)
  - -.53**

- Anxiety
- Mental Composite
- Social Support
  - .51** (.14)
  - -.71**
<table>
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<th>sr²</th>
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*p < .05
**p < .01

Table 10: Regression Analyses for Marital Adjustment as Measured by the RDAS Predicting Change in SF-36 Quality of Life and Functional Capacity Over Time.

<table>
<thead>
<tr>
<th>Variable</th>
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<tr>
<td>MAT</td>
<td></td>
<td>.14</td>
<td></td>
<td>.23</td>
</tr>
</tbody>
</table>

*p < .05
**p < .01

Table 11: Regression Analyses for Marital Adjustment as Measured by the MAT Predicting Change in SF-36 Quality of Life and Functional Capacity Over Time.
<table>
<thead>
<tr>
<th>Variable</th>
<th>R²</th>
<th>β</th>
<th>sr²</th>
<th>p</th>
</tr>
</thead>
<tbody>
<tr>
<td>SF-36 Role Physical (T2)</td>
<td>.18</td>
<td>.44</td>
<td>.16</td>
<td>.05</td>
</tr>
<tr>
<td>SF-36 Role Physical (T1)</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>Social Support</td>
<td>-.14</td>
<td>.02</td>
<td>.51</td>
<td></td>
</tr>
</tbody>
</table>

| SF-36 Social Functioning (T2)                      | .15   | .37   | .11  | .08   |
| SF-36 Social Functioning (T1)                      |       |       |      |       |
| Social Support                                    | -.20  | .04   | .32  |       |

| 6-Minute Walk (T2)                                 | .73   | .86   | .73  | .00   |
| 6-Minute Walk (T1)                                 |       |       |      |       |
| Social Support                                    | .00   | .00   | .98  |       |

*p < .05
**p < .01

Table 12: Regression Analyses for Social Support Predicting Change in SF-36 Quality of Life and Functional Capacity Over Time.
REFERENCES


