MARITAL QUALITY, COMMUNAL STRENGTH, AND PHYSICAL HEALTH

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Much of the extant literature on marital quality and health has examined marital quality as a static, global construct, measured at a single assessment. However, marital quality is a dynamic construct that fluctuates over time, particularly in the early years of marriage. The purpose of the present study was to evaluate whether changes in overall marital satisfaction and communal strength are associated with mental and physical health symptoms assessed via the SF-36 in a cohort of newlywed couples (N = 74 couples). Marital measures including marital satisfaction (MS) and communal strength (CS) were collected at baseline (26 days prior to marriage) and approximately 2 years later. The SF-36 was administered 3 years following baseline. Results showed that baseline MS and CS were associated with significantly fewer mental and physical health symptoms (p's < .05). Independent of baseline level, decreases in CS were associated with poorer mental health (B = .06, SE = .03). There were no sex differences in the effects. Controlling for depressive symptoms reduced the effects of baseline MS and CS on mental and physical health to non-significance. However, the effect of change in CS on mental health remained significant after controlling for depressive symptoms (B = .05, SE = .02). The present findings suggest that even in the early stages of marriage, lower initial levels of marital satisfaction and spousal responsiveness to needs (communal strength) as well as changes in communal strength are associated with increased mental and physical health symptoms.

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1.0 INTRODUCTION

Over the past thirty years, an abundant literature has emerged documenting robust associations between higher levels of social support and integration and lower all-cause and disease-specific morbidity and mortality, including cardiovascular and infectious diseases (Cohen, Gottlieb, & Underwood, 2000). Concurrently, research has also shown that there are mental and physical health costs to conflictual social relationships (Rook, 1998). Given that spouses are the primary source of both social support and social conflict for most adults, the marital relationship has received particular interest in this regard (for reviews see Burman & Margolin, 1992; Kiecolt-Glaser & Newton, 2001). In a recent review, Kiecolt-Glaser and Newton (2001) documented significant associations between marital functioning and diverse health outcomes including self-reported symptoms, pain and pain-related disability, and cardiovascular morbidity and mortality. In addition, robust associations between marital distress (assessed primarily via self-report methods of global marital satisfaction or level of marital conflict) and both syndromal depression and depressive symptoms (Beach & Fincham, 1998; Beach, Fincham, & Katz, 1998; Fincham, Beach, Harold, & Osborne, 1997)—which are themselves risk factors for a number of chronic illnesses--further implicate the quality of the marriage as an important predictor of health. Consistent with overarching theories of gender-linked individual differences in motives, traits, and goals (Cross & Madson, 1997; Helgeson, 1994), some research also suggests that the psychological and physical effects of marital quality may be more pronounced in women than in men (for a review see Kiecolt-Glaser & Newton, 2001).

The existing marital quality and physical health literature suffers from a number of methodological limitations, including reliance on study-specific, often single-item measures of marital quality. Reliance on such measures precludes examination of effects across studies and provides relatively crude assessments of marital functioning. Furthermore, the majority of studies thus far have examined static relationships between marital quality and health. However,

relationship quality fluctuates over time and examination of these fluctuations may be a more valid representation of the effect of marital quality on health. For instance, there is consistent evidence that the transition into parenthood is a period marked by declines in marital quality (Belsky & Rovine, 1990; Kurdek, 1998). Moreover, reports by individuals about their marital quality at a single assessment may reveal more about the personality of those individuals and little about the actual dynamics of the relationship. Therefore, more research is needed that examines the dynamic effects of marital functioning over time on the physical health of men and women.

In addition, the bulk of the existing literature has focused on global indices of marital satisfaction. There have been very few empirical attempts to examine underlying interpersonal processes, grounded in a coherent theory that may explain how and why so-called "good" or "bad" marriages might be linked with physical health. Finally, few studies have examined the influence of marital quality on health in men and women within the same study, which precludes examination of the moderating role of gender on health outcomes. Moreover, including both members of the couple in a study would allow for examination of the dynamic and perhaps synergistic effects of interpersonal processes on health outcomes.

Another notable limitation that characterizes much of the previous research is the truncation of range of marital quality in many of the samples and the subsequent loss of statistical power, perhaps due to the use of older-aged samples with relatively long-lasting and stable marriages (for a discussion of this issue see Kiecolt-Glaser & Newton, 2001). Investigating the impact of marital quality on physical health in younger samples during the early years of marriage may provide a stronger test of the association between marital quality and physical health because there is likely to be a greater range of marital quality—an assumption supported by research showing that one third of all divorces occur within the first five years of marriage (National Center for Health Statistics, 1991). The well-documented pattern of precipitous declines in marital satisfaction following the birth of the first child (Belsky & Rovine, 1990; Kurdek, 1998), further suggests that the early stages of marriage are a period marked by substantial variability in marital satisfaction. Moreover, in previous research that has analyzed the impact of marital quality in older-aged samples with relatively long-lasting marriages (e.g., Gallo, Troxel, Matthews, Kuller, & Sutton-Tyrrell, 2003; Gallo et al., 2003) it is

likely that those couples who were most distressed had already divorced or separated before the study was initiated.

Utilizing younger samples may also elucidate the role of marital factors in the etiology of disease. On the other hand, a challenge in utilizing younger cohorts is identifying an appropriate health outcome with sufficient variability to detect statistical differences in the given age group.

Measures of self-reported health have proven to be both reliable and valid health indicators with sufficient variability in a wide range of age groups (Benjamins, Hummer, Eberstein, & Nam, 2004; Idler & Benyamini, 1997; Merkies et al., 2002). Importantly, however, subjective reports of health status may be confounded by other variables, such as neuroticism or psychological distress and may not correlate with underlying pathology (Mechanic, 1980; Watson & Pennebaker, 1989). Nevertheless, perceived health predicts mortality, independent of biological risk factors, suggesting that self-reports may have incremental validity providing information not captured by standard biological markers of disease processes (Idler & Benyamini, 1997). In addition, self-report methods that focus on specific, well-operationalized symptoms are reliably associated with physicians' diagnoses (Jenkins, Krager, Rose, & Hurst, 1980). Finally, given the association between perceived health and utilization of health care services (Balkrishnan et al., 2003) as well as the burden of disease imposed on the individual and the family, self-reports of health serve an important role in understanding how relationship processes contribute to physical well-being and may serve as an important marker of pathophysiological processes.

A handful of both cross-sectional and longitudinal studies have reported linkages between measures of marital quality and self-reports of health (Barnett, Davidson, & Marshall, 1991; Prigerson, Maciejewski, & Rosenheck, 1999; Ren, 1997; Thomas, 1995). Although both longitudinal and cross-sectional studies suffer the inherent methodological limitations associated with self-reported symptomatology (i.e., potential confounding of personality and distress), longitudinal designs allow for a more stringent test of the association between marital quality and subjective health due to their ability to control for distress-related variance over time. For instance, Wickrama and colleagues (1997) found that higher baseline levels of marital quality predicted better health at study entry *and* improvements in marital quality over a 4- year period predicted decreases in self-reported symptomatology. In further demonstration of the greater power associated with longitudinal designs, Levenstein and colleagues (1995) showed a stronger

cross-sectional association between marital strain and peptic ulcer in men than in women. Interestingly, however, data from the eight- to nine-year follow-up period which controlled for chronic diseases and health-related behaviors showed stronger prospective associations between marital strain and ulcers in women than in men (Levenstein, Ackerman, Kiecolt-Glaser, & Dubois, 1999). A similar gender disparity in the effects of marital functioning on health was found in a study investigating the association between marital quality and symptoms from a symptom checklist among older couples in long-term marriages (Levenson, Cartensen, & Gottman, 1993). Specifically, the investigators found that in distressed marriages women reported more physical problems than men, whereas in healthy marriages there were no gender differences.

Overall, the extant literature suggests that various dimensions of marital functioning are associated with both global perceptions of health and with specific symptoms or illnesses. However, there are a number of limitations of the existing studies. First, these studies primarily focused on global measures of marital satisfaction or marital harmony. There have been few empirical attempts to examine underlying processes, grounded in a coherent theory that may explain how and why so-called "healthy" or "unhealthy" marriages might be linked with physical health. Moreover, several studies used single- or few-item study specific measures of marital functioning and/ or self-reported symptom measures (Medalie, Stange, Zyanski, & Goldbourt, 1992; Ren, 1997; Thomas, 1995), precluding comparison of effects across studies. Finally, few studies included both men and women or tested for gender effects, thereby precluding examination of the moderating role of gender. Moreover, failure to include both members of the marital dyad precludes a comprehensive examination of the dynamic effects between husband and wives.

Therefore, the purpose of the present study is to examine the effect of initial levels of marital quality and changes in that quality on self-reported health symptoms in husbands and wives, over the first several years of marriage. In addition, the current study goes beyond the conventional approach of utilizing global measures of marital satisfaction and draws from current relationship research and theory to examine a specific interpersonal variable that may contribute to health. Specifically, this study examines whether the communal strength of many marriages-- that is, the perception that one's spouse will be non-contingently responsive and nurturing to one's needs-- is associated with self-reported symptoms. The current study also has

measures of depression and hostility, thereby affording the opportunity to examine the unique effects of relationship processes on self-reported health.

To provide a theoretical background in which to frame the present study, I will first give a brief overview of the existing evidence linking marital quality with physical health outcomes in adults. Second, I will highlight relevant research and theory that implicates gender as an important moderator of the effects of marital quality on health. Next, I will explore potential pathways that may explain relationships between marital quality and physical health. Finally, given the relatively simplistic, and often uni-dimensional approaches that have been used thus far in examinations of marital quality and physical health, I will apply theoretical perspectives from the marital and sociological literatures to elucidate a potential underlying relational variable that may be important for physical health outcomes.

2.0 MARITAL QUALITY AND PHYSICAL HEALTH

Poor marital quality has been linked with diverse physical health outcomes including greater self-reported symptoms, pain and pain-related disability, infectious illness, and cardiovascular morbidity and mortality (for reviews see (Burman & Margolin, 1992; Kiecolt-Glaser & Newton, 2001). For instance, a number of cross-sectional reports using self-reported symptoms provide conditional evidence linking marital functioning with physical health (Barnett et al., 1991; Coughlin, 1990; Ganong & Skyring, 1968). Longitudinally, low levels of marital love and support predicted the development of duodenal ulcers in a sample of middle-aged Israeli men (Medalie et al., 1992). An important limitation of this study was that marital quality was assessed via a single-item self-report measure of the husband's perception of his wife's level of love and support. Not only is the reliability and validity of such a measure highly suspect, but the restriction of range is also problematic when using a single item to assess a multiply determined construct.

In a prospective investigation of post-menopausal women, Gallo and colleagues (Gallo, Troxel, Matthews, Kuller, & Sutton-Tyrrell, 2003) found that women who reported high levels of satisfaction in their marriages had lower average levels of cardiovascular risk factors than unmarried women or married women who reported low levels of marital satisfaction. In addition, trajectory analyses revealed that women in highly satisfying marriages had healthier risk trajectories over time for particular risk factors (lipid levels and body mass index) as compared to the other groups. Analyses from the same sample further revealed that women in satisfying marriages had lower levels of subclinical markers of cardiovascular disease (i.e., carotid ultrasounds of intima-media thickness and plaque, and electron beam tomography scans of the aorta) as compared to the other groups (Gallo, Troxel, Kuller et al., 2003). The studies conducted by Gallo and colleagues provide preliminary evidence that marital satisfaction may be involved in the etiology of cardiovascular disease; however, given the age of the sample and the

average length of marriages, most women reported relatively satisfying marriages—resulting in a truncation of range of marital quality and perhaps a loss in statistical power (Kiecolt-Glaser & Newton, 2001). As with the Medalie and colleagues (1992) study, the studies by Gallo and colleagues are limited by the use of a study-specific, 7-item measure of marital satisfaction that does not permit comparisons of results with other more standard scales.

Using a standardized measure of marital adjustment, the Dyadic Adjustment Scale (DAS; Spanier, 1976), Baker and colleagues (1998) found that marital adjustment predicted increases in left ventricular mass --a risk factor for cardiovascular morbidity and mortality. The DAS is reportedly the most widely published instrument of marital adjustment (Eddy, Heyman, & Weiss, 1991) and use of this measure certainly has advantages over single-item or study-specific measures by having well-documented reliability and validity and by providing normative data about marital adjustment. However, the DAS has been criticized for its multidimensional nature that taps into several conceptually distinct dimensions of relationship functioning including satisfaction and disagreement (Eddy et al., 1991; Heyman, Sayers, & Bellack, 1994). Moreover, the DAS conceptualizes marital satisfaction as a uni-dimensional construct with opposite poles representing adjustment versus maladjustment. This strategy is particularly problematic given research that suggests that both positive and negative aspects of marital quality have independent effects on physical health outcomes (e.g., Helgeson, 1991; Coyne, 2001). Despite the evidence suggesting the utility of disaggregating the positive and negative aspects of marital functioning, most research has utilized global measures of marital quality.

2.1 SEX DIFFERENCES EXIST IN THE ASSOCIATION BETWEEN MARITAL QUALITY AND PHYSICAL HEALTH.

Converging evidence over the past decade suggests that women may be more sensitive, both physiologically and psychologically, to negative aspects of relationships than are men (Notarius, Benson, Sloan, Vanzetti, & Hornyak, 1989; Ewart, Taylor, Kraemer, & Agras, 1991; Mayne et al., 1997; Kiecolt-Glaser et al., 1997; Smith et al., 1998). According to sociological research, relative to men's self-construals, women's are characterized by relational interdependence (Cross & Madson, 1997). That is, women's attributions of the self, social information processing, and

emotion regulation skills are influenced by close, dyadic relationships to a larger extent than for men, perhaps due to socialization and other cultural norms (Acitelli & Young, 1996). In contrast, though men value close interpersonal relationships, their self-construals are more closely linked with group memberships and affiliations drawn from a broader social sphere.

As a result of their relatively more relationally interdependent self-construals, women may therefore be more attuned to both the "highs and lows" of marital functioning. It has been suggested that women function as the emotional "barometers" of distressed marriages (Floyd & Markman, 1983). For instance, some research suggests that women's heightened risk for depression may be due in part to their greater sensitivity to relationship events and related stressors (Cross & Madson, 1997). Consistent with this notion, in a longitudinal study of marital functioning and depression using path analytic techniques, Fincham and colleagues (1997) found that for women, causal pathways emerged between marital satisfaction and depression, whereas for men, causal paths were from depression to marital satisfaction.

Evidence from the emotion research suggests that wives are not only better interpreters of their husbands' emotions than the reverse (Notarius et al., 1989), but they also appear to be more vulnerable to their husbands' negative moods than the reverse. That is, particularly in distressed couples, husbands' negative moods are a better predictor of wives' negative emotions than are wives' negative emotions a predictor of husbands' moods (Notarius & Johnson, 1982; Roberts & Krokoff, 1990). Finally, evidence suggests that marital conflicts are more upsetting to wives than husbands (Almeida & Kessler, 1998; Bolger et al., 1989) and wives tend to ruminate more about marital disagreements than their husbands (Ross & Holmberg, 1990). Taken together, the evidence suggests that compared to husbands, wives may exhibit a tighter 'coupling' between interpersonal functioning and emotional and physical well-being, and these effects may be particularly evident in the context of the marital relationship.

Consistent with this notion, based on their review of the marital quality and health literature over the past 10 years, Kiecolt-Glaser and Newton (2001) concluded that women may be more vulnerable to the health consequences associated with marital distress than are men. For example, Coyne and colleagues (2001) reported that among male and female coronary heart disease (CHD) patients, poor marital quality was a more robust predictor of mortality in women than in men.

Research further suggests that this gender disparity may be attributable to gender differences in physiological responding to marital interactions. Indeed, compared with men, women display more pronounced physiological responses (i.e., cardiovascular, endocrine, and immunologic) to marital interactions, particularly when negative interactions are assessed (e.g., Ewart, Taylor, Kraemer, & Agras, 1991; Mayne et al., 1997; Kiecolt-Glaser et al., 1997; Smith et al., 1998).

On the other hand, given data suggesting that the relationship between marital happiness and global happiness is stronger for women than men (Glenn & Weaver, 1981), women may also derive greater health benefits from high quality marriages than men. Indeed, over a 15-year follow-up period, Hibbard and Pope (1993) found that marital characteristics (i.e., companionship and equality in decision making) were associated with a lower risk of death in women but marital characteristics did not predict mortality in men (Hibbard & Pope, 1993).

Despite these central differences, previous research has tended to study the effects of marital quality in single-sex samples, precluding a direct examination of gender effects and raising doubts about the validity of the measures. Moreover, failure to include both members of the couple unit in the same study precludes examination of the dynamic influence of marital processes on health outcomes and the ability to examine spousal concordance on the marital variables and the health outcomes.

2.2 HOW MIGHT MARITAL QUALITY INFLUENCE THE HEALTH OF HUSBANDS AND WIVES?

There are a number of plausible mechanisms that could account for associations between marital quality and physical health. First, marital distress is associated with lifestyle risk factors including non-adherence to medical regimens and engagement in health risk behaviors (e.g., smoking, substance abuse, physical inactivity; for a review see (Kiecolt-Glaser & Newton, 2001). In contrast, research has shown that positive marital interactions predict better adherence to medical regimens (e.g., Trevino, Young, Groff, & Jono, 1990) and lesser likelihood of engaging in risky health habits (i.e., poor dietary habits, substance use, and inadequate sleep; Wickrama, Lorenz, Conger, & Elder, 1997), independent of work stress, education, and income.

Second, poor marital quality is also a robust predictor of psychosocial factors, including depression, hostility, and anger—variables that are themselves risk factors for poorer perceived health status as well as physician-diagnosed illnesses, including infectious illnesses, cardiovascular diseases, and certain cancers (e.g., Rozanski, Blumenthal & Kaplan, 1999; Smith & Ruiz, 2002; Suls & Bunde, 2005). Robust associations have been reported between marital discord and syndromal depression and depressive symptoms (e.g., Beach, Smith, & Fincham, 1994; Beach, Fincham, & Katz, 1998; Fincham, Beach, Harold, & Osborne, 1997). Both cross-sectional and prospective evidence also suggests that marital satisfaction is associated with trait hostility and expressions of anger (Houston & Kelly, 1989; Newton & Kiecolt-Glaser, 1995; Smith, Pope, Sanders, Allred, & O'Keefe, 1988).

Finally, whereas a supportive marriage may serve as a stress-buffer, lessening the impact of stress on mental and physical well-being, a troubled marriage may serve as a primary source of stress. Increased exposure to acute and chronic stress is, in turn, hypothesized to be linked with increased risk for diverse physical ailments including infectious diseases and cardiovascular disease by influencing hemodynamic, inflammatory, and clotting processes (Krantz & McCeney, 2002). Associations between marital processes and alterations in cardiovascular, endocrine, and immune functioning provide solid evidence for physiological pathways linking marital distress with diverse physical health outcomes (Seeman, Berkman, Blazer, & Rowe, 1994; Uchino, Cacioppo, & Kiecolt-Glaser, 1996). For instance, Kiecolt-Glaser and colleagues (Kiecolt-Glaser et al., 1993) found that subjects exhibiting more negative behaviors during a marital interaction showed greater immune system down-regulation, although the effect was stronger in women than men.

Greater marital distress is also associated with augmented cardiovascular responses in both laboratory (e.g., Broadwell & Light, 1999; Ewart et al., 1991) and ambulatory blood pressure studies (e.g., Baker et al., 1999; Carels, Sherwood, Szczepanski, & Blumenthal, 2000). In contrast, Gump and colleagues (2001) found that interactions with one's partner produced attenuated blood pressure responses relative to other types of social interactions, regardless of the quality of the relationship, suggesting that the mere presence of an intimate partner diminishes blood pressure reactivity. Heightened cardiovascular stress responses have, in turn, been shown to predict future elevated blood pressure (Markovitz, Raczynski, Wallace, Chettur, & Chesney, 1998; Matthews, Woodall, & Allen, 1993) and carotid atherosclerosis (Matthews et al., 1998),

and are related to more atherogenic plasma lipid profiles (e.g., Burker et al., 1994; Stoney, Bausserman, Niaura, Marcus, & Flynn, 1999), perhaps consequential to cortisol elevations (McCann et al., 1996). Moreover, higher levels of stress or daily hassles are associated with altered blood glucose modulation in diabetic (Hanson, Henggeler, & Burghen, 1987) and non-diabetic samples (Vitaliano, Scanlan, Krenz, & Fujimoto, 1996).

Although largely speculative at this point, some researchers have argued that the neuropeptide, oxytocin (OT), present in both males and females, but most commonly considered in relation to lactation and inducing childbirth in women, may provide the neural substrate linking social relationships with health outcomes (Ryff & Singer, 2001; Taylor et al., 2000). Oxytocin's role in promoting pair-bonding and maternal behaviors (e.g., licking and grooming in rats) as well as its attenuating effects on cardiovascular stress responses (Light et al., 2000; Uvnas-Moberg, 1998a, 1998b), makes it an especially compelling candidate mechanism linking marital quality and health outcomes; however, this mechanism is largely speculative at this point and awaits future research.

In summary, the existing literature contains ample evidence that the subjective experience of the marital relationship could be linked to physical health outcomes via behavioral and psychosocial pathways and through alterations in immunologic, endocrine, and cardiovascular stress responses.

2.3 WHY ARE NEW MEASURES NEEDED TO EXAMINE THE ASSOCIATION BETWEEN MARITAL QUALITY AND HEALTH?

Taken together, the extant literature suggests that the quality of the marital relationship is linked with physical health and several plausible mechanisms may account for these links. However, the primary focus of most of these studies was typically not on relationship quality at the study's inception and the measures of relationship quality that have been included have often been single item (or at best several item) measures reflecting one couple member's global judgment of the quality of the relationship (e.g. "To what extent are you satisfied with your marriage?" "Does your husband love you?"). The research has arisen primarily from behavioral medicine and

epidemiological research and has not taken advantage of rapid progress being made in the field of basic relationship research.

The associations between marital quality and health that have been observed are intriguing and important, but the limited nature of the relationship measures is troubling for a number of reasons. First, the reliability of single- or few-item relationship quality measures is questionable. Second, asking an individual person about the quality of his or her relationship may reflect a great deal about that person's personality and little about the relationship. More likely, however, both the individual's personality and relational processes contribute to this judgment, consistent with transactional perspectives of reciprocal relationships between the person and the environment (Campos, Campos, & Barrett, 1989; Smith, 1995). Nevertheless, it is entirely possible for one member of a relationship to report being very satisfied whereas the other member reports being very dissatisfied. Relationship researchers would not characterize this as a high quality relationship but past researchers often do classify a relationship as satisfied or good based on just one member's self-report. Thus, a more accurate representation of the impact of marital quality, an interpersonal process, on physical health would be to examine the dynamic influence of both husbands' and wives' reports of marital quality simultaneously. Moreover, given that marital satisfaction is a multiply determined construct, the question remains, does knowing about specific interpersonal attributes add prognostic value or is the individual's global judgment of the relationship most salient in influencing his or her physical health?

Another issue is that global judgments about relationships may have more to do with the person's expectations or standards for a relationship than about the actual quality of the relationship. For instance, given exactly the same relationship, a person with low standards for relationships, given a history of poor relationships, might report being very satisfied whereas a person with high standards for relationships, given a history of terrific relationships, might report being dissatisfied.

In addition, single judgments of relationship quality are necessarily static, but the trajectory of relationship quality (i.e., improving? deteriorating? stable?) may be an important determinant of how relationship quality links to health. Positive trajectories may promote a sense of optimism about the relationship which might stimulate further efforts to continue to work towards improving the relationship. In contrast, deteriorating trajectories may evoke

negative feelings which in turn, lead to further withdrawal tendencies and increased marital distress (Carver & Scheier, 1990; Grote & Clark, 2001). Such affective responses may be linked with physical health through recognized biopsychosocial pathways (e.g., Smith & Ruiz, 2002).

Finally, a global judgment about a relationship (e.g. "I am very satisfied with my marriage") provides no hint of the underlying relationship processes or characteristics of the relationship that contributed to that judgment and that, importantly, might be contributing to health. For instance, global judgments of satisfaction in one's relationship may be indicative of the presence of positive aspects (e.g., support; having an attractive spouse, feeling taken care of), the absence of negative aspects (e.g., conflict), or merely one's generalized expectations of relationships –an entirely relative judgment. Indeed, the limited research that has examined marital quality from a process-oriented level suggests that specific relationship dimensions such as spousal conflict and over-involvement, companionship, disclosure, and equity in decision making, are uniquely predictive of physical health outcomes (e.g., Coyne et al., 2001; Helgeson, 1991). However, more research is needed to determine whether specific relational properties make unique contributions to physical health independent of global marital satisfaction.

On a related issue, researchers often use the terms "marital satisfaction" and "marital conflict" interchangeably, despite evidence that there are independent effects of positive and negative aspects of relationship quality on physical and mental health (Eddy et al., 1991; Fincham & Beach, 1999). For example, as suggested by the title of Ewart and colleagues (Ewart, Taylor, Kraemer, & Agras, 1991) paper "Not being nasty matters more than being nice," negative parameters of relationship functioning significantly predicted blood pressure changes whereas positive or neutral parameters did not (p.155). Importantly, however, the experimental paradigms used to assess marital interactions typically involve resolving a dispute and subsequently may maximize opportunities for conflict behaviors and constrain opportunities to display overt supportive behaviors.

It may be that the health-protective effects of supportive marriages stem from an internal sense of being cared for and supported rather than from overt, measurable behaviors. Indeed, several converging lines of evidence suggest that social support particularly from intimate partners or friends may impact physiological stress responses and ultimately disease pathogenesis independently of the actual, conscious receipt of social support (Bolger, Zuckerman, & Kessler, 2000; Sarason et al., 1991; Sabin, 1993). Basic research and theory

suggests that mental activations of supportive companions (i.e., internalized representations) function similarly to the presence of supportive companions by altering stressor and coping appraisals and mood (Pierce, Baldwin, & Lydon, 1997). Consistent with this notion, Smith and colleagues (Smith, Ruiz, & Uchino, 2003) found that merely thinking and writing about a close companion significantly attenuated cardiovascular reactivity to laboratory stressors whereas thinking and writing about an acquaintance did not. These findings underscore the increasingly accepted view, at least in basic relationship theory and research, that internal representations of social ties are at least as important as actual supportive transactions in explaining the benefits of social ties (Sabin, 1993; Sarason et al., 1991).

However, with few exceptions (e.g., Smith, Ruiz, & Uchino, 2003) behavioral medicine researchers interested in the effects of intimate social ties on health outcomes, have lagged behind in adopting this more nuanced perspective of social support. Thus, theory-driven, process-oriented research is needed that goes beyond global dimensions of marital quality and paradigms that assess "enacted" social support to elucidate the health-protective processes that characterize supportive marriages.

Some researchers have speculated that the perception of support availability may either be comforting in itself or, to borrow a term from the attachment literature, provide the kind of psychological "safe haven" that helps motivate self-reliant coping efforts and attenuates stress responses (Wethington & Kessler, 1986). Extending this reasoning to marriages, I contend that this explanation is precisely why the communal strength of many marriages, that is the mutual, non-contingent responsiveness to spousal needs, may underlie what is generically considered a high quality or supportive marriage. Marriages characterized by high communal strength may provide such a "safe haven" in which there is an implicit and mutual sense that support is there and will be there during times of need and to share positive experiences with as well. I hypothesize that this implicit knowledge is health protective because it goes beyond the tangible aspects of support and captures the fundamental need for belongingness, companionship, love, and nurturance (Hazan & Shaver, 1994). These processes then become incorporated into cognitive structures or "working models" that one carries and benefits from on a day-to-day basis (Gottman, 1982; Hazan & Shaver, 1987; Hazan & Zeifman, 1999).

2.4 COMMUNAL STRENGTH MAY PARTIALLY UNDERLIE ASSOCIATIONS BETWEEN MARITAL QUALITY AND HEALTH.

Drawing primarily from basic relationship theory and the previous and extensive work of one of the Co-PI's (M.S. Clark) on this project, I hypothesize that the communal strength of the marriage, that is the mutual "felt" experience that both oneself and one's spouse is and will "be there" for one another, is the integral process that underlies the salutary effects of some marriages. Figure 1 depicts the model with hypothesized links between communal strength and health outcomes. Specifically, this theoretical explanation is derived from the conception of communal relationships initiated by Clark and Mills in 1979 (Clark & Mills, 1979, 1993; Mills & Clark, 1982) and backed by over 20 years of subsequent work (e.g., Clark, 1981, 1984, 1986, 2002). According to this theory, in communal relationships, benefits are given and received non-contingently in response to the other's needs or, symbolically, to convey caring for one another. In contrast, in other relationships different rules are followed. For instance, in exchange relationships benefits are given and accepted with the intent of getting a comparable benefit in return, or in repayment for benefits received in the past. In exploitative relationships each person tries to acquire the most rewards for him or herself and avoid the most costs without concern for the other.

Substantial evidence supports these theoretical distinctions between communal, exchange, and exploitative relationships (e.g., Clark & Mills, 1979; Williamson & Clark, 1992; Williamson & Clark, 1989). Mills and Clark (1994, 2001; Mills, Clark, Ford, & Johnson, 2004) have further argued that communal relationships vary in strength, such that the greater the motivation to be responsive to the other's needs, the stronger the communal relationship. Thus, whereas most people have weak communal relationships with many people (i.e., they will provide low cost benefits without expectation of repayment), strong communal relationships typically occur only among family members, romantic partners, and perhaps close friends.

Preliminary pilot data from the current sample suggests that adhering to communal norms is negatively correlated with cardiovascular risk factors (Troxel, Clark, & Matthews, unpublished data). As shown in Appendix A, higher average levels of the perception of spouse's communal strength were associated with individual cardiovascular risk factors including lower waist circumference and lower fasting glucose levels (p's $< .05$). In addition, t-tests revealed that

individuals who were categorized as being at high risk for the cluster of cardiovascular risk factors known as the metabolic syndrome (i.e., having 3 or more metabolic risk factors in the top 75% of their distributions) had higher average levels of communal strength, ($t(25) = 2.03$, $p = .05$). Interestingly, neither the average levels nor the trajectories of global marital satisfaction were associated with individual cardiovascular risk factors or the metabolic syndrome cluster. Notably, these results are based on a very small sample ($N = 26$), yielding very low power. Nevertheless, these findings provide pilot data suggesting the importance of considering the communal strength of the marriage as a factor implicated in cardiovascular disease pathogenesis.

3.0 PRESENTATION OF HYPOTHESES CONCERNING COMMUNAL STRENGTH WITH PHYSICAL HEALTH OUTCOMES

I propose that a person's perception of the strength of his or her spouse's communal relationship will be associated with his or her physical health. The perception of spouse's communal strength refers to the person's perception of the degree to which the spouse is responsive to that person's needs, will go to considerable time, effort, and costs to be responsive to those needs and will do so non-contingently. These perceptions are multiply determined, including, most obviously, the spouse's past objective responsiveness to the person's needs. (The higher that responsiveness has been, the greater a person's perceptions of that spouse's communal strength should be.) Importantly, however, even when objectively partners do care, some people, variously labeled as insecure in attachment (Ainsworth, Blehar, Waters, & Wall, 1978), rejection sensitive (Downey & Feldman, 1996), or low in self-esteem (Murray, Holmes, MacDonald, & Ellsworth, 1998) may underestimate the extent to which they care.

Consistent with the attachment literature, past relationship histories (in particular those with the primary caretaker during early child development) become integrated over time into cognitive-affective schemas or working models of the self, others, and relationships (Ainsworth et al., 1978; Bowlby, 1969). Such working models are believed to affect adult relationships by influencing expectancies and perceptions of the social environment and relational behavior in characteristic ways (Collins & Read, 1990; Sroufe & Fleeson, 1986). For instance, holding a spouse's true communal strength constant, chronically low trust in others (as indexed by insecure attachment style, low communal orientation) may lower perceived communal strength of the relationship. Consistent with interdependence theory (Rusbult & Van Lange, 2003) past experiences can set up expectations on a person's part for just how responsive a partner ought to be. If one has had poor past experiences one will have a low comparison level and, again holding true responsiveness constant, one may perceive less communal strength from one's

spouse. Thus, regardless of the source or sources of perceived partner communal strength, I have predicted that it will be linked with better health outcomes.

Despite the lack of direct evidence linking communal strength with objective physical health outcomes (with the exception of our preliminary metabolic data), several plausible mechanisms derived from communal relationships theory and other social psychological research are particularly relevant to understanding how the perception of spousal communal strength may contribute to physical health outcomes. In times of low stress, perceptions of one's spouse's communal strength ought to be associated with willingness to explore the environment without fear as one is confident that someone else is looking out for one's best interest. This line of reasoning coheres with evidence from the attachment literature that children who are secure in attachment (as assessed by the Ainsworth strange-situation paradigm) are more likely to explore their environment than children who are insecure in their attachment to their primary caregiver (Ainsworth et al., 1978). Similarly, evidence from the adult attachment literature suggests that adults who report secure attachment in their marriages are more likely to report secure orientation at work (including higher ratings of work satisfaction and success and lower ratings of fear and anxiety regarding job performance or evaluation by co-workers) relative to their insecurely attached counterparts (Hazan & Shaver, 1990). The authors propose that "[S]ecure explorers, at any age, should reap the most rewards of exploratory activity because they are not distracted by concerns over unmet attachment needs and do not explore primarily for the sake of pleasing or avoiding others (p.271)." Thus, having the perception that one's spouse will go to great lengths to ensure one's physical and emotional well-being should exert a positive influence on health by evoking positive mood states, including increased self-esteem, and a sense of self-efficacy and mastery over one's environment. Although research on the association between positive affect and physical health is limited, recent studies suggest that positive affect may have important implications for physical and psychological health independent of the effects of negative affect (Cohen, Doyle, Turner, Alper, & Skoner, 2003; Folkman & Moskowitz, 2000; Fredrickson, 2002).

In times of threat, again one has a safety net and whereas the presence of such a net may not change perceptions of the nature of the threat (primary appraisal processes), it may predict what Lazarus (Lazarus, 1985; Monat & Lazarus, 1991) has called secondary appraisals of that threat, or, in other words, one's internal, rapid judgments of one's ability to cope with the threat

(Lepore, Mata Allen, & Evans, 1993). Paired with a supportive spouse, one ought to be better able to judge that one is up to the coping task and one may even come to evaluate it as a challenge rather than a threat.

Subsequently, such perceptions of being cared for and supported along with actual tangible aid from the spouse provided on a non-contingent basis, may impact physical health by reducing negative mood states, such as depression and anxiety, which are themselves risk factors for chronic illness, including cardiovascular disease, and all-cause mortality (Suls & Bunde, 2005; Cohen, 2002; Kawachi, Sparrow, Vokonas, & Weiss, 1994; Kubzansky, Kawachi, & Sparrow, 1999; Musselman, Evans, & Nemeroff, 1998) and by attenuating physiological stress responses (Lepore et al., 1993; Uchino et al., 1996; Uno, Uchino, & Smith, 2002). For instance, in an ambulatory blood pressure study, Gump and colleagues (Gump, Polk, Kamarck, & Schiffman, 2001) found that interactions with intimate partners in the natural environment were associated with attenuated blood pressure responses. The authors speculate that this effect may be attributable to a "classically conditioned safety signal," p.431). That is, due to a history of predictable, safe, and supportive interactions with the intimate partner, subsequent interactions with that partner cue feelings of calm and dampened physiological reactivity (Collins & Read, 1990; Sroufe & Fleeson, 1986).

Moreover, by providing such a "safe haven" marriages that are high in communal strength should allow for more open expression of both positive and negative emotion, whereas those that are low in communal strength may be associated with suppression of emotion (Clark, Fitness, & Brissette, 2000). Indeed, this hypothesis has been borne out in a number of empirical studies. For instance, evidence suggests that it is within communal relationships that partners are most likely to react positively to expressions of emotion (Clark & Taraban, 1991), attend to the needs which are conveyed (Clark, Mills, & Powell, 1986; Clark, Mills, & Corcoran, 1989), provide support in response to the needs (Clark, Oullette, Powell, & Milberg, 1987) and feel good about helping (Williamson & Clark, 1989, 1992). In addition, evidence from the individual differences literature, suggests that among dating and married couples, those individuals categorized as being secure in attachment style (a construct closely related to communal strength) were less likely to suppress emotions including anger, sadness, and anxiety to their partner compared to avoidant people (Feeney, 1995, 1999).

Suppression/ expression of emotions have in turn, been linked with physiological effects that may lead to increased risk for physical illness including immune system suppression and exaggerated and/ or sustained cardiovascular stress responses (Appels, Golombeck, Gorgels, De Vreede, & Van Breukelen, 2002; Gross & Levenson, 1993; Gross & Levenson, 1997; Wastell, 2002). For instance, Suls and colleagues (1997) reported that among male post-myocardial infarction (MI) patients, those who tended to suppress their worries and concerns from their spouses 4 weeks post-MI showed poorer adjustment 6 months later. A meta-analytic review of research in the area of emotional expression and cardiovascular responses concluded that the combination of experiencing high levels of emotion and suppressing it results in higher levels of blood pressure (Jorgensen, Johnson, Kolodziej, & Schreer, 1996). Importantly, however, researchers who have linked emotion suppression versus expression to these physiological parameters have generally not simultaneously focused on relationship context (Clark, 2002). Given that most people suppress emotion outside the context of communal relationships and express them within the context of communal relationships, physiological benefits of expressing emotion ought to accrue most often when people are with partners who care about them. Based on these reasons, a primary aim of this study is to evaluate the hypothesis that an individual's perception of the spouse's communal strength will be associated with better self-reported health.

Clark and colleagues' previous work suggests that both newlywed and older-aged couples consider communal norms to be the ideal norms for giving and receiving benefits, but at the same time they consider communal norms to be more ideal than realistic (Grote & Clark, 1998). Moreover, evidence suggests that while most individuals enter marriage feeling a high level of communal strength towards their partner and perceiving a commensurate level of communal strength from their partner, it is common in most marriages for couples to "fall away" from these norms at some point in the relationship (Clark & Chrisman, 1994). For instance, following the birth of the first child which is a period marked by substantial stress and often precipitous declines in marital satisfaction, couples were more likely to endorse utilizing exchange norms for giving and receiving benefits to their spouse, giving rise to perceptions of unfairness in the relationship, which in turn was associated with greater marital distress (Grote & Clark, 1998, 2001; Grote, Naylor, & Clark, 2002).

Given further external stressors combined with individual personality characteristics (e.g., hostility, insecure attachment) of the spousal members, some couples that entered marriage

with high expectations of communion may end up feeling exploited. Such a discrepancy between the reality of the relationship and the expectations at the start of the relationship may engender feelings of hurt, betrayal, anger, and may lead to withdrawal behavior that will lead to further declines in the communal strength of the relationship (for a discussion of this topic see Carver & Scheier, 1990). These feelings, in turn, could then stimulate a cascade of psychological, behavioral, and physiological effects that culminate in increased risk for physical illness. Thus, I hypothesize that over and above the initial level of communal strength, decreases in communal strength over time will be associated with poorer self-reported health.

In summary, one's perception of his/ her spouse's communal strength (both initial levels and changes over the first several years of marriage) are plausibly linked with health by influencing cognitive (e.g., appraisal processes), affective (e.g., emotion expression/ suppression), behavioral (e.g., engagement in health-promoting or compromising behaviors), and physiological responses (HPA, SAM) that may serve as mechanistic pathways leading to physical health outcomes.

Presumably, in high-functioning marriages, there is a mutual sense that not only will one's spouse go to great lengths to ensure one's welfare but one will also go to great lengths to ensure the spouse's welfare. Although there is some evidence from the adult attachment literature suggesting that partners' combined attachment styles affect relationship functioning (Feeney, 1994; Senchak & Leonard, 1992), scant research has examined the conjoint health effects of feeling cared for as well as feeling successfully nurturant and loving towards another. That is, for example, in "couple A," the wife's perception of her husband's communal strength (towards her) combined with her communal strength *towards him* should exert an even greater effect on her physical health than that predicted by either of these constructs alone. In other words, I predict that the combination of feeling cared for by one's spouse along with feeling successfully nurturant towards one's spouse will best predict health. To explore this dynamic relationship, I will examine whether the combination of one's own communal strength towards the spouse and the perception of spouse's communal strength, is associated with physical health outcomes, over and above the individual effects of these constructs. Similarly, I propose that combination of one's own and one's spouse's satisfaction levels will be associated with health outcomes, independent of individual reports of satisfaction. These hypotheses will be

exploratory given the number of analyses proposed and the lack of previous research to support directional hypotheses.

Given that global marital satisfaction is a multiply determined construct tapping into several potential relational processes as well as personality characteristics, the rationale I have proposed concerning the effects of communal strength could be applied to marital satisfaction as well. Thus, I propose similar hypotheses for analyses using communal strength and marital satisfaction as the independent predictors.

4.0 THE CURRENT STUDY

In aggregate, prior research suggests that qualitative aspects of the marriage may be important for physical health and there may be sex differences in the magnitude of the association. Moreover, research suggests that specific positive and negative aspects of marital functioning may be uniquely predictive of health outcomes, but little research has applied a coherent theory of marital dynamics to understand what specific qualities of marriage may be health promoting and why. Using the SF-36, a well-validated instrument for assessing physical and mental health symptoms, the current study examines the association between global marital satisfaction and communal strength and self-reported health in a cohort of newlywed couples.

The current study extends previous research in several key respects. First, this study extends prior research by examining associations between marital quality and self-reported health in a sample of newlywed couples—a cohort in which there is likely to be a greater range of marital satisfaction, thereby providing a more powerful test of the association. Second, by including both husbands and wives from the same marriages, the current study expands upon previous research by examining potential gender differences in the hypothesized associations between marital quality and physical health while holding the variable of particular marriages constant. It also allows for the examination of the dynamic relationship between husbands' and wives' marital satisfaction and communal strength. Third, drawing from the theoretical work of Clark and colleagues, the present study examines how a specific relational variable, communal strength (i.e., the perception that one's spouse will be non-contingently responsive to one's needs and the degree to which one feels communal towards the spouse) may contribute to global judgments of marital satisfaction and may importantly influence health. Finally, the current study extends previous research by considering the effects of both initial levels of communal strength and marital satisfaction as well as changes over time in those factors on self-reported health.

The current data set affords the opportunity to examine the independent effects of global marital satisfaction and communal strength on health outcomes. That is, by simultaneously entering marital satisfaction and communal strength into a statistical model, I can address the question of whether knowing about a specific relationship attribute, communal strength, adds prognostic value or whether the individual's global judgment of the relationship is most salient in influencing his or her perceived health.

The study also allows for statistical control of relevant individual difference variables - depression and hostility, which have been previously linked with physical health outcomes, as well as sociodemographics (age and education), and family contextual variables (i.e., transition to parenthood). Inclusion of these variables in the dataset not only allows for determination of the independent effects of marital satisfaction and communal strength on subjective health, but also may shed light on relevant pathways that link marital variables with health outcomes.

4.1 STUDY HYPOTHESES

Each of the hypotheses was tested separately for the mental and physical health components of the SF-36. For ease of presentation of the hypotheses, I refer generically to these two outcomes as "physical health."

4.1.1 Marital satisfaction

1. Main effect of reports of marital satisfaction on one's own health: Based on previous research linking global marital satisfaction with self-reported symptoms, I hypothesized that higher initial levels of marital satisfaction (measured approximately 26 days prior to the couple's wedding date, Q1) would be positively related with physical health outcomes (i.e., higher satisfaction would be associated with better health).

Husband's Marital Satisfaction (MS) → Husband's Physical Health

Wife's MS→ Wife's Physical Health

2. Main effect of change in marital satisfaction: I predicted that over and above the initial level of marital satisfaction, declines in marital satisfaction would be associated with poorer health outcomes relative to improving or stable trajectories.

3. Interaction effect between sex and marital satisfaction: Consistent with previous research, I predicted that the effect of the initial level of marital satisfaction on health would be stronger in wives than in husbands.

4.1.2 Communal Strength

4. Main effect of perception of spouse's communal strength: For the reasons previously discussed, I predicted that greater initial perceptions of spouse's communal strength would be associated with better health outcomes for both husbands and wives.

Husband's Perception of Wife's Communal Strength → Husband's Physical Health

Wife's Perception of Husband's Communal Strength → Wife's Physical Health

5. Interaction effect between sex and perception of communal strength: I expected that the effects of communal strength (Hypothesis 4) on health outcomes would be stronger in women than in men.

6. Main effect of changes in communal strength: I predicted that over and above the initial level of communal strength, declines in communal strength would be associated with poorer health outcomes.

4.1.3 Independent Effects of Marital Variables

7. For significant effects of either marital satisfaction or communal strength, I examined whether the effects persisted after statistically controlling for demographic risk factors (age and education), psychosocial risk factors (depression and hostility) or family contextual risk factors (i.e., transition to parenthood).

8. To better understand how global marital satisfaction, a multiply-determined construct, may be linked with physical health, I examined whether there are independent effects of initial communal strength or change in communal strength over and above the effects of initial levels and changes in global marital satisfaction on self-reported health.

4.1.4 Exploratory Analyses

9. Joint effects of one's own and one's perception of spouse's communal strength: I explored whether the effect of feeling highly communal towards the spouse combined with perceiving the spouse to feel highly communal towards one is associated with physical health outcomes (i.e., better health) for both partners, over and above the effects of individual perceptions. Although these analyses were exploratory in nature, I expected that the combination of feeling cared for along with caring for another would have a positive effect on health outcomes independent of the individual reports of these measures.

10. Joint effect of husband and wife's marital satisfaction: I also explored the hypothesis that the combination of one's own and one's spouse's report of marital satisfaction would be associated with one's physical health, over and above the effects of their individual reports of marital satisfaction.

4.2 METHOD

4.2.1 Participants and procedures

The parent study from which the participants in the proposed study were drawn consists of 106 newly married couples who were recruited by a variety of means including: bridal fairs, ads in a local "bargain sheet," brochures, flyers, electronic bulletin boards, and word-of-mouth. Eligibility criteria required that this be the first marriage for each member of each couple, that each participant was childless before marriage, and that each participant be at or below the age of

35 at baseline. The mean age of wives at baseline was 26.00 years (SD = 3.23), and the mean age for husbands was 27.25 years (SD = 3.53). The sample is predominantly white (95%; 104 men, 102 women) and overall the sample is educated (41% college graduates) and middle or upper-middle class.

Of the original sample, 19 couples have discontinued their participation, and out of that 19, 8 couples indicated that they had divorced. The current study consists of a subsample of participants in the original study for whom data is available from Q1, Q2, and Q3 (n = 147; 75 males and 72 females). On average, couples dated for 30.72 months (SD = 27.55) prior to their engagement and the average length of engagement was 13.20 months (SD = 6.49). Individuals included in the present sample were less likely to have children and reported higher levels on the communal strength of self measure at baseline compared to those who were not included in the present sample (analyses not shown; p's < .05).

The parent study is a lagged, longitudinal design with the timing of the first set of questionnaires based on each couple's marriage date and continuing at regular intervals from that time forth. The first questionnaire was administered to couples an average of 26 days prior to their wedding day. Q2 was administered on average 25 months after the wedding date. Q3 was administered in November 2001, on average 36 months after the wedding date. The primary variables of interest for the present study (communal strength and marital satisfaction) were collected at Q1 and Q2. Self-reported health was collected at Q3. Questionnaire 4 (Q4) was administered on average 60 months (5 years) following the wedding date. An important limitation of this study is that although there are multiple assessments of marital measures, there is only a single assessment of self-reported health, rendering the associations cross-sectional. Nevertheless, determining whether there is an association between initial levels or changes over time in marital satisfaction and communal strength and self-reported symptomatology in a sample of middle-aged, couples may highlight key interpersonal processes that are implicated in disease pathogenesis in later stages of life.

4.2.2 Measures

Measures that are included in M. Clark's ongoing study and that were used in the current investigation are detailed below.

4.2.2.1 Demographics. Information on participants' education, marital status, and number of children was collected at baseline and at each follow-up period.

4.2.2.2 Marital Satisfaction. Two well-validated measures of global marital satisfaction (Quality Marriage Index (QMI); Norton, 1983) were administered at Questionnaire 1 (Q1) and Q2. Items from both scales were summed to compute a total, global satisfaction score. (Appendix C). In addition to demonstrating excellent discriminant and convergent validity, the QMI is considered a pure measure of marital satisfaction, unlike other measures (e.g., the DAS) which tap into both satisfaction and adjustment (Heyman, Sayers, & Bellack, 1994). The QMI asks participants to rate their endorsement on a 5-point Likert scale of items pertaining to their relationship with their spouse. Examples of items include: "My relationship with my spouse is very stable;" "I really feel like a part of a team with my spouse;" and "To what extent are there problems in your relationship." Alpha reliability for this measure in the current sample is .86. For ease of presentation, scores from the QMI are referred to as marital satisfaction (MS) (see Appendix B for table of acronyms used throughout the paper).

4.2.2.3 Communal Strength. Mills, Clark, Ford, and Johnson (2004) have developed a scale that measures the extent to which the respondent feels an obligation to meet the needs of a particular other (in this case the spouse) and the degree to which the participant thinks his/ her spouse feels an obligation to meet his/her needs. There are 2 scales consisting of 10-items each on a Likert-scale with responses ranging from "not at all" to "extremely." Examples of items from the 1st scale include: "How far would you be willing to go to help your spouse?," "How high a priority for you is meeting the needs of your spouse?," and "How readily can you put the needs of your spouse out of your thoughts?" A separate scale with the same items asks participants to indicate how they think their spouse would respond to these questions (i.e., perception of spouse's communal strength). Both scales have demonstrated adequate internal consistency and discriminant and predictive validity in samples of colleges students and married couples. The alpha coefficients for the present sample are .82 and .63, for perception of spouse's communal strength (PSCS) and communal strength of self (CSS), respectively. For the present study, I used data from these measures collected at Q1 and Q2.

4.2.2.4 Depression. The CES-D (Radloff, 197), a widely used and well-validated instrument for the assessment of depressive symptoms has been administered throughout the study. In the present investigation, baseline (Q1) depression scores were used as covariates in the statistical analyses for any significant effects of marital satisfaction or either communal strength measure. Based on the highly skewed distribution of the CES-D in this sample, depression scores were log-transformed before being entered into statistical models.

4.2.2.5 Hostility. The cynical hostility sub-scale of the Cook-Medley (Cook & Medley, 1954) was administered approximately 25 months after the couples' wedding date (Q2). Hostility scores were used as a covariate in the statistical analyses for any significant effects of marital satisfaction or either communal strength measure.

4.2.2.6 Perceived Health Outcomes. Participants completed the Medical Outcomes study short form (SF-36), a self-report assessment of general health and the degree to which their health impaired functioning, in November of 2001 (approximately 3 years after marriage). The SF-36 was developed for use with patients in the Medical Outcomes Study and is an instrument designed to assess current (in the last 4 weeks) perceived health status. This instrument has excellent reliability and validity and has been used to evaluate the health status of more than 20,000 depressed, chronically ill, and healthy patients (Ware, Snow, Kosinski, & Gandek, 1993). The SF-36 consists of 8 subscales designed to reflect various aspects of mental and physical health. The subscales are: 1) physical functioning; 2) role limitations caused by physical functioning (Role-Physical); 3) Bodily Pain; 4) General Health perceptions; 5) Vitality; 6) Social Functioning; 7) Role limitations resulting from emotional problems (Emotional Role Functioning); and 8) general Mental Health. On each subscale, higher scores reflect better perceived health. Correlations between each of the subscales are reported in Table 2 and 3, separately by sex, for women and men, respectively. As shown in the tables, overall correlations tended to be similar for men and women; however, in some cases there appeared to be a tighter coupling (i.e., associations) between mental and physical health subscales for women than for men.

Although most research conducted to date on the SF-36 has utilized the 8 subscales as the primary outcomes, a number of investigators have advocated the use of summary measures to

reduce the number of statistical comparisons and consequently diminish the Type 1 error inflation rate (e.g., Ware, Kosinski, & Keller, 1994; Jenkinson, Layte, & Lawrence, 1997). The developers of the SF-36 (Ware and colleagues) developed standard scoring algorithms to aggregate the scores from the 8 subscales to form 2 distinct, higher-order summary scores, named the Physical and Mental Component Summary Scores (PCS and MCS, respectively; Ware et al., 1994). These measures were derived from principal components analyses of subscale scores drawn from a general US population sample.

Although several studies have confirmed the reliability and validity of these summary scores (e.g., Ware et al.,1995; Ware et al., 1994), a number of researchers have critiqued the scores on several grounds. Some have argued that by virtue of its negative weighting system (e.g., subscales that reflect mental health are negatively weighted as part of the PCS score and vice versa) the summary component scoring algorithm inaccurately summarizes profile scores and produces counterintuitive results, particularly at the upper and lower extremes of PCS and MCS (Taft, Karlsson, & Sullivan, 2001). Moreover, forcing mental and physical health factors to be inversely related contradicts the extensive research showing robust positive associations between mental and physical health (e.g., for a review see Krantz & McCeney, 2002). Several other authors have voiced similar concerns regarding the negative scoring of coefficients for the MCS and PCS Component scores (Simon et al., 1998; Wilson, Parsons, & Tucker, 2000; Norvedt et al., 2000) and have suggested alternative summary scoring procedures. For instance, the RAND-36 solution is also based on a factor analysis of the subscales; however, 4 subscales contribute to the physical aggregate score and 4 scores contribute to the mental aggregate score, and all coefficients are weighted positively (Norvedt et al., 2000).

Given the young age of the present sample and their relative good health, the issue regarding the negative weighting of coefficients was a particular concern, because the majority of the participants scored in the extreme upper ranges of mental and physical health. Moreover, given that the SF-36 aggregate measures of physical and mental health are based on transformed scores, standardized on a broader population, the variability for these measures was highly restricted (i.e., variance = .65 and 1.3 for PCS and MCS, respectively) rendering insufficient power to detect statistical differences in the present sample. For these reasons, I chose not to use the conventional aggregate measures of the SF-36 and instead created two summary scores based on a factor analysis of the standardized SF-36 subscales.

In the current sample, principle component factor analysis with varimax rotation yielded two distinct factors, reflecting Mental or Physical Health. The subscales that comprised the Mental factor included the following subscales: General Health, Vitality, Social Functioning, Emotional Role Functioning, and Mental Health. Factor loadings for the Mental Health score ranged from .60 - .82 and accounted for 34% of the total variance. The Physical Health factor was comprised of the Physical Functioning, Physical Role functioning, and Bodily Pain subscales. Factor loadings for the Physical Health score ranged from .73 - .78 and accounted for 25% of the total variance. Table 1 depicts descriptive statistics and provides item examples for each of the subscales. Higher scores on the aggregate measures indicated greater perceived health. The Physical Health aggregate factor was highly positively skewed and kurtotic, with the majority of the participants endorsing the highest level of physical functioning. As shown in Appendix C, roughly 1/3 of all scores (36%) were clustered at the extreme upper end on the physical health distribution (indicating perfect or near-perfect physical well-being). The remaining 2/3 of the distribution became gradually more dispersed and evenly distributed. Therefore, I dichotomized this measure such that the top 1/3 of the sample distribution was categorized as 1 (indicating excellent physical health) and the remainder of the distribution was categorized as 0. The Mental Health factor was normally distributed and therefore analyzed as a continuous variable. The correlation between the MCS and the factor-analytically derived Mental Health score was $r = .85$, $p < .01$. The correlation between the PCS and the factor-analytically derived Physical Health score was $r = .77$, $p < .01$. The correlation between the two factor-analytically derived scores was $r = .27$, $p < .01$.

As with all subjective health measures and particularly, given the non-conventional approach used herein to summarize the SF-36 subscales, a primary concern is whether these factors are indeed associated with underlying pathology (Mechanic, 1980; Watson & Pennebaker, 1989). To lend credence to the validity of the Mental and Physical Health factors used in the current study, I used pilot data collected from a subsample of 26 participants from the present sample who had laboratory measures of risk factors that comprise the metabolic syndrome and also had completed the SF-36.

The metabolic syndrome consists of a constellation of risk factors including central adiposity (abdominal obesity), insulin resistance/ hyperinsulinemia, hypertension, and mild dyslipidemia (i.e., elevated triglyceride levels and/ or low levels of high density lipoprotein

cholesterol (HDL-c); (Laaksonen et al., 2002). The metabolic syndrome is reliably associated with incident cardiovascular disease and Type 2 diabetes (Laaksonen et al., 2002) and is relatively prevalent in middle-aged samples (between 13-15% for men and women, ages 30-39, (Ford, Giles, & Dietz, 2002).

While there is currently is no single, well-accepted definition of the metabolic syndrome, the metabolic syndrome is traditionally categorized based on the presence or absence of 3 or more of the risk factors at or above established cut-off points. With the exception of waist circumference and high density lipoprotein cholesterol (HDL-c), less than 10% of the current sample met or exceeded the established cut-points for any of the other metabolic risk factors (i.e., glucose, triglycerides, systolic blood pressure, or diastolic blood pressure). Therefore, I created a summary metabolic risk score based on the top 75% of the distributions for each of the risk factors, respectively, glucose (≥ 97 mg/dl), triglycerides (≥ 139 mg/ dl), systolic blood pressure (≥ 115 mm/ Hg, and diastolic blood pressure (≥ 74 mm/ Hg). As recommended by National Cholesterol Education Program (NCEP) Adult Treatment Panel III Report (ATP III), I used the established cut-points for waist circumference (> 35 inches) and HDL-c (< 50 mg/dl). Individuals who had 3 or more of the risk factors at or above the cut-points were categorized as being in the metabolic risk category.

Sex-adjusted logistic regression analysis revealed that individuals who were in the high physical functioning category were marginally less likely to be in the metabolic risk group in comparison to those in the lower physical functioning category (OR = .22; 95% CI: .04, 1.25; p = .09). Specifically, 53% of individuals in the lower physical functioning category were categorized in the metabolic risk group, whereas only 23% of those in the high physical functioning group were in the high risk metabolic category ($\chi 2$ (1) = 2.67, p = .10). Although this effect is only marginal, perhaps due to the very low power given the small sample, the findings are consistent with previous data attesting to the validity of the SF-36 and support the validity of the summary scoring procedure used herein. Moreover, despite the low power, the Physical health factor accounted for 11% of the variance in the likelihood of being in the metabolic category.

In contrast, however, the Mental factor score was unrelated to risk of being in the metabolic risk category, perhaps suggesting that the subscales comprising this factor are more related to distress-related symptoms rather than underlying pathology. Notwithstanding this

possibility, given the increased utilization of services associated with distress-related illness, the strong associations between mental health problems (e.g., depression, anxiety) and chronic illness, and the burden imposed on the family, understanding associations between marital quality and Mental Health may also yield relevant information.

4.2.3 Data Reduction and Analyses

Preliminary analyses were performed to examine normality of the distributions of the outcomes and predictor variables, and variables with non-normal distributions were transformed or dichotomized. Specifically, based on its skewed distribution, depression scores were log-transformed and the Physical Health factor score was dichotomized such that the top-third of the distribution was categorized as 1 (indicating excellent physical functioning) and the remainder of the scores was categorized as 0.

Change scores between communal strength measures and marital satisfaction between Q1 and Q2 were calculated. Pearson correlations were used to examine the bivariate associations between perceptions of communal strength, marital satisfaction, depression, and hostility. Additional correlations assessed the degree of similarity between husbands' and wives' scores on the major study variable (i.e., marital satisfaction, perception of spouse's communal strength, and Mental and Physical health scores). T-tests and chi-square analyses were used to examine sex differences in the marital variables at Q1 and Q2 and in the SF-36 subscales and factor scores.

4.2.3.1 Preliminary Analyses. A significant challenge of analyzing dyadic data (i.e., couples) is that standard statistical approaches including ordinary least squares (OLS) regression are based on the assumption of independent data- an assumption that is likely to be violated when analyzing data from both members of a couple. For instance, given shared lifestyle factors, including eating habits and leisure activity as well as the expected concordance within couples on indices of marital functioning, within-couple variation in health outcomes is likely to be more similar than between-couples. To account for the shared variance between couples in the current sample, I used Hierarchical Linear Modeling (HLM; Raudenbush, Cheong, & Congdon, 2000; Bryk, & Raudenbush, 1992) as the primary statistical approach. This technique accounts for the

fact that each individual in the sample is nested within a couple- thereby controlling for shared variance within each couple unit. Moreover, unlike OLS, HLM is quite flexible in accounting for missing data points through an iterative computing technique called maximum likelihood estimation (MLE).

The independent predictor in each of the models was either perception of spouse's communal strength or marital satisfaction, analyzed separately except when noted. Separate analyses were run for each of the subscales of the SF-36. Hierarchical linear regression models were to examine the Mental Health factor score, whereas hierarchical logistic regression models (i.e., Bernoulli models) were used to examine the binary, Physical Health factor score. For significant effects of either of the marital variables on either of the SF-36 factor scores, I explored which of the SF-36 subscales were driving the significant associations by conducting analyses with the relevant subscales as outcomes.

In HLM parlance, the first level of analysis reflects the relationship between the individual-level variables (e.g., age, marital satisfaction, communal strength) and the outcome of interest (i.e., SF-36 subscales). Level 2 reflects variance attributable to nesting within couples. Therefore, the resultant Level 1 regressions are simply regression equations that account for dependencies (i.e., nesting) within couples (Raudenbush, Brennan, & Barnett, 1995). I have specified below how I entered the variables into each of these Level 1 models to evaluate each hypothesis. Separate models were run for marital satisfaction and communal strength, except where noted.

Interaction terms were entered incrementally after first analyzing the main effects. Sex-stratified regression analyses evaluated the direction of significant interaction effects. With the exception of sex (male coded 0 and female coded 1) and "have a child or not" (childless coded 0 and "have child" = 1) all covariates and predictors were centered about the grand-mean and were modeled as non-randomly varying. Missing data were excluded on an analysis-specific basis. Thus, degrees of freedom vary somewhat across analyses.

Models involving the SF-36 factor scores involve two levels of analysis, with individuals (level 1) nested within couples (level 2). Initially, a fully unconditional, random intercepts model was conducted (i.e., no predictors at any level; Bryk & Raudenbush, 1992) to estimate the amount of variance attributable to each level of analysis (individual or couple-level) for the Mental Health factor (variance accounted for statistics and chi-square statistics are not available

for binary outcomes). This preliminary analysis revealed that 90% of the total variance was attributable to inter-individual differences, whereas only 10% of the variance was attributable to couple-level differences. Nonetheless, the variance accounted for by clustering within couples was marginally significant (p =.07). Thus, I chose to maintain the nested data structure to maximize statistical power. P-values less than .05 were considered statistically significant.

To address the hypotheses concerning the effects of baseline levels (Hypothesis 1) and change in the marital satisfaction (MS; Hypothesis 2) on the SF-36 factor scores, sex, baseline MS, and change in MS were entered into the level 1 regression. The decision was made to enter baseline level as a covariate along with raw change scores (instead of residualized change scores) in order to statistically adjust for the common variance shared by baseline level with both the predictor variable (e.g., change in marital satisfaction) and the outcome (i.e., physical or mental health).

To address whether the effect of MS on the health outcome is stronger for women than for men (Hypothesis 3), the full models entered sex, baseline MS, change in MS, and the interaction terms between sex and baseline MS and sex and change in MS. Similar models, substituting perception of spouse's communal strength (PSCS) for MS variables, will be conducted to address the hypotheses concerning the effect of baseline levels and change in PSCS, and the degree to which sex moderates the effects (Hypotheses 4,5, and 6, respectively).

For any significant main effects of MS or perception of PSCS, I examined whether the effects persisted after statistically controlling for relevant personality variables (i.e., hostility or depression), demographics (i.e, age and education), or transition to parenthood (i.e., have a child or not prior to Q2) entered in separate models. With the exception of transition to parenthood, all other covariates were entered as individual level covariates at Level 1. Transition to parenthood was entered as a couple-level covariate at Level 2.

To evaluate whether one's perception of his/her spouse's communal strength is associated with the health outcomes, independent of overall marital satisfaction, sex, baseline MS, MS change, baseline PSCS, and PSCS change were entered into the Level 1 regression equation.

4.2.3.2 Exploratory Analyses. To evaluate whether there are synergistic health effects of both perceiving the spouse to be high in communal strength (PSCS) combined with feeling high in

communal strength towards one's spouse (CSS), sex, PSCS, CSS, and the interaction between PSCS and CSS were entered in the level 1 regression equation.

To explore whether the combination of husbands' and wives' levels of marital satisfaction influences their physical health, over and above the effects of their individual reports of marital satisfaction, a slightly more complex HLM model was required to avoid data redundancy. Thus, in this case, the Level 1 model predicting the health outcome included sex only. The resultant outcomes from the Level 1 regression equation: 1) intercept (health of the couple) and 2) a slope for sex (effect of sex on health) were then predicted by the Level 2 coefficients which included husband's marital satisfaction, wife's marital satisfaction, and the interaction between husband's and wife's marital satisfaction. Thus, the Level 2 analyses examined the effect of each predictor on both the couple's average health (intercept from Level 1) and the effect of sex on health (sex slope effect from Level 1). Equations predicting the sex slope essentially involve tests of moderation – i.e., if the marital variables interact with sex to affect health. For example, an effect of husband's marital satisfaction on the sex slope would indicate that the effect of husband's marital satisfaction on health depends on sex – i.e., differs (in direction or magnitude) for husbands and wives. Sex-stratified analyses were used to disentangle any significant sex effects. Finally, parameters for the interaction term between husband's and wife's marital satisfaction would indicate whether there was a synergistic effect of the joint satisfaction, over and above the individual satisfaction effects on the health of the couple (Level 1 intercept) or the sex effect (i.e., whether the effect on health is more important for men than women or vice versa). Given that the communal strength variables as well as husband's and wives' marital satisfaction are correlated constructs, a statistical concern in analyzing these combined models is the issue of collinearity and its effects on the stability of the regression coefficients. However, tolerance statistics indicated sufficient independence between each of the predictors in these models.

4.3 RESULTS

4.3.1 Participant Characteristics

In the current sample, 20 couples had a child prior to Q2, 48 couples did not have any children by Q2, and 6 couples did not report whether or not they had a child by Q2. Overall, the sample was highly educated with less than 10% of the sample having less than a college degree. Ninety-four percent of the sample was employed on a full-time or part-time basis and there were no sex differences in employment status. Neither marital satisfaction nor communal strength was associated with length of engagement or length of dating prior to engagement (p's > .10).

4.3.2 Marital Satisfaction and Communal Strength

Descriptive statistics for the marital satisfaction (MS), perception of communal strength (PSCS), one's own communal strength (CSS), and change over time for each of the marital variables are reported for the total sample and for males and females separately (see Table 4). There were no significant differences between men's and women's mean scores for any of the marital measures at Q1 or Q2. On average, both men and women showed declines in each of the marital measures. However, women showed greater declines in their perception of their spouse's communal strength between Q1 and Q2, when compared with men. Women also reported more depressive symptoms at baseline relative to men ($t(145) = -2.06$, $p < .05$), but men reported greater hostility than women at Q2 ($t(145) = 2.52$, $p = .01$).

Tables 5 and 6 present the correlations (stratified by sex for women and men, respectively) between the marital variables at Q1 and Q2 and change in the marital variables between Q1 and Q2. For women, all of the marital variables at both time points were significantly correlated with one another, with Pearson correlation coefficients ranging from $r = .28$ to $r = .51$. For men, correlations between the marital variables at each time point were of somewhat lesser magnitude (r's ranging from .19 to .53) and baseline MS was uncorrelated with Q2 PSCS or CSS. There were significant correlations between baseline and change scores for each of the marital variables for women (r's ranging from -.23 for baseline MS and change to -.40 for baseline PSCS and change). For men, baseline MS scores were unrelated to change in

MS; however, there were significant inverse correlations between baseline and change scores for PSCS and CSS (r's = -.55 and -.38, respectively).

4.3.3 Correlations between Covariates and Primary Study Variables

With the exception of depression scores, none of the other covariates (i.e., age, education, hostility, transition to parenthood) were associated with either the Physical or Mental health summary scores. For men, there was a modest correlation between depression and hostility (Pearson's r = .27, p < .05), but there was no association between depression and hostility in women (r = .17, p > .10). In addition, higher depression scores were associated with poorer scores on the mental health summary measure for both women and men (r's = -.43 and -.45, respectively, p < .01) but there was no association between depression and the physical health measure in sex-stratified correlations.

Appendices D and E depict the sex-stratified correlations between all of the marital variables and all of the covariates used in the analyses. For women, baseline depression scores were significantly correlated with baseline marital satisfaction and baseline perception of spouse's communal strength (r's = -.42 and -.49, respectively, p's < .01). Somewhat smaller in magnitude, though still significant correlations were found between depression and baseline MS and baseline PSCS in men (r's = -.24 and -.26, respectively, p's < .05). Baseline MS was significantly correlated with hostility, but only in women (r = -.26, p < .05). Hostility was unrelated to baseline PSCS for either sex. Similarly, neither depression nor hostility was related to change in PSCS or change in MS for either sex (p's > .10).

4.3.4 Transition to Parenthood and Marital Quality Decline

Consistent with previous research, analyses comparing the magnitude of change between baseline and Q2 marital satisfaction scores for couples *with* versus those *without children* showed that couples who had at least 1 child between baseline and Q2 experienced significantly greater declines in marital satisfaction (M change score = -3.65) compared to those without children (M change score = -.68; p < .05). Interestingly, there were no significant differences in

change in perception of spouse's communal strength between baseline and Q2 for those with versus without children ($p > .10$).

4.3.5 Similarities within Couples for Major Study Variables

There was a significant correlation between husbands' and wives' scores on the Mental health factor of the SF-36 ($r = .20$, $p < .05$) but no significant correlation between husbands' and wives' scores on the Physical health factor. Not surprisingly, husbands' and wives' scores were significantly correlated for MS ($r = .34$, $p < .01$) and PSCS ($r = .25$, $p < .01$). Similarly, husbands' and wives' change scores in MS and PSCS were also significantly correlated (r 's = .20 and .27, respectively, p's < .05).

4.3.6 Hypothesis 1: Higher baseline MS will be associated with better health outcomes

Table 7 summarizes the analyses regressing the Physical or Mental Health factors on the MS variables. As shown in Table 7 (Model 1a), individuals who reported higher baseline MS scores were more likely to be in the high physical functioning category ($p < .05$). Higher baseline MS was also associated with higher scores (i.e., better health) on the Mental Health factor score ($p < .01$). Sex was inversely related to physical and mental health, indicating that wives perceived their health to be worse than husbands.

Analyses of the association between baseline MS and the individual subscales that comprised the Physical Health factor revealed that higher baseline MS was associated with less bodily pain, better physical functioning, and fewer role limitations due to physical problems (analyses not shown; p's < .05).

Analyses of the individual subscales that comprised the Mental Health factor revealed that baseline MS was positively associated with the following SF-36 subscales: vitality, general perceptions of health, and mental health (p's < .05).

4.3.7 Hypothesis 2: Change in MS will be associated with better health outcomes, independent of baseline MS

Contrary to expectations there were no significant effects of change in MS on Physical or Mental Health (Table 7; Model 1a and 1b, respectively). Together, baseline and change in MS accounted for 6% of the variance in Mental Health.

4.3.8 Hypothesis 3: The effect of MS on health outcomes will be stronger for women than for men

There were no significant effects for either the sex * baseline MS or sex * MS change interaction terms on Physical Health (Table 7; Model 2a). In the model predicting Mental Health, however, there was a significant sex * MS change interaction (Model 2b). Sex-stratified regressions revealed that smaller declines in MS were significantly associated with better Mental Health in men, $t(72) = 3.30$; $p < .01$, but there was no association in women, $t(71) = .12$; $p > .10$. The interaction between sex and baseline MS was non-significant. Change in MS was significantly associated with Mental Health in the full model. The coefficient for MS change was positive, indicating that participants who showed less of a decline in MS over the first several years of marriage reported better mental health. The addition of the sex interaction terms accounted for an additional 5.4% of the variance in Mental Health.

Analyses that explored the significant effect of change in MS on Mental Health for men revealed that MS change was associated with the following SF-36 subscales: vitality, mental health, and social functioning (p's $< .05$).

4.3.9 Hypothesis 4: Higher baseline levels of perception of spouse's communal strength (PSCS) will be associated with better health outcomes

Table 8 summarizes the results for the HLM regressions of the Physical or Mental Health factors on PSCS. Consistent with predictions, there was a significant, positive effect of baseline PSCS on Physical and Mental Health (p's $< .05$).

Exploratory analyses revealed no significant associations between baseline PSCS and the individual SF-36 subscales (i.e., Role-Physical, Physical Functioning, and Bodily Pain) that comprised the Physical Health factor, suggesting that PSCS is associated with the aggregate rather than being driven by any one measure.

Analyses of the individual subscales that comprised the Mental Health factor revealed that baseline PSCS was associated with higher scores on the mental health and vitality subscales (p's $< .05$) and a trend toward better social functioning ($p < .10$).

4.3.10 Hypothesis 5: Change in PSCS will be associated with health outcomes, independent of baseline PSCS

The effect of PSCS change was non-significant in the model predicting Physical Health (Table 8, Model 1a); however, there was a significant effect of PSCS change in the model predicting Mental Health (Model 1b). As predicted, the direction of the coefficient indicates that individuals who perceived less of a decline in their spouse's communal strength had better mental health. Together, baseline and change in PSCS accounted for 4.7% of the total variance in Mental Health.

There were no significant effects of change in PSCS on any of the individual subscales comprising the Mental Health factor score.

4.3.11 Hypothesis 6: The effect of PSCS on health will be stronger for women than for men

In the full model predicting Physical Health (Table 8, Model 2a), neither of the sex interaction terms was significant. Similarly, neither of the sex interaction terms was significant in the model predicting Mental Health (Model 2b) and the variance accounted for by these terms was negligible.

4.3.12 Covariate Models

For significant effects of either of the marital variables on physical or mental health, I statistically controlled for relevant demographic (age and education), personality (depression or hostility), or parent status (have a child or not) in separate models.

4.3.13 Demographics Adjusted Models

Neither age nor education was a significant predictor of Physical or Mental Health. Statistical control for these demographic factors did not substantively change the positive effect of baseline MS on Physical Health (B = .11, SE = .05). Similarly, the effects of baseline MS, change in MS, and the interaction term between sex and change in MS on Mental Health remained virtually the same when controlling for age and education Mental Health (p's < .05). In contrast, the effect of baseline PSCS on Physical Health was reduced to marginal significance after controlling for age and education. Both baseline PSCS (B = .07, SE = .03) and change in PSCS (B = .06, SE = .03) remained significant predictors of Mental Health after controlling for demographics.

4.3.14 Psychosocial Adjusted Models

Neither depression nor hostility was related to the Physical Health outcome. However, statistical control for these variables reduced the effect of baseline MS and baseline PSCS to non-significance.

Adjustment for depression and hostility in the full MS model predicting Mental Health, reduced the effect of baseline MS to non-significance ($p > .10$); however, change in MS (B= .24, SE = .08, $p < .01$) and the interaction between change and sex (B= -.24, SE = .09, $p < .05$) remained significant predictors). Not surprisingly, depression was a strong and significant predictor of Mental Health (B = -9.59, SE = 1.83, $p < .001$), accounting for 16% of the total variance. Hostility was unrelated to the outcome. Controlling for these psychosocial factors reduced the effect of baseline PSCS to non-significance; however, the effect of change in PSCS remained statistically significant (B = .05, SE = .02).

4.3.15 Models Adjusted for Transition to Parenthood

Due to missing data, the degrees of freedom for the analyses controlling for parenthood status were reduced to n = 119. Transition to parenthood (entered at level 2 of the analysis) was a significant predictor of Physical Health. Specifically, couples who had a child prior to Q2 reported poorer Physical Health in comparison to couples without children. However, the effects of baseline MS and baseline PSCS on Physical Health were still statistically significant after controlling for parenthood status.

Statistical control for transition to parenthood was not a significant predictor of the Mental Health outcome and did not substantively affect any of the significant effects for MS or PSCS on Mental Health.

4.3.16 Combined Marital Satisfaction and Communal Strength Models

To examine potential processes that may underlie the effect of overall marital satisfaction on health, I simultaneously entered sex, baseline PSCS, baseline MS and their change scores into the models predicting either the Physical or Mental Health Factor. In these combined models, baseline PSCS was marginally associated with Physical Health (B = .03, SE = .02, p = .08), but baseline MS was reduced to non-significance (B = .08, SE = .05, p = .14). Neither change score was related to the outcome. Interestingly, in the model predicting Mental Health, baseline marital satisfaction was positively associated with the outcome (B = .17, SE = .06, p = .006), but neither baseline PSCS nor either of the change scores were significant predictors.

4.3.17 Interactive effects of Perception of Spouse's Communal Strength and Communal Strength of Self (towards the spouse) on Mental and Physical health factor scores

Contrary to expectations, in the model that entered sex, baseline perception of spouse's communal strength, baseline communal strength towards the spouse, and the interaction of these terms, there were no significant effects for the Physical or Mental Health outcomes.

4.3.18 Joint effects of Husbands' and Wives' Marital Satisfaction on Mental and Physical health factor scores

Similarly, in the 2-level model that tested the individual effects of husbands' and wives' marital satisfaction as well as the interaction between the two, there were no significant effects on either health outcome.

5.0 DISCUSSION

Previous research suggests that subjective marital quality may importantly shape health and well-being (e.g., Kiecolt-Glaser & Newton, 2001, Wickrama, Lorenz, Conger, & Elder, 1997). However, most of the research on marital quality and health has focused on relatively crude assessments of marital functioning—usually global marital satisfaction, assessed at a single time point. Given that marital satisfaction is a multiply-determined construct, it remains unclear whether specific relational processes underlie the association between marital satisfaction and health. In the current study, I examined the utility of applying a theoretical model of relationship functioning to gain a more in-depth understanding of the links between "high-quality" marriages and health.

As hypothesized, individuals who reported higher initial levels of the perception of their spouse's communal strength had higher perceived mental and physical health. Baseline reports of marital satisfaction were also significantly associated with better perceived mental health and there was a marginal association with physical health. These findings are consistent with the growing body of research showing that the subjective experience of the marriage may be an important predictor of a wide variety of mental and physical health outcomes, including depression, perceived health status, infectious illnesses, and cardiovascular diseases (e.g., Beach & Fincham, 1998; Levenson, Cartensen, & Gottman, 1993; Kiecolt-Glaser et al., 1993; Troxel, Matthews, Gallo, & Kuller, 2005).

The findings for change in marital satisfaction and change in perception of spouse's communal strength on the health outcomes were less consistent than the effects of baseline levels. Specifically, there was a significant effect of change in perception of spouse's communal strength for mental health and this effect persisted after adjusting for depression and hostility. There was, however, no association between change and perceived physical health. The fact that changes in communal strength were a significant predictor of mental health suggests that over

time, dynamic interpersonal processes contribute to mental well-being independently of correlated, but distinct personality characteristics. In addition, in the full marital satisfaction model predicting mental health there was a significant effect of change in marital satisfaction as well as a significant interaction between sex and change in marital satisfaction—effects that persisted in the covariate-adjusted models.

In general, however, the effects of marital satisfaction and perception of spouse's communal strength on perceived mental and physical health were largely explained by psychosocial risk factors, depression in particular. Given that depression was a strong predictor of mental health (i.e., accounting for 16% of the total variance) and that depression and marital quality are correlated constructs, these results may reflect a viable pathway linking marital processes with health outcomes, rather than depression merely being a confounding variable. That is, on the one hand, baseline depression scores may serve as a proxy for some underlying personality construct, such as negative affect that is related to both marital functioning and health outcomes—potentially rendering any associations between marital functioning and health outcomes spurious. Indeed, the present analyses do not rule-out the possibility that depression may be related to both the marital measures and the health outcomes separately, rendering the associations between the marital measures and self-reported health spurious. However, the fact that the effects of both change in marital satisfaction and change in communal strength on the mental health outcome persisted after controlling for depression and hostility suggests that depression is not merely a confounding variable. Moreover, given the extensive research to date implicating the bidirectional relationships between marital processes and depression (e.g., Beach, Fincham, & Katz, 1998; Fincham, Beach, Harold, & Osborne, 1997; Beach & Fincham, 1998), it is equally plausible that the current findings reflect the mediating role that depressive symptoms play in linking marital processes with health outcomes. Indeed, exploratory analyses, following recommended guidelines for testing statistical mediation (Baron & Kenny, 1986) showed that increases in depressive symptoms between baseline and Q2 partially mediated the effects of change in marital satisfaction and change in PSCS on mental health. Specifically, adding change in depressive symptoms to the full marital satisfaction model predicting mental health attenuated the effect of change in marital satisfaction by 14% and attenuated the interaction effect between sex and MS by 11%. Both of the marital effects, however, remained statistically significant and there was no attenuation of the effect of baseline marital satisfaction. Similarly, increases in

depressive symptoms over time attenuated the effect of change in perception of spouse's communal strength on mental health by 50% although the effect of change in PSCS was still statistically significant. The effect of baseline PSCS was virtually unchanged. The extant literature suggests that causal relationships exist between depression and marital functioning and the direction of causality may depend, at least in part, on gender (Fincham, Beach, Harold, & Osborne; for a review see Beach, Fincham, & Katz, 1998). Future longitudinal research using path-analytic or trajectory approaches are needed to more comprehensively examine the complex interplay between marital processes, depression/negative affect, and physical health outcomes.

Though these mediational analyses were exploratory in nature, they reflect the growing recognition in interpersonal theory and psychosomatic research that individual risk factors such as depression and marital functioning are simultaneously characteristics of both the individual and the social environment they inhabit (for a discussion of interpersonal theory and transactional models see Smith, Glazer, Ruiz, & Gallo, 2004, Pincus & Ansell, 2003). Given that marital processes and characteristics of the individual (e.g., hostility, attachment style, depression) are expected to (according to interpersonal theory) and indeed, do covary within individuals, future research using appropriate statistical methods (e.g., cluster analytic techniques) are needed to address such covariation as an inherent part of the process rather than a confound to be statistically controlled.

Given that the marital measures assessed for this study were first collected 26 days prior to the marriage and collected again, approximately 2 years later, most of the couples experienced declines in marital quality (both satisfaction and communal strength measures). This is not particularly surprising, given that most couples enter marriage with relatively high expectations and feelings of good will immediately prior to the wedding date. Thus, it is perhaps normative for all couples to have declining trajectories in their subjective experience of their marriage, at least in the first several years following the initial "honeymoon period." Moreover, the present data are consistent with previous research showing precipitous declines in subjective marital quality following the birth of the first child (e.g., Belsky & Rovine, 1990; Kurdek, 1998). Therefore, in the early years of marriage, when some deterioration in marital satisfaction and communal strength is, to a large extent normative, declining trajectories may not have a significant impact on health outcomes.

However, it may be that some couples who experience those initial declines from the "honeymoon period" accept those changes as part of the natural course of a relationship, but do not, in response resort to negative behaviors, such as becoming hostile or withdrawing from their partner, or moving away from communal norms. In contrast, holding initial levels of marital satisfaction and communal strength constant, other couples (or individuals within a couple) may develop feelings of resentment, withdrawal, mistrust, and hostility, which cumulatively may result in the conversion from a communal relationship to one of exchange or exploitation (Grote & Clark, 2001). Previous research has identified a number of likely individual and interpersonal variables including psychological distress (i.e., depression, Grote, Clark, & Moore, 2004), emotion regulation (Shapiro, Gottmann, & Carrere, 2000), attachment style (Davila, Karney, & Bradbury, 1999), and conflict resolution styles (Schneewind & Gerhard, 2002) that may distinguish couples who are able to withstand the initial declines in marital quality without substantively changing the long-term communal strength of the relationship from those who continue along a negative marital trajectory. Future longitudinal research that includes marital measures and health outcomes over a longer course of time (i.e., 5-10 years following the wedding date) are needed to elucidate whether these divergent relationship patterns are associated with physical health outcomes over time.

5.1 WHAT DOES THIS STUDY REVEAL ABOUT GENDER DIFFERENCES?

Based on previous research and theory suggesting that women, due to traditional gender roles and stereotypes, may exhibit stronger associations between marital processes and health (for a review see Kiecolt-Glaser & Newton, 2001), I hypothesized that the effects of marital factors on health would be stronger for women than men. Notably, however, with one exception (i.e., the full marital satisfaction model predicting mental health), there were no other significant sex interactions. Interestingly, the only significant sex interaction that was found was opposite of the hypothesized direction (i.e., the effect of change in marital satisfaction was stronger for men than for women).

Although speculative, one possible explanation for this finding is that since women in general have larger and more integrated social networks than do men (e.g., Cross & Madson,

1997) the women in the present study may have been relatively insulated from declines in their marital satisfaction because they have relatively more satisfying relationships outside of the marriage than do men. Another possibility is that particularly during women's child-bearing years, wives may be relatively buffered from the effects of declines in marital functioning because they gain more satisfaction from having a child and child-rearing than their husbands (Shapiro, Gottman, & Carrere, 2000), even though having the child may be the cause of the decline in marital satisfaction. Such interpretations can only be considered speculative, however, particularly in light of the overall lack of significant gender differences in the effects of marital variables on physical or mental health and given the consistency of previous research showing more prominent effects of marital functioning on women's health relative to men's (e.g., Kiecolt-Glaser & Newton, 2001; Fincham, Beach, Harold, & Osborne, 1997; Beach & Fincham, 1998).

Overall, the lack of significant moderating effects of sex may be specific to this high SES, middle-aged sample. It is notable that there were no sex differences in employment at study entry and over 90% of the women in the present study worked outside of the home. Some researchers have speculated (Williams, 2003) that due to the changing roles of men and women in today's Western culture there is likely to be a diminishment of the traditionally reported sex differences in the effects of marriage on health.

Notwithstanding this possibility of a cohort effect, even within this sample of highly educated, middle-aged men and women, several findings are notable as they fall along traditional gendered lines. First, as in previous research, women reported higher levels of depression than men, whereas men reported higher levels of hostility (Kessler, 2000; Stoney & Engebretson, 1994). Researchers have suggested that women's higher rates of depression as compared to men may be due to their relatively greater investment and role identification associated with close personal relationships (e.g., Cross & Madson, 1997). It has been speculated that men, on the other hand, are more prone to hostility due to socialization processes that favor aggression and assertiveness in men as compared to women (Garside & Klimes-Dougan, 2002). Second, the correlations amongst the marital variables and the psychosocial variables tended to be stronger for women than for men, suggesting that there may be a tighter coupling between women's psychological well-being and interpersonal functioning as compared to men. Such a finding is also consistent with theories regarding gender-linked self-construals, motivations, and goals (for a review see Kiecolt-Glaser & Newton, 2001). Finally, the correlations amongst the physical

and mental health subscales of the SF-36 tended to be more strongly correlated in women than in men- a finding that may reflect the traditional notion that women's physical health is more closely linked with psychological well-being than it is for men (Nykvist, K., Kjellberg, A., & Bildt, C., 2002).

5.2 WHAT DOES THIS STUDY SUGGEST ABOUT THE RELATIVE STRENGTH OF MARITAL SATISFACTION VERSUS COMMUNAL STRENGTH?

With few exceptions, marital satisfaction tended to be a relatively stronger predictor of the mental health outcomes than communal strength, accounting for 6% versus 4% of the total Mental Health variance, respectively. In addition, in the model that simultaneously entered baseline marital satisfaction, change in marital satisfaction, as well as baseline and change in communal strength, baseline marital satisfaction was the only significant predictor.

Given that marital satisfaction is a multiply determined construct, it captures both negative and positive characteristics of the relationship, whereas, communal strength primarily captures positive aspects of the relationship. While the absence of positives in a relationship (e.g., low communal strength) may be conceptualized as poor overall quality, they may not be as salient for well-being as the presence of overt negatives (e.g., conflict). Indeed, previous research has found that positive aspects of marriage are less predictive of health outcomes than negative aspects, in particular conflict (Ewart et al., 1991). Consistent with this notion, I also found no evidence to suggest synergistic effects between the combination of one's own and one's spouse's marital satisfaction or one's communal strength towards the spouse and one's perception of his/ her spouse's communal strength.

This is not to say that positive aspects of relationships, including communal strength do not matter as Ewart and colleagues title "Not being nasty matters more than being nice" (1991) would suggest. Rather, it may be that communal strength may have a cumulative impact on health by building up a "reserve of goodwill" within the couple, so that when the stresses of marriage arise (e.g., around the birth of a child, financial issues, etc.) couples who have a strong communal base may be less likely to convert to more "toxic" behaviors (e.g., becoming hostile, exploitative, or withdrawing).

Interestingly, however, communal strength tended to be more closely related to subjective ratings of physical health problems. In addition, evidence from the pilot data collected within this sample showed that the perception of spouse's communal strength was associated with greater risk for the metabolic syndrome, whereas there was no association with marital satisfaction. Future research with larger, more diverse samples is warranted to investigate the association between communal strength and objective physical health endpoints.

Statistically, marital satisfaction may, in fact, be a more powerful predictor of health outcomes than communal strength, simply because it is a more global construct. However, there are a number of reasons to continue pursuing theory-driven relationship research in the context of behavioral medicine. First, given that marital satisfaction is a multiply determined construct comprised of a number of characteristics related to both the person and the interpersonal relationship, further research utilizing global measures alone may provide additional evidence supporting that there is an association between marital satisfaction and health, but it reveals little about how or why some marriages confer health benefits whereas others confer health costs. In order to address these questions, theory-driven, process-oriented relationship measures are still needed.

Furthermore, while the perception of the spouse's communal strength may not be as powerful a predictor of health outcomes as marital satisfaction in the early stages of marriage, it may be that a more behaviorally-oriented approach to analyzing the degree of spousal responsiveness to needs may be a stronger predictor. That is, future studies utilizing ecological momentary assessment methods (e.g., palm pilots, daily diaries) might investigate whether behavioral indices of the degree of spousal responsiveness (e.g., the number of benefits one's spouse gives as well as the perception of why the benefit was given) are associated with health outcomes.

It may also be that changes in communal strength are not themselves as powerful predictors of health outcomes as are the behavioral and psychological consequences that occur as a result of relationships transitioning from one of communal norms to one of exchange or exploitative norms. For instance, in the current study, there was no association between transition to parenthood and change in perception of spouse's communal strength. Perhaps in the early stages of marriage and parenthood, spouses recognize that while their needs may temporarily not be met by their spouse, they can forgive these transgressions because they

recognize that the spouse's shortcomings in responsiveness may be primarily due to lack of time. Over time, however, as needs continue to go unmet, some couples, or some individuals within couples may become resentful and more hostile in their interactions with their spouse. It is among these vulnerable couples (or individuals) that the negative health effects of declines in communal strength are likely to manifest. That is, cumulatively, the effect of having one's needs unmet may, for these 'vulnerable' individuals lead to chronic anxiousness and a need to be hyper-vigilant in the marital relationship—a stark divergence from the conceptualization of marriage as a "safe haven." The need to be vigilant in one's most intimate relationship may lead to increased risk for chronic illness through recognized biopsychosocial pathways, including chronic arousal of the cardiovascular and neuroendocrine systems and dysregulation of immune functioning (Krantz & McCeney, 2002).

Within this context, it is notable that despite previous evidence linking showing strong associations between hostility and marital quality as well as physical health outcomes (for a review see Smith, Glazer, Ruiz, & Gallo, 2004), the current study showed no associations between hostility and the health variables and was only associated with baseline marital satisfaction in women. One explanation is that the current sample was simply less hostile than samples used in previous research or that the range of hostility scores was too restricted in this very healthy sample for a discernible effect. However, such an explanation is unlikely because both the average level and variance of hostility scores in the current sample are consistent with prior research (Barefoot et al., 1991; Brissette & Cohen, 2002). Moreover, the sex differences in hostility found herein are also consistent with prior findings.

Prior research suggests that hostility may have a cumulative effect over time that degrades the quality of marital interactions (Newton & Kiecolt-Glaser, 1995; Roberts & Krokoff, 1990). Research linking hostility with coronary heart disease suggests that hostility influences health via chronic, negative interpersonal encounters over time (Smith, 1992; Smith, Glazer, Ruiz, & Gallo, 2004). Hostile individuals both experience more interpersonal difficulties and respond to them with heightened physiological reactivity as compared to their less hostile counterparts. Moreover, evidence suggests that hostile individuals not only experience less social support but they are less responsive to the stress-attenuating properties of social support when it is provided (Smith, Glazer, Ruiz, & Gallo, 2004). Given the centrality of the marital relationship for most adults, hostility in the marital relationship has been hypothesized to exert

negative health consequences on spousal members by eliciting chronic hyper-arousal of the sympathetic nervous system and neuroendocrine system (for a review see Kiecolt-Glaser & Newton, 2001). Therefore, it may be that the consequences of hostility both in terms of marital functioning and health outcomes simply occur over a more protracted period than was included in the current investigation. Future research should investigate how over time, declines in communal strength may be linked with increases in hostility and how the interaction between hostility and communal strength influences physical health.

Finally, given that marital satisfaction and communal strength are distinct but overlapping constructs, particularly in the early stages of marriage, there may be limited statistical power to adequately deconstruct whether the variance is attributable to overall satisfaction or to the communal strength of the marriage. That is, most couples enter marriage with both high levels of satisfaction and communal strength. Subsequently, it is perhaps not surprising that during a time period in which these measures are so tightly converged, the more global construct of the two (i.e., satisfaction) would have greater statistical power. However, over time, communal strength and satisfaction are likely to become more divergent—allowing for a more precise investigation of the relative strength of each. Indeed, future studies may maximize their ability to delineate the relative effects of overall satisfaction and communal strength by utilizing samples of couples in which there is likely to be a discrepancy between the level of communal strength and the degree of satisfaction in the marriage. For instance, future investigations might focus on populations in which there are strong religious or cultural prohibitions against divorce. In such cases, it may be easier to identify couples in which overall satisfaction with the spouse may be low but communal strength may be high because one may still perceive the spouse to be responsive because there is such a strong cultural motivation to maintain one's "duty" in the marital relationship.

5.3 LIMITATIONS

The current findings must be interpreted within the context of the study's limitations. First, given that the data were collected within a relatively homogenous group of educated, white, middle-aged couples, the results may not generalize to the population at large.

The constrained nature of the sample also posed a significant challenge in the ability to detect statistically significant differences in the health outcomes. Indeed, there was almost no variability in the conventional Physical Component Score of the SF-36 and very limited variability in the factor-analytically derived measure of Physical Health used herein. Previous reports have similarly noted problems in analyzing the SF-36 due to its skewed distribution and inclusion of such sever indices of physical functioning, such as physical role limitations (Kazis et al., 2004; Falck, Wang, Siegal, & Carlson, 2000). Given the lack of variability in this measure, it was necessary to dichotomize the physical health outcome, further reducing statistical power and also calling into question the meaning of the findings (i.e., "excellent" versus "less than excellent" physical functioning). Although based on necessity, given the characteristics of the current sample, the non-conventional approach to summarizing the SF-36 subscales is also a limitation because effect sizes cannot be compared to previous reports using the traditional SF-36 aggregate measures.

In addition, given that the current study relied exclusively on self-report measures, common method variance may have contributed to observed associations. Moreover, despite evidence showing that perceived health is an important predictor of objective health endpoints, including mortality (Idler & Benyamini, 1997), its subjective nature, as well as the self- reports of communal strength and marital satisfaction, may have been influenced by unmeasured personality variables, such as neuroticism. Nevertheless, pilot data collected for the current study suggest that the perceived physical health measure was associated with risk of being in the high-risk metabolic group. Moreover, in this middle-aged, healthy sample, variations in subjective health status may have a significant impact on the overall well-being of the family and may have a cumulative impact on physical and mental health.

Another limitation in the current study is that the baseline assessment was collected 26 days prior to the wedding date- a time in which most couples exhibited very high levels of marital satisfaction and communal strength. Given that there were only two assessments of the marital variables available prior to the collection of self-reported health, change scores were calculated between baseline and approximately 2 years following baseline. Thus, the relatively high baseline measures of marital satisfaction and communal strength may have limited the power to detect associations between both baseline or change and the subjective health outcomes.

Finally, although there were multiple assessments of the marital variables over time, there was only a single assessment of self-reported health. Without having baseline measures of the SF-36, causal relationships between the marital measures and the SF-36 outcomes cannot be inferred.

5.4 STRENGTHS

Notwithstanding the aforementioned challenges that arise when utilizing younger samples, the demographics of the current sample are notable for several reasons and represent an important contribution to future research concerning marital trajectories and physical health. First of all, by utilizing a sample in the early years of marriage, the current study captures a period within the marital relationship characterized by significant changes in the dynamics of the couple (e.g., the birth of the first child) and typically, precipitous declines in marital functioning. Indeed, the vast majority of couples in the current sample experienced declines in both marital satisfaction and communal strength between the baseline assessment (26 days prior to marriage) and the 2nd assessment, approximately 2 years later—a finding consonant with prior research on marital functioning and transition to parenthood (e.g. Shapiro, Gottman, & Carrere, 2000).

Several other findings are notable as they support the internal validity of the present study. First, although the pilot study sample was small (i.e., n = 26), the fact that there was an association between the metabolic category and the Physical Health risk factor supports the factor-analytic approach used in the current study to summarize the SF-36 subscales. Second, the finding of higher levels of depression among women as compared to men and higher levels of hostility in men as compared to women is consistent with prior literature attesting to gender differences in these psychosocial characteristics (Kessler, 2000; Stoney & Engebretson, 1994). Finally, the magnitude of the association between depression scores and marital satisfaction was consistent with prior research which has documented associations between -.20 and -.60 (Fincham, Harold, & Osborne, 1997).

Whereas previous research has tended to focus on static assessments of marital quality, the current study included longitudinal assessments of marital variables, thereby affording the opportunity to simultaneously explore the effects of initial levels of marital quality and changes

in quality over the first several years of marriage. In addition, whereas much of the previous research has tended to focus on global marital satisfaction alone, the present study examined a theoretically-driven, process-oriented relationship variable that may contribute to global judgments of marital satisfaction and may importantly influence health.

Finally, the inclusion of both members of the couple and the use of appropriate statistical methods to analyze dyadic data represents an important contribution to the extant literature which has tended to utilize single-sex samples. Examining the effects of marital variables on both husbands and wives simultaneously afforded the opportunity to examine gender differences in the effects and also allowed for a more comprehensive examination of the dyadic processes that may contribute to health.

5.5 FUTURE DIRECTIONS

The results of the present study elucidate several avenues for future research. First, future longitudinal research is needed that includes multiple assessments of both marital quality and physical health in order to examine the dynamic relationship between marital functioning and health outcomes. Such research may address not only the effect of the trajectory of the marital functioning (i.e., stable, deteriorating, or improving) but would also allow for the examination of the dynamic effects of fluctuations in marital quality over time (e.g., over and above the average level of marital quality, is there an effect of exposure to periodic "dips" in marital functioning on health outcomes? And for whom are those periodic fluctuations most detrimental?).

Despite the challenges in finding an appropriate health outcome with sufficient variability in younger samples that also is linked with morbidity and mortality, longitudinal examinations of marriage and health that begin in the early stages of marriage and that include initial assessments of health are essential in order to elucidate the direction of the relationship between marital quality and health. The metabolic syndrome is an excellent candidate for future research investigating trajectories of marital quality and physical health because it has sufficient variability in younger age groups and is reliably associated with cardiovascular and diabetes morbidity and mortality (Ford, 2004).

The findings of the current study along with the existing literature on marital quality and health suggest that various aspects of the subjective experience of the marriage, including marital satisfaction and communal strength, are linked with important indicators of health. Future research is needed, however, to continue to investigate the physiological, behavioral, and psychosocial pathways that may link marital functioning with health outcomes.

Overall sleep quality and sleep disturbance is an important, though understudied health-related behavior that may serve as an important pathway linking marital functioning with physical health. There are a number of reasons why sleep behaviors may be an important pathway linking marital processes with physical health. First, previous research has shown that sleep complaints or sleep duration predict physical health decline and all-cause mortality (e.g., Wingard & Berkman, 1983; Newman et al., 2000). Behavioral sleep medicine researchers (i.e, those that study links between psychosocial processes, such as stress, sleep behaviors, and physical health outcomes) have identified two primary sources of psychological stress that may adversely impact sleep quality—acute and chronic life events, as well as ambient or environmental stress. Distressed marital relationships may be particularly salient for overall sleep functioning because spouses may not only serve as potent sources of acute and chronic stress, but they may also contribute to greater ambient stress given that spouses are presumably bed partners. Finally, given that the communal strength of the relationship has been conceptualized to provide a "safe haven" for the individual to physiologically and emotionally recover from the stresses of the day, sleep is a particularly compelling potential pathway because it is a behavioral and physiological manifestation of the body's ability to rest and recover. Thus, sleep may serve as an important link between the communal strength of the relationship and health.

Finally, future intervention research using empirically supported treatments for couples may help to elucidate whether there is a causal relationship between marital quality (or changes in that quality) and putative behavioral and physiological mechanisms, including sleep, blood pressure reactivity and immune system responses.

For decades behavioral medicine researchers and relationship researchers have worked largely in isolation of each other. However, future research is needed to continue in the current study vein, incorporating theoretically-driven models of relationship functioning into behavioral

medicine research. Such theoretically-driven research will allow for a more in-depth examination of how and why certain marriages are linked with physical health.

In conclusion, the current study provides preliminary evidence linking the perception of one's spouse's communal strength and overall marital satisfaction with perceived mental and physical health; however, future research is needed to replicate these findings in more diverse populations and with objective health endpoints. The present findings support the utility of applying a more nuanced approach to the study of marital relationships in the behavioral medicine context in order to develop a richer understanding of the pathways linking close personal relationships with physical health and well-being.

6.0 TABLES

Table 1. Descriptive statistics and scale descriptions of SF-36 subscales and aggregate scores.

Variable	Men Mean (SD)	Women Mean (SD)	T-test	Alpha	Scale Description/ Item Examples
Physical Functioning (PF)	28.96 (2.90)	27.74 (3.84)	2.23*	.93	10 items 3-pt Likert scale "Does your health now limit you in these activities? If so, how much? e.g., "Walking several blocks" "Bathing or dressing yourself"
Role- Physical (RP)	86.51 (27.22)	81.49 (33.79)	1.01	.86	4 items Response format: yes/ no "…have you had any of the following problems with your work or other regular daily activities as a result of your physical health?" e.g., "Accomplished less than you would like." "Were limited in the kind of work or other activities."
Bodily Pain (BP)	78.22 (15.32)	71.75 (19.93)	2.25*	.80	2 items Response format: 6-pt Likert scale "How much bodily pain have you had…?" "How much did pain interfere with your normal work?"

General Health (GH)	75.18 (18.27)	70.04 (21.57)	1.57	.81	5 items Response format: 5-pt Likert scale "I seem to be as healthy as anyone I know." "My health is excellent."
Vitality (VT)	54.93 (17.50)	48.25 (20.44)	2.17*	.88	4 items Response format: 6-pt Likert scale "Did you feel full of pep?" "Did you feel worn out?"
Social Functioning (SF)	87.01 (18.30)	81.17 (20.44)	1.87#	.71	2 items 5pt Likert scale "…to what extent has your physical health or emotional problems interfered with your normal social activities…?" "…how much of the time has your physical health or emotional health interfered with your social activities?"
Role-Emotional (RE)	78.95 (33.48)	67.95 (41.69)	1.80#	.83	3 items Response format: yes/ no "…have you had any of the following problems with your work or other regular daily activities as a result of any emotional problems…? e.g., "Accomplished less than you would like." "Were limited in the kind of work or other activities."
Mental Health (MH)	72.21 (15.68)	67.95 (18.67)	1.53	.86	5 items 6-pt Likert scale "Have you been a very nervous person?" "Have you felt downhearted and blue?"

Note. All questions refer to "in the past 4 weeks." Higher scores indicate better health.

* $p < .05$; # $p < .10$

Table 2. Correlations between SF-36 subscales for women (n = 72)

Variable	1	2	3	4	5	6	7
1. Physical Functioning	—						
2. Role-Physical	.56**	—					
3. Bodily Pain	.31**	.52**	—				
4. General Health	.05	.31**	.43**	—			
5. Vitality	.18	.25*	.35**	.57**	—		
6. Social Functioning	.30*	.26*	.22#	.19	.43**	—	
7. Role-Emotional	-.10	.14	.15	.44**	.42**	.37**	—
8. Mental health	-.21#	-.02	.04	.26*	.53**	.48**	.50**

Note. **p < .01; * p ≤ .05; # p < .10

Table 3. Correlations between SF-36 subscales for men (n = 74)

Variable	1	2	3	4	5	6	7
1. Physical Functioning	—						
2. Role-Physical	.10	—					
3. Bodily Pain	.36**	.47**	—				
4. General Health	.07	.40**	.26*	—			
5. Vitality	.19	.21#	.23*	.59**	—		
6. Social Functioning	.00	.11	.02	.29*	.23*	—	
7. Role-Emotional	.06	.17	.13	.34**	.36**	.40**	—
8. Mental health	.13	.29	.11	.31**	.55**	.36**	.56**

Note. **p < .01; * p ≤ .05; # p < .10

Table 4. Descriptive statistics for marital variables at Q1 and Q2 for the total sample and by sex

Variable	Total Sample Mean (SD)	Men Mean (SD)	Women Mean (SD)	T-test
Baseline Marital Satisfaction (MS)	61.42 (3.47)	61.25 (3.50)	61.60 (3.45)	-.60
Q2 MS	59.33 (6.39)	59.44 (5.99)	59.22 (6.82)	.21
Baseline Perception of Spouse's Communal Strength (PSCS)	85.05 (12.81)	84.35 (12.86)	85.79 (12.80)	-.68
Q2 PSCS	81.48 (13.08)	83.35 (12.28)	79.53 (13.69)	1.78#
Baseline Communal Strength of Self (CSS)	89.35 (7.70)	89.39 (7.88)	89.31 (7.56)	.06
Q2 CSS	86.95 (8.92)	87.16 (8.75)	86.73 (9.16)	.29
Change MS	-2.09 (5.94)	-1.81 (5.11)	-2.38 (6.73)	.57
Change PSCS	-3.58 (12.91)	-1.00 (13.14)	-6.26 (12.20)	2.52*
Change CSS	-2.40 (7.99)	-2.23 (7.85)	-2.58 (8.19)	.26
Baseline Depression‡	11.32 (8.35)	9.88 (6.70)	12.80 (9.59)	-2.12*
Q2 Hostility	30.91 (5.32)	31.98	29.81	2.52*

Note. * p < .05; # p < .10

‡ Analyses based on raw CES-D scores.

Table 5. Correlations between marital variables at baseline (Q1), Q2, and change between baseline and Q2 for women

Variable	1	2	3	4	5	6	7	8	9
1. Baseline Marital Satisfaction (MS)	—								
2. Baseline Communal Strength (CSS) of Self	.51**	—							
3. Baseline Communal Strength of Spouse (PSCS)	.51**	.70**	—						
4. Q2 MS	.28**	.02	.12	—					
5. Q2 CSS	.29**	.53**	.45**	.19#	—				
6. Q2 PSCS	.33**	.43**	.58**	.39**	.61**	—			
7. Change in MS	-.23*	-.24	.14	.87**	.05	.23*	—		
8. Change in CSS	-.15	-.33**	-.15	.20#	.63**	.29**	.27**	—	
9. Change in PSCS	-.17	-.25*	-.40**	.31**	.22#	.52**	.40**	.48**	—

Note. ** p < .01; *p ≤ .05; # p < .10.

Table 6. Correlations between marital variables at baseline (Q1), Q2, and change, between baseline and Q2 for men.

Variable	1	2	3	4	5	6	7	8	9
1. Baseline Marital Satisfaction (MS)	—								
2. Baseline Communal Strength (CSS) of Self	.19#	—							
3. Baseline Communal Strength of Spouse (PSCS)	.36**	.50**	—						
4. Q2 MS	.53**	.26*	.24*	—					
5. Q2 CSS	.07	.56**	.41**	.36**	—				
6. Q2 PSCS	.26	.34**	.46**	.55**	.64**	—			
7. Change in MS	-.07	.17	.03	.81**	.37**	.47**	—		
8. Change in CSS	-.11	-.38**	-.05	.14	.56**	.37**	.24**	—	
9. Change in PSCS	-.11	-.18	-.55**	.28*	.20#	.49**	.40**	.40**	—

Note. ** $p < .01$; *$p < .05$; # $p < .10$.

Table 7. Results of the analyses regressing the SF-36 factor scores (Physical or Mental Health) on marital satisfaction (MS) variables with and without adjustment‡ for demographic characteristics,[a] psychosocial risk factors,[b] or parenthood status.[c]

Variables Entered	Unadjusted Model	Demo-graphics Model	Psychosocial Model[b]	Parent Status Model[c]
	B (SE)	B (SE)	B (SE)	B (SE)
Model 1a: Physical Health[+] (df = 136)				
Sex	-.81 (.31)**	-.90 (.31)**	-.80 (.33)*	-.88 (.34)**
Baseline MS	.12 (.05)*	.11 (.05)*	.09 (.06)	.12 (.06)*
Change MS	-.02 (.03)	-.02 (.03)	-.02 (.03)	-.02 (.04)
Model 1b: Mental Health (df = 138)				
Sex	-1.63 (.51)**	-1.60 (.53)**	-1.06 (.48)*	-1.70 (.57)**
Baseline MS	.23 (.07)**	.24 (.07)**	.09 (.07)	.23 (.07)**
Change MS	.09 (.07)	.09 (.07)	.06 (.07)	.10 (.08)
Model 2a: Physical Health[+] (df = 136)		N/A	N/A	N/A
Sex	1.20 (6.35)			
Baseline MS	.13 (.07)#			
Change MS	.02 (.06)			
Baseline MS * Sex	-.03 (.10)			
Change * Sex	-.05 (.07)			
Model 2b: Mental Health (df = 138)				
Sex	-5.27 (8.48)	-4.39 (2.13)*	.15 (8.77)	-6.25 (10.77)
Baseline MS	.20 (.08)**	.22 (.07)**	.10 (.10)	.18 (.12)
Change MS	.29 (.07)**	.28 (.07)**	.24 (.08)**	.32 (.10)**
Baseline MS * Sex	.05 (.14)	.04 (.03)	-.03 (.14)	.07 (.18)
Change MS * Sex	-.28 (.13)*	-.27 (.12)*	-.24 (.09)**	-.31 (.11)**

Note. Change scores are deduction of baseline scores from scores at Time 2. B coefficients and standard errors represent final estimation of fixed effects with robust standard errors.

[+]Results are based on Bernoulli models for binary outcomes. Coefficients for the binary models represent the log-odds of having the outcome (i.e., "excellent physical functioning").

‡ N/A. Adjusted models are only reported for significant effects from the unadjusted models.

[a] Model adjusted for age and education.

[b] Model adjusted for depression and hostility.

[c] Model adjusted for transition to parenthood (i.e., have a child = 1; childless = 0).

** p < .01; * p < .05; # p < .10

Table 8. Results of the analyses regressing the SF-36 factor scores (Physical or Mental Health on perception of spouse's communal strength variables (PSCS) with and without adjustment‡ for demographic characteristics, psychosocial risk factors, or parenthood status.

Variables Entered	Unadjusted Model	Demo-graphics Model	Psychosocial Model[b]	Parent Status Model[c]
	B (SE)	B (SE)	B (SE)	B (SE)
Model 3a: Physical Health[+] (df = 139)				
Sex	-.71 (.32) *	-.82 (.33) *	-.68 (.34) *	-.75 (.38) *
Baseline PSCS	.04 (.02) *	.03 (.02) #	.03 (.02)	.05 (.02) **
Change PSCS	.02 (.02)	.02 (.02)	.02 (.02)	.03 (.02)
Model 3b: Mental Health (df = 138)				
Sex	-1.40 (.53) **	-1.40 (.56) *	-.81 (.52)	-1.54 (.58)
Baseline PSCS	.07 (.03) *	.07 (.03) *	.02 (.03)	.07 (.03) *
Change PSCS	.06 (.03) *	.06 (.03) *	.05 (.02) *	.05 (.03) *
Model 4a: Physical Health[+] (df = 139)		N/A	N/A	N/A
Sex	.58 (2.20)			
Baseline PSCS	.04 (.02) *			
Change PSCS	.02 (.02)			
Baseline PSCS * Sex	-.02 (.03)			
Change * Sex	-.001 (.03)			
Model 4b: Mental Health (df = 138)				
Sex	-.56 (4.46)			
Baseline PSCS	.07 (.03) *			
Change PSCS	.06 (.04) #			
Baseline PSCS * Sex	-.01 (.06)			
Change PSCS * Sex	-.01 (.05)			

Note. Change scores are deduction of baseline scores from scores at Time 2. B coefficients and standard errors represent final estimation of fixed effects with robust standard errors.
[+]Results are based on Bernoulli models for binary outcomes. Coefficients for the binary models represent the log-odds of having the outcome (i.e., "excellent physical functioning").
‡Adjusted models are only reported for significant effects from the unadjusted models.
[a] Model adjusted for age and education.
[b] Model adjusted for depression and hostility.
[c] Model adjusted for transition to parenthood (i.e., have a child = 1; childless = 0).
** p < .01; * p < .05; # p < .10

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