SOCIAL SUPPORT AND DIETARY CHANGES IN A COUPLES-BASED TREATMENT FOR CORONARY HEART DISEASE

Susan Elizabeth Stanton

A dissertation submitted to the faculty of the University of North Carolina at Chapel Hill in partial fulfillment of the requirements for the degree of Doctor of Philosophy in the Department of Psychology

Chapel Hill
2007

Approved by:

Donald Baucom, Ph.D.

Abigail Panter, Ph.D.

David Penn, Ph.D.

Tamara Sher, Ph.D.

Jennifer Snyder, Ph.D.

ABSTRACT

SUSAN STANTON: Social support and dietary changes in a couples-based treatment for coronary heart disease
(Under the direction of Donald Baucom)

The current study examined a mediational model of social support as the mechanism of change in a couple-based treatment for dietary behavior among patients with coronary heart disease. None of the assumptions of mediation regarding social support were met. Treatment condition (individual versus couple) did not predict changes in social support or changes in diet. Changes in social support did not predict changes in diet, possibly due to the lack of significant change in social support from pre to post treatment. Considering social support as a stable characteristic of partners, post hoc analyses examined social support as a moderator of treatment's effects on diet. Results demonstrated that patients in the individual treatment condition whose partners provided higher amounts of expressive support showed lower increases in percent of calories from fat. In addition, patients in the individual treatment condition whose partners provided higher positive affect during social support showed greater increases in percent of calories from fat and saturated fat. In addition to examining the role of social support in a couple-based treatment for health behavior change, the current study revised and applied a coding system for social support in couples to discussions about one partner's health. Exploring relationships among different aspects of social support and relationship adjustment demonstrates the ways in which instrumental and expressive support behaviors are linked with the quality and emotion with which partners

performed those behaviors.

ACKNOWLEDGEMENTS

I am indebted to many people for their assistance with this lengthy project. Thank you to Tamara Sher for the generous sharing of her dataset and flexibility in including a social support observational task tin the Partners for Life study. Dr. Sher and her numerous research assistants, including Jenna Duffecy and Gail Osterman, were invaluable in providing information about the treatment, sample, and measures. I honor the many undergraduate students who dedicated hours of their time in the often frustrating task of learning and applying the coding system. Kit Meyer, Amber Chambers, Elisa Doctor, Paige Garrison, Melanie Ritter, and Karl Straub not only coded with enthusiasm and accuracy, they also made our many coding meetings lively and fun. Special thanks to Rachel Meyer for choosing to use data from the current study for her Honor's Thesis. Steffany Fredman provided many insightful comments on the revision and application of the coding system as well. Numerous consultants assisted with the statistical aspect of the current project, including Abigail Panter, David Atkins, Li Cai, and R.J. Wirth. Thank you to members of my faculty committee for donating their time and advice to my dissertation, including Andrea Hussong, Abigail Panter, David Penn, Tamara Sher, and Jennifer Snyder.

The largest debt of gratitude for this and all my psychology projects belongs to my advisor, Donald Baucom. Words are inadequate to express the tremendous role that he has played in my graduate school career and development as a psychologist. From supporting my decisions to providing advice to giving me opportunities, Dr. Baucom could not have

done more to ensure my success in graduate school. I will always value him in my life as a mentor, colleague, and friend.

In addition to Dr. Baucom, a number of people supported me throughout my graduate school journey. My classmates, Chris, Evan, Lauren, Matt, Naomi, Shaye, and Steffany, showed me an incredible example of friendship with their support, laughter, and love. My family never wavered in their confidence of my abilities and always put the trials and tribulations of graduate school in proper perspective. Indeed, my mother and father's insistence on education for the sake of learning throughout my life gave me an essential foundation for the long graduate school journey. Finally, I thank my muse for inspiring me to explore social support in couples. My own partner for life, David, has been a constant example of the highest quality instrumental and expressive support.

TABLE OF CONTENTS

LIST OF TABLES

Table

LIST OF FIGURES

Figures

CHAPTER 1

BACKGROUND AND SIGNIFICANCE

Diet, exercise, and smoking – these are among the most difficult habits to change. Yet they are essential in the management of chronic health conditions such as coronary heart disease, obesity, and diabetes. Doctors often recommend adherence to a treatment regimen that includes a low-fat, healthy diet; regular, moderate exercise; and smoking cessation, as well as medication compliance (Uchino, Uno, & Holt-Lunstad 1999). The maintenance of a healthy lifestyle has serious medical implications, such as reducing the risk of angina, secondary illnesses, and other disease outcomes like morbidity and mortality (Miller, Hill, Kottke, & Ockene, 1997; Shepherd, 1996). However, less than 60% of people make the recommended changes in health behaviors from their doctors, despite knowing these risks (the Department of Health and Human Services, 1996; Dunbar-Jacob & Schlenk, 2001). Thus promoting a healthy lifestyle has become a serious public health issue, with different types of health professionals and agencies implementing programs to assist people in making these difficult changes

Interventions for health behavior change

Psychosocial programs for health behavior change tend to be based on medical education rather than on theories about health behavior change. Treatment outcome research in this domain uniformly describes the type of information conveyed in the intervention group, but it does not consistently discuss the reasons that particular information should

result in behavior change. In attempting to understand the moderate success rates of psychosocial programs for health behavior change, a review of the literature identifies which interventions are provided and whether they are efficacious, but not how or why such treatments lead to behavior change. In order to refine or expand upon successful treatments, the field must discover the psychological mechanisms by which the content of programs affects health outcomes.

The descriptions of programs for health behavior change imply that increased education about physical health should lead directly to adoption of healthier behaviors. Almost all of these programs include education: education about the participant's medical condition, education about proper diet and nutrition, education about appropriate types and amount of exercise, and education about the effects of health behaviors on relevant medical conditions. Education about psychological factors involved in health behavior change primarily focuses on the benefits and difficulties in making changes, possibly with suggestions about solving such difficulties. In addition to providing information, programs may provide some guidance on how to make health behavior changes, such as teaching goal-setting or self-monitoring.

However, the explanation for change might not be as simple as more education resulting in more adaptive behavior. Researchers often propose different models for the process of behavior change, such as emphasizing individual cognitions such as self-efficacy or environmental influences such as social support (e.g., Allison & Keller, 2004; Barrera et al., 2003). These models usually are supported by descriptive research demonstrating correlational relationships between psychological factors and health behaviors (e.g., Bennett, Mayfield, Norman, Lowe, & Morgan, 1999; DiMatteo, 2004). Despite the apparent

influence of these more elaborate theories of behavior change on researchers' conceptualizations, treatments for health behavior change rarely deviate from the content described previously. It is unclear whether researchers believe that increased knowledge from health education will influence factors such as self-efficacy and motivation or whether they simply have not tailored their interventions to reflect their theoretical models. In addition to the failure to describe the ways in which their theoretical models influence the development of their interventions, researchers also have been remiss in testing the extent to which proposed mechanisms of change such as motivation, self-efficacy, and social support explain treatment effects in health behaviors. The following review of programs for health behavior change will consider the content of the target intervention, mechanisms of change proposed by the investigators, and the extent to which the intervention and proposed mechanisms influence health behaviors such as diet and exercise. The population is limited to patients with diabetes, obesity and heart disease because these illnesses require long-term management of health behaviors perceived to be under the control of the patients.

Self-efficacy. Self-efficacy refers to people's perceptions of their capabilities to engage in particular behaviors (Bandura, 1997). Individuals' beliefs about their abilities to enact certain behaviors affect their emotions and thoughts as well as their behaviors in stressful situations (O'Leary, 1985). For example, higher self-efficacy relates to better adherence to diet and exercise recommendations in patients with coronary heart disease and diabetes (Bennett el al., 1999; Kavanagh, Gooley &Wilson, 1993; Plotnikoff, 1996; Senecal, Nouwen & White, 2000; Winkleby, Flora & Kraemer, 1994). Bandura (1997) has argued that interventions improving self-efficacy may produce better health behaviors because

stronger beliefs about one's abilities should lead people to use more resources and generate the effort necessary to engage in healthy behaviors.

When treatment outcome studies reference self-efficacy as an influence on behavior change, they often include treatment components targeted at perceived barriers to change, self-monitoring of incremental change, and encouragement from others such as a nurse, study personnel, or a peer support group (Allison & Keller, 2004; Dallow & Anderson, 2003; Glasgow et al., 1992; Glasgow, Boles, McKay, Feil, & Barrera, 2003; LaFramboise, Todero, Zimmerman, & Agrawal, 2003). Telephone and group-based interventions for patients with diabetes, heart disease, and obesity that include some attempt to increase self-efficacy overall have produced changes in health behaviors compared to control groups (Allison & Keller, 2004; Glasgow et al., 2003; LaFramboise et al., 2003). Although the treatments demonstrated improvements in physical activity and diet, results were inconsistent regarding the interventions' effects on self-efficacy. The telephone-based interventions for patients with diabetes and coronary artery disease did not affect self-efficacy (Allison & Keller, 2004; Glasgow et al., 2003; LaFramboise et al., 2003), whereas group-based programs for obesity and diabetes found that group discussion of participants' abilities to change behaviors produced increases in self-efficacy (Dallow & Anderson, 2003; Glasgow et al., 1992). However, Dallow and Anderson (2003) and Glasgow et al.'s (1992) failure to test the relationship between self-efficacy and improved diet and exercise makes it difficult to know the extent to which changes in self-efficacy due to the intervention explain changes in health behaviors. Thus findings suggest that interventions attending to self-efficacy in patients with heart disease, obesity, and diabetes produce health behavior change, but changes in self-efficacy may occur only in more intensive, active treatments such as face-to-face groups.

Furthermore, changes in self-efficacy may or may not be related to changes in diet and exercise following interventions.

Even in generic interventions consisting of education about health, goal-setting, and problem-solving that did not target self-efficacy, some researchers noted that healthy behaviors and self-efficacy in patients with, or at risk for, coronary artery disease increased following treatment (Toobert, Strycker, Glasgow, Barrera & Bagdale, 1998; Witmer, Hensel, Holck, Ammerman, & Will 2004), while others did not find treatment effects for self-efficacy or health behaviors (Ross, Moore, Earnest, Wittevrongel & Lin, 2004). However, Toobert et al. (1998) and Witmer et al. (2004) did not examine whether changes in self-efficacy due to treatment were associated with treatment-related improvements in diet and exercise. In an intervention targeting weight loss in obese women, Dennis and Goldman (1996) found that self-efficacy served as a moderator of treatment effects. Women higher on self-efficacy before or during treatment showed greater weight loss due to a 12-week diet and exercise program. Because the study did not have a control group and the intervention did not directly target self-efficacy, it is unknown the extent to which the treatment was responsible for any changes in self-efficacy. Although some women increased on self-efficacy during treatment, others reported stable levels of self-efficacy and some decreased on self-efficacy. Therefore, self-efficacy may relate to better health behaviors as defined by weight loss, but it is unclear the extent to which self-efficacy serves as a mechanism of change following treatment.

Motivation. The two leading theories about how motivation impacts health behavior are the transtheoretical model of change (Prochaska & DiClemente, 1982) and self-determination theory (Deci & Ryan, 1985). The transtheoretical theory refers to viewing

motivation for behavior change by incorporating four stages based on people's readiness to change. People may begin with little consideration for implementing change (Stage 1: precontemplation) and then may increase motivation and move to more serious consideration (Stage 2: contemplation), followed by engaging in change (Stage 3: action), and maintaining it (Stage 4: maintenance). Researchers have developed interventions to assist people in progressing from an earlier stage of change to a later stage, typically adapting education to different stages of change. These interventions include education about the stages of change, problem-solving about barriers to change, goal-setting, and, in some cases, motivational interviewing to encourage readiness for change. In interventions comprised of motivational enhancement strategies and attempts to reduce barriers to change, participants with diabetes and at risk for heart disease increased their stages of readiness and improved their dietary behaviors (Clark, Hampson, Avery, & Simpson, 2004; Glasgow, Terborg, Strycker, Boles & Hollis, 1997). However, neither study examined whether higher stages of readiness accounted for changes in dietary outcomes.

Interventions viewing motivation through self-determination theory focus less on the *level* of motivation for engaging in health behaviors and more on the *types* of motivation held by participants. Self-determination theory in the context of health behavior change focuses on the extent to which people's reasons for change are autonomous (intrinsic) or controlling (extrinsic) (Deci & Ryan, 1985). Researchers propose that individuals will be more likely to engage in healthy behaviors if they believe they have control over the process and desire change for their own personal reasons. Conversely, individuals who seek to make behavior change because other people are exerting control over them, such as nagging or overly structuring the change process, will be less likely to adopt healthy behaviors. For example,

higher autonomous motivation and lower controlling motivation in patients with diabetes and at risk for coronary artery disease has been related to better eating habits and diet adherence at baseline and 3 months later (Pelletier, Dion, Slovinec-D'Angelo & Reid, 2004; Senecal et al., 2000). However, interventions designed to promote greater autonomy in obese patients and healthy volunteers have not affected motivation and have had only small effects on diet adherence (Gardner & Hausenblaus, 2004; Levy & Cardinal, 2004). Overall, motivation as defined by amount (stages of readiness) or type (self-determination theory) appears to relate to health behavior change, suggesting its promise as a mechanism of change in future interventions for health behaviors. Although motivation may be amenable to change, it is unclear the extent to which changing motivation would result in health behavior changes.

Social support. Social support refers to the presence of others in one's life, the availability of other people to help when needed, the perception that others have helped when needed in the past, and the behaviors performed by other people in response to one's stressors or illness (Cohen & Syme, 1985). However, the measurement of social support has been approached in a multitude of ways, involving different definitions of support and differing assessment modalities. The responses of other people may be defined as (a) what the stressed individual perceives the responses to be or as (b) the actual behaviors as reported by outside sources (Cutrona, 1996). For example, support providers may give support that is "invisible," or unnoticed, by stressed individuals but nevertheless may assist in the problem (Bolger, Zuckerman, & Kessler, 2000). Cutrona and Suhr (1992) noted only modest correlations between reports of support behaviors from stressed individuals and reports of support behaviors from support providers ($r = .30$). Discrepancies in support providers' and support recipients' reports of behaviors may be due to personality factors, relationship

quality, mood, and cognitive appraisals (Cutrona, 1996). Thus self-report measures of social support from stressed individuals may be capturing perceived *availability* of support in the future, perceived *satisfaction* with past support, or perceived *amount* and *type* of support given in the past. Self-report measures of social support from support providers might reflect the actual amount and types of support given for a particular problem, but such reports also may be influenced by factors such as cognitive appraisal, social desirability, personality, and relationship quality (Cutrona, 1996). Finally, observational measures of social support examine interactions in which stressed individuals discuss their individual concerns and support providers are instructed to respond normally. Coding systems then categorize the amount and type of supportive behaviors displayed by support providers in the interaction as an approximation of naturally occurring support.

In the domain of health behaviors, self-report measures from patients are the most common sources of assessed support, followed by reports from support providers. Few studies have employed observational measures of social support in this population. In a meta-analysis looking at social support as measured by self-reports from patients or providers in 122 health studies, DiMatteo (2004) found strong relationships between greater social support and adoption of better health behaviors. Furthermore, she found that practical support, such as advice, information, and assistance with tasks, predicted the strongest effects on health behaviors. However, the relationships between better health behaviors and emotional support, or the demonstration of caring, concern, esteem, and empathy, and unidimensional support, which did not distinguish different kinds of support behaviors, also demonstrated significant effect sizes across studies. Nevertheless, these descriptive studies reflect cross-sectional, naturally-occurring relationships with no information about the

effectiveness of changing social support during interventions in order to boost health behavior change.

Researchers often deliver health behavior interventions based on education in group formats. The presence of other group members to hear concerns, offer suggestions, and share similar experiences may constitute social support. However, the groups are similar to most interventions for health behavior change in that they provide education about diet, nutrition and exercise, discuss benefits of and barriers to change, and offer suggestions for setting and meeting goals. Social support may be limited to naturally occurring interactions among group members, without explicit intervention components designed to increase the amount or type of social support from members. Such group-based interventions lead to superior changes in diet and exercise in patients with diabetes or coronary heart disease compared to wait list control groups (Oren, Carella, & Helma, 1996; Wierenga, 1994). Furthermore, Oren et al. (1996) found that members of the group intervention for diabetes self-management reported higher levels of confidant support, or greater perception that others would listen to concerns, but this higher perceived support did not relate to changes in health behaviors. Wierenga (1994) did find relationships between perceived support and changes in diet and exercise among diabetic patients, but the group-based intervention did not lead to changes in perceived support. When using generic interventions for health behavior in a group-based format, it appears that social support may play some role in the intervention's effects, but it is unclear the extent to which it is a mechanism of change in health behaviors.

Some group-based interventions stipulate strategies for increasing social support for health behavior change. For example, Calfas, Sallas, Oldenburg and Ffrench (1997) encouraged participants with coronary heart disease to identify existing supporters in their

environment and seek their help for fostering healthy behaviors. Correlational analyses suggested that greater support from family members and friends related to increases in physical activity after the intervention. However, this relationship disappeared in a multiple regression analysis including other psychosocial variables. Barrera et al. (2003) found that a group-based intervention that promoted emotional support, suggestions for coping strategies, frustrations about diabetes management, and advice about improving health behaviors increased perceived social support in diabetic patients. However, they were unable to test social support as a mechanism of treatment-related change in health behaviors because the group-based treatment did not produce superior changes in diet and exercise behaviors compared to individual treatment conditions (Glasgow et al., 2003). Although the group-based treatment and individual-based treatment affected health behavior change equally, it is still possible that their effects occurred through different psychosocial mechanisms so that it would have been worthwhile to examine whether changes in social support related to changes in health behaviors. Overall, the small number of interventions for health behavior change with obese, diabetic, and coronary heart disease patients has not focused on ways to increase social support as a substantial focus of their treatments. However, social support does appear to show relationships with interventions and with health behavior changes, suggesting it might warrant further investigation as a mechanism of change in health behavior interventions.

Whether interventions view self-efficacy, motivation, or social support as a possible mechanism of change in health behaviors, they need to refine their treatments to increase a focus on these psychosocial variables in a way that is consistent with theoretical models of behavior change. For example, researchers who view self-efficacy as an influence on health

behavior changes such as diet and exercise should include intervention strategies aimed at boosting patients' confidence in their abilities to make changes. If these more targeted interventions produce health behavior changes, then researchers must examine the extent to which the intervention influenced psychosocial variables such as motivation, as well as health behaviors such as diet and exercise. Finally, researchers must examine whether changes in psychosocial variables such as social support explain changes in health behaviors. Only then will the field understand how its interventions are producing health behavior changes in patients with diabetes, obesity, and coronary artery disease. As a corollary to examining the relationship between specific interventions and health behavior change, researchers also should expand their measurement of proposed mechanisms of change. For example, existing observational measures of social support may be adapted to health behavior change to supplement self-report measures of social support.

Social support and couples-based treatment

The call to provide treatment components tailored to proposed mechanisms of change may be answered best in couples-based treatments for health behavior change. The inclusion of partners in treatment may spur researchers to develop more explicit social support components in their interventions. When confronted with a partner to train, a protocol describing specific skills training and desirable behaviors in a support provider becomes as important as a protocol for intervening with patients. The development of explicit protocols has the additional advantage of defining the areas of support expected to change due to treatment. Investigators then may incorporate measures that capture those specific elements of support before and after the intervention. In particular, observational coding of social support during interactions between partners may be the most accurate way to measure

whether support providers are implementing behaviors as taught during the intervention. Such planning sets the stage for more precise analysis of whether treatment changes support in the way intended, and whether these changes predict behavior changes. Precise definitions of support interventions and measurement of congruent areas of support may assist in tailoring interventions to be maximally successful.

Attending to the existence of a romantic partner in treatment development also acknowledges the influence that partners might have over health behaviors. Partners are natural support providers because of their investment in patients' health, their expected role as a caregiver, and their consistency in being with patients after other programs conclude (Elizur & Hirsch, 1999; Franks, Wendorf, Gonzalez, & Ketterer, 2004). Patients have reported that support from romantic partners is particularly helpful when making behavior changes due to chronic illness (Coyne & Smith, 1991). Conversely, researchers have noted that nagging, overprotective, and controlling behaviors from partners in response to patients' behavior change may reduce adoption or maintenance of healthy behaviors (Coyne & DeLongis, 1986; Keefe et al., 1996; Umberson, 1987). Finally, the practicalities of daily living require that at least some partner and patient health behaviors be interdependent.

Due to the association established in descriptive literature between support behaviors from spouses and health behaviors (e.g., Finnegan & Suler, 1985), investigators have attempted to marshal the influence of romantic partners in interventions for health behavior change. In most studies, promotion of partner support has been defined primarily in terms of including partners in treatment. For example, in 8 out of 13 weight loss treatments, Black, Gleser, and Kooyers (1990) found that discussions about the role of partner support was limited to partners' attendance at group treatment sessions. Typically, the remaining

treatment components with partners present are very similar to group-based interventions without partners in which patients meet for 8-12 weekly sessions to learn about proper diet and exercise and apply standard behavioral principles to making changes. Often, these investigators note that partners may be encouraged to share their experiences with patients' efforts at change, to engage in the same behavior changes themselves, and to reinforce patients for gains (Black et al., 1990). After a qualitative review of couples-based interventions for weight loss, Black et al. (1990) provided descriptions of various tasks assigned to partners that may be classified into different types of support. However, the assignment of such tasks appeared to be unsystematic and informal rather than explicitly incorporated into treatment protocols. For example, O'Neill et al. (1979) described applying identical group behavioral treatments for diet and exercise to couples and individual groups of obese patients, with the exception that partners were encouraged to participate in the discussion, use the techniques in the intervention, and asked to provide positive rather than negative support. Other treatment studies also have asked partners to participate in the components of the treatment, but they provided minimal instruction on improving support skills. For example, Burke, Giangiulio, Gillam, Beilin, and Houghton (2004) mailed information packets about exercise and weight loss and provided telephone calls to young couples living together for the first time. The only couple specific module referred to exercise and diet during pregnancy. Another bibliotherapy intervention for patients with coronary heart disease asked partners to be supportive of healthy behaviors by reinforcing good habits, reducing negative comments, and helping in problem-solving (Black, 1989). However, the latter study did not measure whether partners or patients even looked at the materials.

Only two intervention trials have described interventions built around promoting support from family members. One such intervention consisted of a home visit from a nurse to hypertensive patients and a close family member, usually a spouse, to discuss educational materials about health behaviors and blood pressure (Morisky, DeMuth, Field-Fass, Green & Levine, 1985). The nurse asked family members to identify three ways in which they could assist the patient with lowering blood pressure and to try to remind patients to take their medications and attend follow-up appointments. More recently, a couples-based intervention for pregnant women to quit smoking organized the intervention around the partner's support (McBride et al., 2004). Materials such as a brochure and videotape consisted of messages about reducing "bad" support, such as nagging or checking, and increasing "good" support for smoking cessation, such as encouragement and contingency planning. Both husbands and wives received three telephone calls pre and post partum from health educators to assist them in tailoring support to their lifestyles. Health educators created contracts regarding the types of behaviors both partners would adopt related to smoking, and discussed barriers and benefits to change. To our knowledge, this is the most comprehensive couples-based support intervention for health behavior change to date.

Despite the failure to maximize the presence of the partner in developing interventions, some couple-based programs have improved diet and exercise health behaviors. Both bibliotherapy treatments and the intervention with a family home visit resulted in better dietary behaviors and more physical activity than control conditions, although only the study with a home visit included an active treatment as a control condition (Black, 1989; Burke et al., 2004; Morisky et al., 1985). However, none of these interventions included measures of social support, so it is difficult to assess the extent to which promotion

of social support in partners led to behavior changes. Findings related to couples-based group programs for weight loss, such as O'Neill et al. (1979), have shown inconsistent effects. Some programs have demonstrated superior changes in health post-treatment compared to control groups or individual-only groups, but Black, Gleser, and Kooyers' (1990) meta-analysis describes these effects as small overall, with many programs not producing treatment differences. Although a few of these studies included measures of the amount and type of partner support behaviors as reported by patients and partners, they did not consistently predict weight loss (Brownell, Heckerman, Westlake, Hayes, & Monti, 1978; Murphy et al.,1982; Pearce, LeBow, & Orchard, 1981). In the most comprehensive study to examine social support as a mechanism of change, McBride et al. (2004) found that the couples-based treatment did not change social support more than the other two treatment conditions; furthermore, changes in social support did not relate to smoking cessation in pregnant women. However, the authors noted that the intervention may not have been strong enough to influence partner support, which is consistent with the failure of other mail- and telephone-based interventions to influence proposed mechanisms of behavior change, such as self-efficacy (Allison & Keller, 2004; Glasgow et al., 2003). In addition, the addictive nature of smoking may make it a more difficult health behavior to change through couples-based support interventions than diet or exercise.

Despite some forays into couples-based treatments for health behavior changes, a number of areas remain unexplored. First, researchers need to consider specific ways in which partner support may be helpful when developing the content of interventions. Specific strategies for increasing support skills in partners or formal education about helpful and unhelpful support strategies would capitalize on the presence of the partners in the treatment

sessions. Furthermore, specificity in the active ingredients intended by the intervention would provide guidance for exploring processes of health behavior change. By understanding the ways in which interventions affect health behavior changes, researchers can tailor future programs. Using measures that assess the aspects of support targeted by the intervention would assist in this endeavor, as well as contribute to an overall understanding of the relationship between social support and health behavior change in the context of chronic illnesses. In particular, the health psychology field has largely ignored advances in social support assessment wrought by observational coding systems. At least three observational coding systems looking at the behavioral manifestations of social support in couples have supplemented results from self-report measures in the overall field of social support. However, researchers looking at social support in a health context have relied almost exclusively on self-report measures of social support in both descriptive and treatment outcome studies. Thus an examination of social support as a mechanism of health behavior change would not only benefit from more specific analysis of specific social support interventions in couple-based treatments, it also would be assisted by the incorporation of observational coding as a measure of social support.

Partners for Life: A Couples-based Intervention for Behavior Change in Coronary Heart Disease Patients

A recently completed study comparing the effects of a couples-based treatment and an individual-based treatment on health behavior change following heart disease provides a context for examining the role of social support in interventions and health behavior change. Similar to previous interventions, this study, called Partners for Life (PFL), targets motivation, as seen in greater readiness to engage in new behaviors; desire to make change

for more internal, personal reasons; and freedom to choose their health behavior plans in order to produce adherence to healthy diet, exercise, and medication behaviors (Sher, et al., 2002). The couples-based treatment also attempts to improve couple communication surrounding health issues. While the primary investigators for this study did not envision their couples-based treatment explicitly as a social support intervention, the treatment includes many strategies that could be reconceptualized in terms of social support. From this perspective, assessing the support aspects of the intervention allows for an examination of whether a couples-based intervention does affect social support, and whether those changes explain treatment effects on health behavior changes. By specifying treatment components that promote social support, this study could describe how different types of support are likely to be affected by the intervention.

The couples-based group differs from the individual-based group in several ways: (a) the presence of the partner at group meetings; (b) discussion of emotional expressiveness and problem-solving skills related to health issues; (c) practice of these communication skills; (d) changes in the social and physical environment dependent on partner's assistance, and (e) the formation of plans for health behaviors as a couple. As noted before, the presence of a partner in an intervention targeted at health behavior changes for one person immediately constitutes a focus on social support. As the primary support provider, the partner's participation in the program demonstrates a willingness to assist in a difficult process. Similarly, PFL urges participants in the couple-based treatment to view behavior change as a couple process, thus legitimizing the partner's role in providing support for behavior change. Furthermore, sharing the experience of attending groups could make partners feel more intimate. All of these factors likely would influence patients' perceived support. Patients

with coronary heart disease who perceive their partners to be more supportive are more likely to make and sustain health behavior changes such as improved diet and exercise (e.g., Kulik & Mahler, 1993).

The specific ways in which the couples-based intervention involves partners in the process of patients' behavior change may relate primarily to observed social support behaviors. Although general communication skills are presented, the examples and practices in those modules focus on applying skills to health-related topics, such as diet, exercise, medication compliance, or emotional reactions to the illness. Within these discussions, partners are instructed to follow the lead of the patients. Partners receive an explicit message that they should respond to patients' needs regarding health concerns and behavior changes rather than dominating the conversations. Thus the intervention focuses on improving a subtype of communication for one person's individual concerns, which may be construed as social support. By urging patients to request particular kinds of responses, the intervention helps to navigate a potentially difficult aspect of providing social support. The general social support literature has noted that partners do not always know when and how to respond to their partners' stressors (Johnson, Hobfoll, & Zalcberg-Linetzy, 1993; Pearlin & McCall, 1990). However, failures to respond appropriately to partners in times of crisis may decrease individuals' sense of being supported and exacerbate their stress (Bailey & Kahn, 1993; Cohen & McKay, 1984; Cutrona, Cohen, & Ingram, 1990; Coyne, Wortmen, & Lehman, 1988; Shinn., Lehman, & Wong, 1984; Shumaker & Brownell, 1984). Stressed individuals who receive the type of support they prefer from partners demonstrate better coping (Dunkel-Schetter, Folkman, & Lazarus, 1987; Manne, 1999). By promoting the principle that partners

should learn and respond to patients' requests and needs, the couples-based condition of PFL teaches partners to be better support providers.

In addition to promoting more responsive support overall, the two types of communication skills may impact different types of support. For example, emotional expressiveness training emphasizes listening skills and validation. When one person is discussing an area of individual concern, partner responses that demonstrate understanding, concern, and belief in the stressed individual are defined as expressive support (Cutrona, 1996). In the context of health behavior change, expressive support has been related to improvements in patients' compliance with recommendations for healthy diet and exercise behaviors (DiMatteo, 2004). Although no studies have tested possible reasons for the relationship between expressive support and changes in diet, exercise, or medication compliance, researchers speculate that expressive support has an indirect effect on other factors that promote health behavior change (Connell, Davis, Gallant, & Sharpe, 1994). Expressive support may increase patients' self-efficacy by demonstrating partners' confidence in their abilities to make change (Taal, Rasker, Seydel, & Wiegman, 1993). Expressive support also shows a strong relationship to decreased depression and distress in patients with chronic illnesses (Allgower, Wardle, & Steptoe, 2001; Connell et al., 1994; DiMatteo, Lepper, & Croghan, 2000). As depression has been linked to lower motivation for change (e.g., Stotts, DeLaune, Schmitz, & Grabowski, 2004), social support might indirectly increase motivation for health behavior changes.

Problem-solving skills, on the other hand, emphasize the use of appropriate suggestions, consideration of different types of information, and implementation of solutions. In the context of responding to individuals' stressors, these skills constitute instrumental

support, or the provision of information, advice, or task-oriented assistance. Instrumental support appears to demonstrate the strongest relationship between social support and adherence, perhaps because it may have a direct influence over the behaviors (DiMatteo, 2004). For example, advice about how to avoid barriers to a healthy diet, such as late-night snacking, would enable patients to change their habits related to eating. Instrumental support also may influence the amount of time and energy available to patients to make health behavior changes (Kaplan & Hartwell, 1987). For example, offering to cook heart-healthy meals allows patients to adhere to nutrition guidelines as well as frees time to engage in other heart-healthy behaviors such as exercise.

Despite the possible benefits of instrumental support in a health context, researchers have indicated that it can be more problematic to give instrumental than expressive support in other stressful contexts. People dislike receiving unsolicited advice from partners, which has sometimes been labeled emotional overinvolvement or social control (Coyne & DeLongis, 1986; Umberson, 1987; Williams, Grow, Freedman, Ryan, and Deci, 1996). Some partners may be averse to any types of instrumental support, including information and practical assistance. Even when partners are open to instrumental support such as advice, they may find it supportive only under certain circumstances (Cutrona & Suhr, 1992). For example, Cutrona and Suhr (1992) found that support recipients perceived their partners' informational support (i.e., facts and advice) to be helpful only when partners had expertise in the area and the situation was beyond the recipients' control. Despite recognizing the importance of matching support to individual preferences, few studies have offered guidance in this area. Partners for Life assists partners in navigating these potential difficulties by promoting patients' need for autonomous change. In following self-determination theory, Sher et al.

(2002) propose that people will have greater motivation for changing health behaviors if they feel a sense of control over their actions rather than feeling coerced into making changes. Despite PFL's emphasis on partner involvement in the creation and implementation of behavior plans, the study asks patients to direct the changes in health behavior. Partners are asked not to provide advice unless asked by patients. Partners for Life acknowledges that any health-related solutions must be acceptable to both partners, but they hope that providing structured plans with timelines for completions and checkpoints will alleviate nagging or unwanted support from the partners (Sher & Bellg, 2001). Furthermore, the treatment allows couples to tailor their behavioral plans to their preferences, so that patients who prefer less support may specify that when making contracts with their partners regarding health behaviors. Finally, the couples-based treatment improves partners' instrumental support skills by providing them with accurate, useful health information. Patients may be less likely to dismiss partners' opinions as lacking expertise if partners have heard the same nutritional and exercise information as patients.

The couples-based treatment for Partners for Life includes additional components that may be reinterpreted as social support training. The intervention discusses the need to create a physical and social environment amenable to the patients' new lifestyle choices. Although these sessions provide information to the couple together, partners particularly may receive a message about providing support consistent with program goals. For example, PFL advises couples to anticipate dietary restrictions when having dinner with friends or to consider the types of food available in the house. For these changes to be successful, partners may need to alter aspects of their own health behaviors. These and other examples of creating a healthy environment serve to improve partners' instrumental support by indicating the ways

in which they can provide the most helpful practical assistance. When making changes to the patients' environment that do not involve the partner directly (e.g., healthy snacks at work), the partner still may provide enhanced instrumental support by offering suggestions in line with the program or raise issues/concerns/barriers that patients are not considering at the time.

Other aspects of the program promote better expressive support. For example, PFL's emphasis on autonomy-supporting interactions results in instruction to partners on how to provide encouragement for health behaviors or efforts at change without nagging or undermining patients' motivation. Similarly, partners are asked to validate only appropriate health-related behaviors and efforts at change rather than criticizing failures to adhere to the plans. These lessons serve to improve partners' demonstrations of concern, empathy, and confidence in patients' abilities to make behavior change, which translates into better expressive support. Finally, the overall philosophy and format of the program promotes the message that patients and partners should address the process of behavior change together, providing time in and outside sessions for couples to discuss information and plans related to patients' behavior changes.

By identifying the specific ways in which Partners for Life promotes instrumental and expressive support, it is possible to examine social support as a mechanism of health behavior change. The current study proposes that the unique elements of the couples-based intervention may be characterized as social support training. Thus the process by which the couples-based treatment produces more change in health behaviors compared to the individual treatment might be due to changes in partner social support. Changes in social support will be examined with a method akin to the way in which social support was

promoted in the intervention. Just as partners participated in discussions related to patient's CHD throughout the intervention, so will social support be measured during couple interactions in which patients share heart-related concerns and partners respond. Observational coding will be used to examine changes in instrumental and expressive support due to the intervention. As noted, no prior treatment outcome studies have employed observational coding for social support related to health behaviors. Existing social support observational coding systems have either focused exclusively on the type of behavior performed (e.g., instrumental or expressive; Cutrona, 1996) or the quality of support (e.g., numbered ratings of support helpfulness; Dehle, 1999; Pasch & Bradbury, 1998). However, interventions may influence both the kind of support given and the way in which it is delivered. Therefore, a secondary goal of the current study is to revise a current social support coding system in order to differentiate between the content of partners' support as defined by specific behaviors such as advice-giving and empathy, and the context in which partners deliver support. Context refers to how well partners present and time their behaviors as well as the positive and negative affect that accompany behaviors. By differentiating between the content and context of social support, it may be possible to ascertain whether the relative helpfulness of social support is related to specific types of behaviors or the manner in which behaviors are performed.

The current study will focus on treatment-related changes in diet. In addition to being the focus of half the sessions in PFL, diet may elicit support more than exercise or medication compliance because couples frequently eat meals together. As noted in PFL's exercise session in the couples-based treatment, patients might choose to exercise alone without any input from partners or may take medications when partners are not monitoring

them. However, it is difficult for couples to buy two sets of food and cook two meals, so that partners by necessity are involved in heart-healthy meal-planning, cooking, and purchasing of snacks. Often partners may be restricted in their dietary choices in order to minimize temptation for patients. Because dietary changes might be particularly salient to partners, diet provides a context for eliciting responses such as instrumental and expressive support from partners.

In order to test social support as a mechanism of change in Partners for Life, the current study examined a partial mediational model in which changes in social support before and after PFL's intervention might partially explain superior changes in dietary behaviors in the couples-based group over the individuals-based group. Because the observational measure of social support may not capture every element of support promoted by the intervention and the couples-based treatment is likely to have direct effects on diet not captured by the support measure, partial rather than full mediation is expected. As represented by the conceptual model in Figure 1, the couples-based treatment is expected to produce greater changes in diet pre to post intervention than the individual-based treatment (leg a). The couples-based treatment also is expected to lead to more positive changes in instrumental and expressive support in the support provider from pre to post intervention (leg b). These more positive changes in support pre to post intervention will predict greater change in diet from pre to post intervention (leg c). Finally, the effects of the couples-based intervention on changes in diet (leg a) are expected to decrease once the effects of social support on diet are considered (leg c).

If treatment group does not differentially predict changes in diet, a mediational model is not possible regardless of the results of analyzing the other legs in the model. However,

the current study will proceed with analysis of all aspects of the mediational model even if results in one leg reveal that mediation cannot exist. Therefore, the next analysis will explore the relationship between treatment condition and social support. Understanding the relationship between (a) an intervention which includes several support components and (b) social support measured observationally may provide information for improving interventions. It is possible that the intervention will not have any direct effects on health behavior change. However, a secondary hypothesis predicts that indirect effects may be present, so that treatment condition influences diet only because treatment differentially predicts social support and social support predicts diet.

If treatment condition does not differentially predict social support, then a tertiary hypothesis will collapse the sample across treatment groups to examine whether changes in social support across time predict changes in diet across time. This model would contribute to the literature that has described a relationship between social support and health behavior change by looking at changes in support, rather than baseline measures only. Furthermore, this would be the first study linking observational measures of social support to changes in health behaviors. Although the mediational model is the primary hypothesis, examining all legs of the conceptual model in Figure 1 will enhance our understanding of the relationships among interventions, health behavior change, and social support from partners.

CHAPTER 2

METHODS

Design

The study used an experimental design because participants were randomly assigned to two treatments. As noted above, the hypotheses address between-group comparisons in changes from pre-treatment to post-treatment. Self-report measures were collected originally to test treatment effects for health outcomes and were not chosen explicitly for the current investigation. However, the current investigator applied a coding system designed specifically to answer the questions in this study. The current hypotheses use pre (baseline) and post (6 month) self-report and observational data and do not include self-report data collected 12 and 18 months after the baseline assessment.

Participants

Participants were recruited for the intervention study from four hospitals in a major metropolitan area. Eligibility criteria included a history of a cardiac event (MI, surgery, or other invasive procedure), being married or living with a partner, no current alcohol or drug abuse, and permission from the participant's cardiologist to participate. Cardiologists needed to approve their patients for interventions addressing weight loss (or dietary modification based on current AHA recommendations), exercise, and lipid-lowering medication. Sixty-six couples were randomly assigned to one of two conditions, (a) individuals group or (b) couples group. Of those, 57 couples had male patients and female partners; 8 couples had

female patients and male partners, and 1 couple had two male partners. Due to reported differences in men and women's provision of social support, male and female providers should be considered separate samples. However, the small number of male providers does not allow for gender comparisons. Therefore, the 8 couples in which women were patients were excluded from the current study. Although limiting the sample to male patients and female partners limits generalizability, the prevalence of heart disease among married men still makes the results pertinent to a large population. In addition, all previous research has looked at social support in heterosexual couples, and it is unknown if differences in support provision exists in homosexual couples. Given the inability of the current sample to make comparisons, the one gay couple was excluded. Therefore, only the 57 heterosexual couples with female support providers will be considered for the current study.

Because the hypotheses for the current study address changes in observed social support pre to post treatment, couples must have videotaped interactions at both time periods to be included. Eighteen of the 57 couples were missing either pre or post support interactions or had problems with the videotaping. The final sample of 39 couples does not differ from the 18 excluded couples with male patients and female providers on either partner's age or marital quality scores as measured by the Dyadic Adjustment Scale. However, the sample of 39 couples differs from the 18 excluded couples on both partners' ethnicity, salary, and education. See Table 1 for comparison of the demographics for the male patients and Table 2 for comparison of the demographics for the female providers.

In the current sample of 39 couples, 18 received individual treatment and 21 received couples treatment (in the excluded group, 13 received individual treatment and 5 received couples treatment). Couples in the two treatments did not significantly differ on

demographic information or baseline marital satisfaction, so summary statistics for the current sample are reported. The average age of men was 59.34 (*SD* = 10.21) and women was 56.78 (*SD* = 9.46). Approximately 72% of the men and 74% of the women were Caucasian. About 15% of men and 23% of women received a high school education or less. Household income varied, with approximately 54% making more than $80,000; 21% reporting household income ranging from $40,000-$80,000, and 26% of couples making less than $40,000. All of the couples were married and 87% had children. Finally, men and women in the current sample both reported marital adjustment in the satisfied range on the Dyadic Adjustment Scale (DAS; Spanier, 1976), although there is a large range in marital satisfaction (Male DAS: *M* = 114, *SD* = 15.5; Female DAS: *M* = 110, *SD* = 19.9).

Measures

Kristal Food Habits Questionnaire (Kristal, Shattuck, & Henry, 1990). The Kristal Food Habits Questionnaire is a 20-item self-report measure with questions about the type and amount of food patients consumed in the previous month. Dimensions of dietary behavior measured include excluding high-fat ingredients, modifying high-fat foods, substituting manufactured low-fat foods for high-fat foods, and replacing high-fat foods with low-fat alternatives such as fruits and vegetables. Convergent validity with percent of calories from fat in the original measurement study was high (*r* = .68; Kristal, Shattuck, & Henry, 1990). The current study uses change in the total score from pre to post as one approximation of the dietary behaviors of male participants.

Average calories per day. As part of pre and post assessments, participants recounted the food they had eaten in the previous two weeks to a dietician. The dietitian then calculated the average number of calories consumed per day. The current study used

patients' amount of change in calories from pre to post as one approximation of behavior changes in diet by male patients. Percent change in calories from recall interviews is a common measure of diet in the fields of nutrition assessment and cardiovascular disease, with higher caloric intake seen as a risk factor for cardiovascular disease and its effects (e.g., Arnett, et al., 2002; Wright, et al., 2004).

Average calories from fat per day. As part of pre and post assessments, participants recounted the food they had eaten in the previous two weeks to a dietician. The dietitian then calculated the average percent of calories from fat consumed per day. The current study uses patients' amount of change in percent of calories from fat from pre to post as one approximation of behavior changes in diet. Percent change in calories from fat from recall interviews is a common measure of diet in the fields of nutrition assessment and cardiovascular disease, with higher caloric intake from fat seen as a risk factor for cardiovascular disease and its effects (e.g., Arnett, et al., 2002; Wright, et al., 2004).

Average calories from saturated fat per day. As part of pre and post assessments, participants recounted the food they had eaten in the previous two weeks to a dietician. The dietitian then calculated the average percent of calories from saturated fat consumed per day. The current study used patients' amount of change in percent of calories from saturated fat from pre to post as one approximation of behavior changes in diet. Percent change in calories from saturated fat from recall interviews is a common measure of diet in the fields of nutrition assessment and cardiovascular disease, with higher caloric intake from saturated fat seen as a risk factor for cardiovascular disease and its effects (e.g., Wright, et al., 2004).

Weight. Change in weight (in pounds) from pre to post is used in the current study as one approximation of dietary behavior.

Body Mass Index. Calculated from a formula incorporating height and weight, the Body Mass Index is considered a reliable indicator of body fatness for most people (Centers for Disease Control and Prevention, n.d.). Body Mass Index correlates highly with laboratory measures of body fat, including body density, body water, and body potassium (Garrow & Webster, 1985). The current study will use change in the Body Mass Index from pre to post as one approximation of diet.

National Institutes of Health Fruit and Vegetable Screener (Thompson et al., in press). The National Institutes of Health Fruit and Vegetable Screener is a 10-item self-report measure of the amount and type of fruits and vegetables consumed in the previous month. Validity and reliability information is not available for this in press article, but the National Institutes of Health Behavior Change Consortium (n.d.) recommends it as a measure of nutrition in studies of behavior change. Change in the total score is used in the current study as one approximation of healthy eating behaviors.

Social Support Behavior Code-Revised (SSBC; Cutrona, 1996; Cutrona & Suhr, 1992, 1994; Suhr, 1990). Interactions between the couples were assessed using a revised version of the Social Support Behavior Code (SSBC; Cutrona, 1996; Cutrona & Suhr, 1992, 1994; Suhr, 1990). The measure, which was designed for interactions in which one partner discusses a personal problem with the other partner, was chosen because couples in this study discussed men's concerns or problems related to their CHD during the coded interactions. The SSBC is a microanalytic coding system in which all of the providers' verbal behaviors are assigned one of the SSBC categories. Supportive behaviors are divided into categories of: (a) informational support (giving suggestions and advice or helping the partner reappraise a situation); (b) tangible aid (offering to help with tasks to reduce stress on the partner,

participating in activities with the other person, and showing willingness and complying with requests to help); (c) emotional support (being physically affectionate, being sympathetic, expressing empathy for the partner, and reassuring or expressing concern for the other); and (d) and esteem support (giving compliments, offering validation for the partner's feelings, and relieving the partner of blame). The revised system combined (a) emotional and esteem support into one broad category of expressive support and (b) informational support and tangible aid into one broad category of instrumental support, as suggested by the social support literature. These overall categories generate two support scores. The amount of each type of response was calculated by dividing the frequency of each type of behaviors by the total number of verbal behaviors displayed by the provider during the interaction. Because behaviors may include categories such as negative behaviors, inquiries, humor, meta behaviors, and unclear responses that were not tested in the current study, the ratios for each of the two targeted categories will not sum to 1. Reliability for the original SSBC has been demonstrated with intraclass correlations ranging from .73 to .94 for the four support scales and a mean intraclass correlation of .85 (Suhr, Cutrona, Krebs, & Jensen, 2004). These correlations indicate a high degree of reliability for the subscales of the SSBC. The measure also proved to have sufficient validity, with all the support SSBC codes (except for those in the Tangible Aid category) correlating with marital quality.

For the current study, the investigator created codes addressing the context in which each type of behavior occurred; these codes were added to the SSBC for the current study in order to look at different aspects of social support. In previous studies with the SSBC, it was unclear to what extent the context of each type of behavior was considered when labeling it as support. For example, the original SSBC did not consider the ways in which the support

provider's quality and tone of delivering the behavior might change the nature of the action. The original coding system did not provide any instructions for how to evaluate a behavior given the support recipients' actions and the course of the conversation. The current study views the original SSBC support categories as descriptions of behavioral responses without any value judgments.

While categorizing a given behavior, coders also rated the quality (defined by responsiveness, helpfulness, and appropriateness), the amount of nonverbal negative affect, and the amount of nonverbal positive affect with which each behavior was delivered. Quality referred to the overall impression of the supportiveness of the behavior. For example, support providers might have given advice following recipients' concerns about weight loss by saying, "Some people have suggested that setting small goals can help make the task less overwhelming," or by saying, "You need to control yourself and get rid of the junk food!" Although the original SSBC might code both behaviors as suggestion/advice under instrumental support, the first statement appears to be potentially more helpful to the recipient than the second statement and, thus, would have received a higher quality score in the revised SSBC. In making quality ratings, 1 signified the lowest quality, 3 was the average or expected quality, and 5 was the highest quality.

In addition to being responsive or helpful, the impact of social support may have been determined by the ways in which those verbal behaviors were delivered. Positive and negative affect referred to how the provider performed the behavior by examining the accompanying nonverbal behaviors of tone of voice, body language, and facial expression. The same words may be considered more or less supportive based on the amount of positive and negative affect accompanying them. Negative and positive affect were considered on

separate scales because the absence or presence of one type of affect did not automatically dictate the absence or presence of the other type of affect. Examples of negative affect included turning away from the recipient, crossed arms, scowling, aggression, and frustrated tone of voice. Examples of positive affect included smiling and nodding; open, connected body posture; and a caring tone of voice. In making ratings of affect on a 1 to 5 Likert scale by attending to tone of voice, body language, and facial expression, 1 indicated no negative or positive affect, 3 indicated some negative or positive affect, and 5 indicated high levels of negative or positive affect. All three context ratings were made based on the conversation up to the point that included the behavior that was being coded and, thus, did not consider the recipients' reactions to the behavior. For example, it was possible for something to be of high quality but not perceived as helpful by the recipient in the moment. Coders were trained as cultural informants, rating the quality and affect based on knowledge of norms for such behaviors occurring in particular contexts. Development and revisions of these context codes were based on theory as well as training with a previous group of undergraduate coders. The creation of the revised coding system involved writing a new coding manual based on theory and evidence about good social support from the literature and then coding with a group of undergraduates for a year to pilot and revise the manual (please contact the author for a current version of the manual combining elements of the SSBC and the revisions for this study).

Procedure

Recruitment and intervention. Typically, cardiologists and cardiology nurses described the study to their patients and asked for permission for study personnel to contact them, although some participants responded primarily to newspaper and other media

advertisements. Patients and partners expressing interest on follow-up phone calls were consented at an appointment with a study nurse. Eligible couples were randomized to one of two intervention groups. Both groups consisted of 10 participants (or 5 couples) and one therapist. Groups met for 18 sessions over a period of 24 weeks, with the last six sessions alternating weeks. Interventions for each group included:

Individuals group (18 sessions): generally focused on providing education for cardiac risk

(a) Twelve sessions contained brief didactic presentations on nutrition, exercise, medication adherence, and general cardiac rehabilitation.

(b) Six sessions contained brief didactic presentations on maintenance and relapse prevention.

(c) All 18 sessions contained group discussions about personalizing information from didactic topics in a supportive context, with the therapist acting as a resource person

(d) All 18 sessions contained homework assignments and review, with problem-solving if necessary

Couples group (18 sessions): generally focused on couples communication and behavioral change from both partners

a) Twelve sessions contained brief didactic presentations on nutrition, exercise, medication adherence, and general cardiac rehabilitation, plus motivation and communication skills training.
b) Six sessions contained brief didactic presentations on maintenance and relapse prevention.
c) All 18 sessions contained "break-out sessions," in which partners discussed the weekly topics or practiced skills within each couple. The therapist served as a

resource for the discussion, offering assistance with content or process areas as needed.

d) All 18 sessions contained homework assignments and review of the previous week's homework with problem-solving pertaining to the homework if necessary.

Data collection. At the initial appointment with a study nurse, couples completed baseline videotaped interaction tasks and were asked to complete and mail self-report questionnaires separately. Interaction tasks included a problem-solving discussion about an area related to heart disease and a social support task in which patients shared an area of concern related to heart disease. Self-report questionnaires completed by patients included measures on diet and exercise habits and motivation, dietary supplements, optimism, depression, general health, and marital adjustment. Self-report questionnaires completed by partners included measures on optimism, depression, general health, and marital adjustment. Six months later, or one to two weeks following the completion of treatment, couples were mailed the self-report questionnaires and asked to bring completed questionnaires to a follow-up appointment, at which point they repeated the videotaped interaction tasks. Couples also completed self-report questionnaires 12 months and 18 months after baseline, but they did not provide any more videotaped interaction tasks. Nutritional information was obtained by three, random, dietary recalls at every measurement point. The three recalls were averaged to obtain one set of nutritional information per measurement time. The Nutrition Data System for Research (NDS-R) software (versions 4.0-4.6) was used to analyze 24-hour dietary recalls (University of Minnesota, 2003). The recalls were obtained by a registered dietitian trained in the use of the system. Study personnel called couples to remind them about completing the questionnaires and to inquire about missing data. If couples did

not complete an assessment after a month of attempted contacts, study personnel discussed whether to treat the data as missing at that time period and count it as part of the next time period.

Social support coding. Three undergraduate advanced psychology students (2 female and 1 male) were trained as coders using the revised SSBC manual for the interactions. Coders were blind to the study hypotheses, treatment condition, and assessment period. Coders were trained over the course of a semester using sample interactions of couples from the Partners for Life study who were excluded in the current analyses due to missing data. They met three times weekly with the primary investigator to learn the coding system and also practiced coding tapes individually. Once the coders demonstrated acceptable levels of inter-rater reliability during training (see Table 3), they coded the tapes of the couples in the study individually. Interrater reliability was assessed using the Rater Agreement Index (RAI; Burry-Stock, Shaw, Laurie, & Chissom, 1996). The RAI measures the degree to which coders agree on their ratings in reference to the possible range of ratings. The index ranges from 0 to 1, with 1 indicating perfect agreement. The basic formula for calculating the RAI is: $RAI = 1 - (|R_1-R_2| / (I-1))$. [$R_1$=coder A's rating, R_2=coder B's rating, I=the range of the scale (in this case, I=5)].

Twenty-five percent of the tapes were randomly selected throughout for reliability checks and correction of coder drift, if needed. Coders watched each interaction five times. They first watched the interaction uninterrupted in order to receive an overall impression of the support provision. They then recorded talk turns, noting the time at which each speaking turn occurred. The next viewing concentrated on rating the content of the interactions, adding the times at which each behavior occurred if there were multiple behaviors per talk

turn. In the fourth viewing, coders rated the context codes for each behavior already recorded. Finally, coders watched the interaction again uninterrupted, following their codes and making any necessary corrections. Coders noted any places in which they could not decide upon a final code even after referring to coding rules and the manual. Coders met twice weekly as a group with the primary investigator to ensure continued understanding of the system and to discuss any issues related to confusing interaction behaviors. Disagreements about content ratings were resolved through group consensus. If context ratings differed by one point, the average score of the two coders was used. If context scores differed by more than one point, group consensus resolved differences. Reliability for the revised SSBC is presented in Table 3.

CHAPTER 3

RESULTS

Preliminary analyses

Exploration of the data revealed one or two outliers on almost every measure at both pre and post treatment. Because the cases serving as outliers varied with each measure, the outliers's scores were adjusted to two standard deviations above and below the mean for each measure pre and post treatment and retained as part of the sample in order to avoid further reduction of the sample size (Barnett & Lewis, 1995).[1] Measures of skewness and kurtosis, histograms, and normality plots and tests showed pre and post measures of negative and positive affect for instrumental and expressive support to be negatively skewed and non-normally distributed even after correcting for outliers. Body Mass Index and the total score of the NIH Fruit and Vegetable Screener at pre and post treatment also violated assumptions of normality, linearity, and heteroscedasticity. Because violation of these assumptions affects factor scores and regression weights most egregiously when occurring in dependent variables, BMI and the Fruit and Vegetable Screener were not included as diet outcome measures. Negative and positive affect, which also violated assumptions of normality, linearity, and heteroscedasticity, were not included in the support measures tested in mediation. Although negative and positive affect may have predicted diet outcomes without undue concern about violating regression assumptions, their skewed distributions likely

[1]See Table 4 for values of the outliers of each variable before and after windsorizing them.

would have affected regression results when they served as dependent variables being predicted by treatment condition.[2] Means and standard deviations for predictor and outcome variables after windsorizing the outliers are presented in Table 5.

The content and context codes for instrumental and expressive support were scored in two ways: (b) means/frequencies and (b) average scores weighted by amount of time engaging in each behavior or each context rating. Zero-order correlations between these two scoring strategies were conducted to clarify whether these scoring approaches provided highly similar information. Results in Table 6 show large correlations between these two different ways of calculating support, with content scores (ratio of behavior to all other behaviors in the interaction) correlated at r = .6 to .8 and context scores (quality, negative affect, and positive affect) correlated above r = .9 for both instrumental and expressive support. Therefore, the following analyses used the simpler measures of support as means and frequencies rather than employing the highly related but more complicated measures of support as a function of amount of time engaging in each behavior or quality rating. Further exploration of the relations among different types of support in the revised SSBC will be presented later in this section.

Zero-order correlations among the five remaining diet outcome measures (total calories, percent of calories from fat, percent of calories from saturated fat, Kristal Food Habits Questionnaire, and weight) are presented in Table 7. Only percent of calories from fat and percent of calories from saturated fat were significantly correlated with each other. Therefore, percent of calories from fat and saturated were considered together as outcomes in

[2]Log transformations were performed on instrumental and expressive negative and positive affect, the Fruit and Vegetable Screener, and BMI. Their distributions and linearity were not greatly improved by this procedure. Therefore, no analyses were performed with transformed variables.

multivariate analyses in order to reduce the overall number of analyses and prevent spurious results with calories from fat and calories from saturated fat. Total calories, the Kristal Food Habits Questionnaire, and weight were analyzed separately as outcomes in univariate analyses. Due to the small sample size, corrections to *p*-values for multiple tests were not performed. Implications of the small sample size and number of analyses are presented in the Discussion.

Change scores for support and diet measures were calculated as the standardized residuals from regressing post scores on pre scores of each measure. Change scores were calculated with pre and post variables corrected for outliers and were used in tests of mediation. Table 8 presents the mean change scores and effect sizes (calculated using Cohen's *d*; Cohen, 1988) for predictor and outcome variables.

Test of mediation hypotheses

Although Structural Equation Modeling (SEM) with latent factors of support and diet originally was the preferred method of testing for mediation, the small sample size, general lack of underlying structure to the diet measures as seen in their zero-order correlations, and inconsistent relationships between support content and context are not suited to an SEM procedure. Therefore, hypotheses were tested using multiple regression analyses as outlined by Baron and Kenny's (1991) stepped approach to examining mediation (See Figure 1 for the mediation model). The four assumptions of multiple regression analyses were met when using the frequency and mean quality of instrumental and expressive support as measures of support, and when using total calories, percent of calories from fat, percent of calories from saturated fat, Kristal Food Habits Questionnaire, and weight as measures of diet. Because men and women's data were used separately without an attempt to link partners' data, the

assumption of independence of observations was met. Examinations of further assumptions in the change scores revealed that the normality of residuals, heteroscedasticity of residuals, and linearity between the predictors and outcome variables were adequately met.

Step 1: Treatment predicts outcome. In order to demonstrate mediation, there must be a relationship between the predictor variable, or treatment, and the outcome variable, or diet. Separate univariate regression analyses were performed with treatment as a categorical independent variable and total calories, Kristal Food Habits Questionnaire, and weight as continuous dependent variables, and a multivariate regression was performed with percent of calories from fat and percent of calories from saturated fat regressed on treatment. Treatment did not predict changes in any diet measures (see Tables 9a-9d).

Step 2: Treatment predicts mediator. Although mediation was not possible because the first condition set by Baron and Kenny (1991) was not established, the additional legs of the model were analyzed in order to understand the relationships among treatment, changes in support, and changes in diet. The second step examined whether support changes differently across treatment condition. Treatment condition served as the independent variable and changes in instrumental frequency, instrumental mean quality, expressive frequency, and expressive mean quality served as the dependent variables in four separate univariate regressions. Treatment condition did not predict changes in any of the support variables (See Table 10a-10d).

Step 3: Mediator predicts outcome. The first two steps of the model failed to find any treatment effects for support or diet. However, it is possible that changes in support predicted changes in diet without the influence of treatment. The third step examined eight regressions (6 univariate and 2 multivariate) using instrumental support as a predictor and

eight regressions (6 univariate and 2 multivariate) using expressive support as a predictor. The Kristal Food Habits Questionnaire, total calories, and weight were dependent variables in the univariate analyses, and percent of calories from fat and percent of calories from saturated fat were the two dependent variables in the multivariate analyses. Neither changes in instrumental frequency nor instrumental quality, nor changes in expressive frequency nor expressive quality predicted changes in total calories, weight, Kristal Food Habits Questionnaire, percent of calories from fat, or percent of calories from saturated fat (See Table 11a-11p).

Step 4: Treatment effects on outcome disappear when including the mediator. Because neither treatment nor support predicted diet outcome, this step could not be preformed.

Overall results demonstrated that the mediational model was not supported. Treatment did not predict either changes in support or changes in diet, and changes in support did not predict changes in diet. One possible explanation for the failure to support the mediational model was the apparent lack of change in support from pre to post treatment. An examination of the means in instrumental and expressive support showed little movement from pretest to posttest. Effect sizes (calculated using Cohen's *d*; Cohen, 1988) looking at change in support from pre to post by treatment type were primarily small, with a few medium and large effects, ranging from $d = .001$ to .84 (see Table 8). Similarly, effect sizes of change in diet measures from pre to post treatment were typically small, with a few large effects, from $d = .01$ to .76. Mediation models are used to assist in explaining change in variables over time, which is not possible when there are no consistent treatment effects.

Test of Moderation Hypotheses

Although social support did not serve as a mediator of treatment effects in diet change, it still may influence the effects of treatment on outcome as a moderator. Given that social support did not change much over time, it is possible that support was a stable individual characteristic of certain partners. Patients married to partners who generally provided more or less support may have responded differently to couple or individual treatments for diet change. For example, patients whose partners did not provide good social support may have benefited more from the couple treatment because the structured, guided support provided by their partners in treatment may have buffered the ill effects of less support at home. Conversely, patients whose partners provided good support overall may have received the benefits of their partners' help at home regardless of whether they are in the individual or couple treatment. (Similar findings in treatments aimed at preventing marital distress find that premarital programs lead to better communication outcomes in couples with lower pre-treatment marital adjustment, whereas couples with higher levels of pre-treatment marital adjustment show fewer changes following the premarital program (Schilling, Baucom, Burnett, Allen & Ragland, 2003)). Such a finding also might explain the failure of treatment to predict change in diet in the current study. Perhaps such effects only appear when considering social support as a moderator of treatment. The following posthoc analyses used regression models to see whether partner support served as a moderator of response to treatment. In these analyses, the main effects and interactions of treatment and support (as measured at pre-test) served as predictors of change in diet.

When the overall models significantly predicted changes in diet, semipartial correlations were used to examine the unique effects of each variable. Variables with both main and interaction effects were interpreted only in terms of interaction effects. When

interaction effects existed, the direction of the relationship was explored according to guidelines suggested by Aiken and West (1991). These guidelines include centering support variables, dummy coding treatment condition, and plotting simple regression equations. Significant unique effects were not probed or discussed if the overall regression models were not significant. Unlike the mediation analyses, positive and negative affect were included as predictors along with other measures of support because regression models are more robust to violations in normality in independent than dependent variables.

Instrumental support as a moderator of treatment effects. The first set of post hoc moderator analyses examined a model that includes treatment condition, instrumental frequency, instrumental mean quality, instrumental mean negative affect, instrumental positive affect, and the interactions between treatment condition and each instrumental support variable as predictors. Three univariate regression analyses with total calories, weight, and Kristal Food Habits Questionnaire as outcome variables and one multivariate regression analysis with percent of calories from fat and percent of calories from saturated fat were conducted.

None of the univariate regression models using instrumental support as independent variables significantly predicted changes in diet: Kristal Food Habits Questionnaire measure ($F = 1.187$, $p = .34$); total calories ($F = .844$, $p = .58$); and changes in weight ($F = 1.409$, $p = .23$). Tables 12-14 present standardized beta weights and the unique effects of each term using semipartial correlations.

The multivariate regression model with percent of calories from fat and percent of calories from saturated fat as dependent variables demonstrated significant joint effects of several variables on changes in percent of calories from fat and percent of calories from

saturated fat, including instrumental negative affect (*Wilks' Lambda* = .803, $F = 3.442$, $p < .05$), instrumental positive affect (*Wilks' Lambda* = .658, $F = 6.059$, $p < .01$), and the interaction between treatment and instrumental positive affect (*Wilks' Lambda* = .797, $F = 3.574$, $p < .05$). See Table 15 for complete results of the multivariate regression. When referring to changes in percent of calories from fat and changes in percent of calories from saturated fat, the direction of mean change indicated that percent of calories from fat and saturated fat *increased* overall from pre to post treatment. Therefore, findings are discussed in terms of the extent to which independent variables predicted *increases* in percent of calories from fat and saturated fat, even though the initial expectation was that percent of calories consumed from fat and saturated fat would decrease with treatment. Univariate analyses demonstrated that the overall model for predicting changes (i.e., increases) in percent of calories from fat was significant ($F = 2.793$, $p < .05$), and the overall model predicting changes (i.e., increases) in percent of calories from saturated fat was marginally significant (F=2.198, p=.052).

Exploring moderator effects for instrumental support predicting changes in percent of calories from fat: Equation 1 presents the unstandardized beta weights for each regression term and the constant in the univariate regression analysis predicting changes in percent of calories from fat; Table 16 presents standardized beta weights and the unique effects of each term using semipartial correlations.

Change in percent of calories from fat = .079 - .427 treatment - .412 frequency - .371 quality + .521 negative affect + .829 positive affect +.685 frequency*treatment + .088 quality*treatment - .670 negative affect*treatment -.999 positive affect*treatment

(Eq. 1)

The main effect of instrumental negative affect ($p < .05$) suggests that patients with partners who showed higher levels of negative affect prior to treatment also demonstrated greater increases in percent of calories from fat. The direction of the interaction between instrumental positive affect and treatment condition suggests that, in the individual treatment condition, patients with partners who demonstrated more positive affect while providing instrumental support showed greater *increases* in percent of calories consumed from fat pre to post treatment (see Figure 2). In the couple treatment condition, increases in positive affect while giving instrumental support did not relate to increases in patients' percent of calories consumed from fat pre to post treatment.

Exploring moderator results for instrumental support predicting changes in percent of calories from saturated fat: Equation 2 presents the unstandardized beta weights for each regression term and the constant in the univariate regression analysis predicting changes in percent of calories from saturated fat. Table 17 presents standardized beta weights and the unique effects of each term using semipartial correlations.

Change in percent of calories from saturated fat = .244 - .664 treatment - .133 frequency - .334 quality + .134 negative affect + .771 positive affect + .256 frequency*treatment + .039 quality*treatment - .098 negative affect *treatment - .835 positive affect*treatment (Eq. 2)

The main effect for instrumental negative affect was not interpreted because it did not occur in the multivariate regression. Results indicated an interaction between instrumental positive affect and treatment condition, with more positive affect shown by partners during instrumental support predicting *greater* increases in percent of calories from saturated fat for patients in the individual treatment condition, and no relationship between increases in

positive affect and increases in percent of calories from saturated fat in the couples condition (See Figure 3).

Expressive support as a moderator of treatment effects. The second set of post hoc moderator analyses examined a model that includes treatment condition, expressive frequency, expressive mean quality, expressive mean negative affect, expressive positive affect, and the interactions between treatment condition and each expressive support variable as predictors. Three univariate regression analyses with change in total calories, weight, and Kristal Food Habits Questionnaire as outcome variables and one multivariate regression analysis with changes in percent of calories from fat and percent of calories from saturated fat were run.

None of the univariate regression models significantly predicted changes in diet: Kristal Food Habits Questionnaire ($F = 1.667$, $p = .15$); total calories ($F = .770$, $p = .64$); and changes in weight ($F = .583$, $p = .80$). Tables 18-20 present standardized beta weights and the unique effects of each term using semipartial correlations.

The multivariate regression model demonstrated significant joint effects of several variables on changes in percent of calories from fat and percent of calories from saturated fat, including frequency of expressive behaviors (*Wilks' Lambda* = .703, $F = 5.279$, $p < .05$), expressive positive affect (*Wilks' Lambda* = .625, $F = 7.488$, $p < .01$), treatment condition (*Wilks' Lambda* = .738, $F = 4.439$, $p < .05$), the interaction between treatment condition and frequency of expressive behaviors (*Wilks' Lambda* = .777, $F = 3.591$, $p < .05$), and the interaction between treatment condition and expressive positive affect (*Wilks' Lambda* = .766, $F = 3.808$, $p < .05$). See Table 21 for complete results of the multivariate regression. As noted previously, when referring to changes in fat and changes in saturated fat, the

direction of mean change indicated that percent of calories from fat and saturated fat *increased* from pre to post treatment. Therefore, findings are discussed in terms of the extent to which independent variables predicted *increases* in percent calories from fat and saturated fat, even though the initial expectation was that percent of calories consumed from fat and saturated fat would decrease with treatment.

Exploring moderator effects of expressive support predicting changes in percent of calories from fat: Univariate analyses demonstrated that the overall model for predicting changes (i.e., increases) in percent of calories from fat was significant ($F = 2.548$, $p < .05$) and the overall model predicting changes (i.e., increases) in percent of calories from saturated fat was not significant ($F = 1.646$, $p = .15$). Equation 3 presents the unstandardized beta weights for each regression term and the constant in the univariate regression analysis predicting changes in percent of calories from fat, and Table 22 presents standardized beta weights and the unique effects of each term using semipartial correlations.

Change in percent of calories from fat = -.905 - .783 treatment – 7.902 frequency + .035 quality - .387 negative affect + 2.391 positive affect + 1.265 frequency*treatment - .065 quality*treatment + .226 negative affect*treatment – 1.049 positive affect*treatment (Eq. 3)

The direction of the interaction between ratio of expressive behaviors and treatment condition as plotted suggests that, in the individual treatment condition, patients of partners who demonstrated more expressive support relative to other behaviors showed *lower* increases in percent of calories consumed from fat pre to post treatment (see Figure 4). In the couple treatment condition, increases in the ratio of expressive support behaviors relative to other behaviors did not relate to increases in patients' percent of calories consumed from fat

pre to post treatment. The direction of the interaction between expressive positive affect and treatment condition as plotted demonstrated that patients in the individual treatment condition whose partners gave higher levels of positive affect while providing expressive behaviors showed *greater* increases in percent of calories from fat from pre to post-treatment (See Figure 5). In the couple treatment condition, levels of expressive positive affect by the partner did not relate to changes in the percent of calories from fat consumed by patients. Table 23 presents standardized beta weights and the unique effects of each term using semipartial correlations for the univariate regression analysis predicting changes in percent of calories from saturated fat from treatment condition and expressive support.

Summary of moderator analyses. Overall results suggest that social support served as a moderator of the effects of treatment on diet outcome for changes in percent of calories from fat and saturated fat, but not for changes in the Kristal Food Habits Questionnaire, total calories, or weight. The only main effect that can be interpreted found that greater levels of negative affect by partners while providing instrumental support related to greater increases in the percent of calories from fat consumed by patients. All the moderator effects showed an influence of social support on diet outcomes only in the individual treatment condition. Unexpectedly, for both instrumental and expressive support, having partners who gave higher levels of positive affect during support interactions was associated with greater increases in the percent of calories from fat consumed after receiving the individual treatment. The finding also held with instrumental positive affect predicting changes in percent of calories from saturated fat. An additional moderator effect found that receiving greater amounts of expressive behavior relative to other behaviors during support interactions was associated with a lower increase in percent of calories from fat.

Exploration of the Revised Social Support Coding System

A secondary aim of this project was to improve upon existing behavioral coding systems of social support in couples. Context ratings were added to the frequency counts of different types of support used in Cutrona's SSBC, proposing that coding systems should consider the way in which support is delivered as well as the type of support given. In order to evaluate the usefulness of adding separate context codes to the content codes found in previous coding systems, zero-order correlations among the support codes and between the support codes and relationship adjustment were examined. The support variables represented behaviors performed by female partners at pre-test interactions and marital adjustment referred to male patients' scores on the DAS at pre-test. Support codes focused on instrumental and expressive support but also considered their relationships to other types of support found less often in this sample (e.g., negative behaviors, inquiries, humor behaviors, and meta behaviors).

Social support content codes and marital adjustment. Previous research on social support has found modest positive correlations between supportive behaviors and relationship adjustment (Cutrona, 1996) and modest negative correlations between negative behaviors demonstrated during support interactions and relationship adjustment (Pasch & Bradbury, 1998). Therefore, we would expect the frequency of supportive behaviors to be related to higher DAS scores, with all content codes, except for negative behaviors, showing a positive association with relationship adjustment. Results partially supported this hypothesis, with expressive frequency showing a modest positive association and unclear behaviors showing a negative association to relationship adjustment (See Table x for correlations between DAS and support codes). However, instrumental support, negative

behaviors, inquiries, humor behaviors, and meta behaviors were not significantly associated with relationship adjustment. Overall, results suggested that partners' frequency of engaging in various support behaviors more or less than other behaviors did not relate to patients' relationship adjustment.

Social support context codes and marital adjustment. Although previous coding systems have not separated ratings of support frequency from support quality, it was hypothesized that higher quality of support also would be associated with greater relationship adjustment. This finding should hold even with negative behaviors because it is possible to deliver negative behaviors in a helpful way (e.g., constructive criticism).
As seen in Table 24, results partially supported this hypothesis, with higher instrumental and expressive mean quality ratings associated with higher levels of relationship adjustment. Mean quality when performing negative, inquiry, humor, or meta behaviors was not associated with relationship adjustment.

Previous coding systems also have not looked explicitly at the affect present when delivering supportive behaviors, but most coding systems looking at couple communication more broadly have found positive and negative affect during interaction tasks to be a significant predictor of relationship adjustment (see Kerig & Baucom, 2004, for examples). Specifically, positive affect tends to relate to higher levels of relationship satisfaction, and negative affect tends to relate to lower levels of relationship satisfaction (see Kerig & Baucom, 2004, for examples). Results from the current investigation did not support previous findings for positive affect, as greater positive affect during all support behaviors did not relate to relationship adjustment (See Table 24 for correlations between DAS and support codes). Results generally supported previous findings regarding negative affect and

marital adjustment, with greater levels of negative affect performed during instrumental support, negative behaviors, and inquiries predicting lower levels of relationship adjustment (See Table 24).

Overall, associations between the content and context of support behaviors and relationship adjustment are somewhat consistent with previous findings in the literature. Adding quality and negative affect ratings appeared to add unique information about the relationship between social support and relationship adjustment, with instrumental quality, instrumental negative affect, negative behavior negative affect, and inquiry negative affect showing significant relationships to relationship adjustment despite no apparent relationships between the frequency of these behaviors and relationship adjustment. Expressive support seemed to work somewhat differently than other types of behaviors, as both higher frequency and higher quality were associated with higher levels of relationship adjustment. Exploring the relationship between the content and context ratings within and across different supportive behaviors (e.g., instrumental, expressive, negative, inquiry, humor and meta types of support) may elucidate this finding.

Interrelationships among social support content and context codes. In order to understand the expanded SSBC coding system, the following sections will examine the patterns of correlations among support codes in two different ways. First, in order to understand the broad categories of support such as instrumental and expressive behaviors, the pattern of correlations among the seven support categories (e.g., instrumental, expressive, negative, inquiry, humor, meta, and unclear behaviors) were explored. Second, relationships among the content and three context ratings (e.g., quality, negative affect, and positive affect) both within and across the seven categories of support were examined. Although the one

content and three context codes represented unique constructs, it is likely that they were related in modest ways.

Correlations between the content of instrumental and expressive supportive behaviors and other support codes: As seen in Table 24, examining the relationships among the relative frequencies of each of the seven categories of support yields little new information, as the use of a ratio to measure relative frequency of support content codes ensured that exhibiting greater frequencies of one category of support (e.g., instrumental support) would result in displaying lower frequencies of other support categories (e.g., expressive, inquiry, negative behaviors, meta or humor). A similar finding existed with expressive support and all other types of behaviors. However, correlations between the content codes of instrumental and expressive support and the context codes of all the support behaviors revealed an unexpected pattern of results. Partners who demonstrated higher frequencies of instrumental support behaviors relative to other categories of support scored *lower* on multiple ratings of quality and *higher* on ratings of negative affect while performing instrumental behaviors. There was no relationship between the frequency of instrumental behaviors and ratings of instrumental negative affect. Conversely, partners who demonstrated higher frequencies of expressive support behaviors relative to other behaviors scored *higher* on multiple ratings of quality, *lower* on multiple ratings of negative affect, and *higher* on multiple ratings of positive affect. This pattern of results suggested that giving more advice and opinions relative to exhibiting other supportive behaviors was associated with lower quality support and higher levels of negative affect. On the other hand, it appeared that people who gave more validation, compliments, and empathy during support

interactions also performed a number of behaviors with higher quality, more positive affect, and less negative affect.

Correlations between the quality of instrumental and expressive supportive behaviors and other support codes: As seen in Table 24, performing instrumental or expressive behaviors with higher quality tended to relate to performing other types of behaviors (e.g., negative behaviors, inquiries, humors, and metas) with higher quality. In addition, higher mean levels of instrumental quality were associated with *more* instrumental and expressive positive affect, *lower* levels of instrumental negative affect, a *higher* frequency of expressive behaviors relative to other behaviors during the interaction, and *fewer* negative behaviors relative to other behaviors during the interaction. Similarly, higher expressive quality related to *more* expressive positive affect, *lower* instrumental negative affect, a *greater* relative frequency of expressive and humor behaviors, and *fewer* negative and instrumental behaviors. Overall, results suggested that people who provided instrumental and expressive support behaviors with high quality also performed other types of behaviors with high quality and greater levels of positive affect. In addition, higher mean levels of quality were associated with fewer negative behaviors, less instrumental negative affect, and, in the case of expressive quality, fewer instrumental behaviors.

Correlations between the negative and positive affect of instrumental and expressive supportive behaviors and other support codes: Table 24 shows a pattern of results whereby positive affect and quality were positively correlated, whereas negative affect was negatively correlated with both positive affect and quality. Partners with higher ratings of positive affect during instrumental and expressive support behaviors also scored *higher* on ratings of quality and positive affect and *lower* on ratings of negative affect across multiple support

behaviors. People who demonstrated higher mean levels of negative affect while performing instrumental or expressive behaviors tended to display *lower* levels of quality and positive affect and *higher* levels of negative affect across multiple support behaviors. Generally, results suggested that the type of affect given by partners was consistent across support behaviors. Positive and negative affect overall appeared to be inversely related. The pattern of results generally pointed to a positive relationship between positive affect and quality ratings and a negative relationship between negative affect and quality ratings.

Positive and negative affect also showed interesting relationships to the frequency of different types of support behaviors (see Table 24). People who showed more positive affect during instrumental and expressive behaviors tended to give *more* expressive behaviors relative to other types of behaviors during the interaction, whereas people who showed more negative affect during instrumental and expressive behaviors tended to provide a *lower* relative frequency of expressive behaviors. Greater levels of positive affect during instrumental and expressive behaviors also related to *fewer* negative and instrumental behaviors, whereas greater levels of negative affect related to a *greater* number of negative instrumental behaviors relative to other support behaviors in the interaction. Overall, people who performed support with higher quality and more positive affect tended to give more expressive and less negative and instrumental behaviors relative to other support behaviors during an interaction. Conversely, partners who displayed more negative affect tended to give fewer expressive and more negative and instrumental behaviors relative to other behaviors during the interaction.

Summary of correlations between content and context codes: The overall pattern of results suggested that people tended to be consistent in their levels of quality, negative affect,

and positive affect across different types of support behaviors. For example, partners who gave higher quality expressive support also performed instrumental, negative, inquiry, meta, and humor behaviors with higher quality. When examining the relationships among the context codes, the expected inverse relationship between positive and negative affect was found. Interestingly, results showed that partners who provided higher quality support also tended to give more positive and less negative affect. Notable findings also emerged when examining the relationship between the content code measuring the relative occurrence of certain types of behaviors (such as instrumental and expressive) and the context codes describing how various behaviors were performed. Whereas people who gave more expressive support relative to other behaviors also tended to give higher quality support with more positive and less negative affect, people who gave more instrumental support relative to other behaviors showed somewhat lower quality and positive affect in some of the analyses.

CHAPTER 4

DISCUSSION

Mediational Model

Results did not support the mediational model with social support as a mechanism of change for diet outcomes following a couples-based treatment for heart disease. None of Baron and Kenny's (1986) conditions of mediation were met (see Figure 1). Patients in the couple-based treatment group did not show greater change on measures of diet than patients in the individual-based group from pre to post intervention (leg a). Although analyses may have ended at this point because there is no treatment effect to mediate, the other steps of the model were examined in order to understand the relationships among treatment, social support, and diet outcome. However, treatment group also did not predict changes in social support pre to post treatment (leg b). Finally, changes in social support did not relate to changes in diet outcomes (leg c).

The failure to find any support for the mediational model may be attributed to the lack of change in the variables of interest. Of five diet measures (i.e., Kristal Food Habits Questionnaire, weight, calories, calories from fat, and calories from saturated fat), none showed significant change from pre to post when examined by treatment group. Similarly, the mean levels of the four support measures (i.e., instrumental and expressive frequency and quality) were virtually identical at pre and post treatment. Because all a priori hypotheses

focused on learning about the intervention's mechanism of change, the lack of movement on any variables from pre to post treatment renders a mediational model inappropriate.

Multiple explanations may account for the treatment's failure to affect social support. As noted previously, Partners for Life did not directly target social support in its couples-based interventions. Although many aspects of the program appeared to address social support processes indirectly, it may be necessary to discuss changes in social support more overtly. Even explicit social support interventions have failed to alter social support over the course of treatment (Calfas, Sallas, Oldenburg & Ffrench, 1997; McBride, Baucom, Peterson, Pollak, Palmer, Westman, & Lyna, 2004), making it less likely to find positive results in a more subtle treatment. For example, Wierenga (1994) did not find that a group-based intervention for behavior change following coronary artery disease changed perceived social support in patients from pre to post intervention. Perhaps researchers have not pinpointed either the correct information or the manner in which to intervene on social support processes between romantic partners. Conversely, interventions may alter social support over time, but six months was not enough time between assessments to see significant change. For example, a treatment outcome study comparing two types of couples therapy found no differences at post-test but significant differences in marital adjustment between groups at four-year follow-up (Snyder, Wills, & Grady-Fletcher, 1991). Assessing social support at additional time periods may have found such a lag effect. (Another possibility is that individuals vary in their preferences for social support to such an extent that a uniform treatment is not effective for many participants, with improvements by some participants canceling declines by others and leading to stable mean levels of social support). Finally, social support experts have debated the theoretical nature of support, with some

describing support from a behavioral perspective and others looking at level and type of social support as a personality trait. The latter group argues that social support is a stable, intrapersonal characteristic that changes little over time (Neely, Lakey, & Cohen, 2006).

Multiple explanations also exist for the lack of significant change in diet outcomes due to treatment condition. The sample in the current study was limited to those couples with male patients who completed pre and post videotaped interactions, approximately half the couples originally enrolled in the Partners for Life project. Couples who were excluded due to missing data included men who were overall less educated, more likely to smoke, and less likely to be Caucasian than those included in analyses. However, it is unlikely these demographic differences affected changes in the dependent variable because there did not appear to be significant differences between included and excluded participants on diet variables. The sample may have affected diet results by including participants who typically had been coping with heart disease for at least a year. Perhaps people make the most dietary change early in their diagnosis, with the primary difficulty being the maintenance of change. Rather than further improving patients' diets, the intervention may have served to prevent declines in healthy eating. Perhaps the apparent lack of change is a positive outcome indicating that treatment was a buffer against relapse into unhealthy diet. For example, Black, Gleser, and Kooyers (1990) found in a meta-analysis of weight-loss programs that most participants had a pattern of weight loss followed by weight gain rather than a steady decline in weight. Cella, Hahn, and Dineen (2002) further noted that among participants with chronic illness, quality of affect tended to worsen over time so that even small improvements from an intervention were clinically significant. In somewhat different couple-based interventions—relationship education for couples preparing for marriage—the

results are similar. Relationship education does not appear to increase marital adjustment but rather slows or halts the decline in relationship functioning that is typical during the early years of marriage (e.g., Stanley, Amato, Johnson, & Markman, 2006).

Treatment outcome literature often finds that change following an intervention may become apparent after accounting for moderator variables. For example, a study examining the effects of a premarital program for the prevention of relationship distress found that men with higher pre-treatment levels of depression and lower pre-treatment levels of marital satisfaction benefited more from the acquisition of positive communication skills than men without these risk factors (Schilling, et al., 2003). Similarly, the interventions in the current study may have had an effect on diet outcomes in a subset of patients that is only apparent when examining moderators.

Moderation model

Considering both the stable nature of social support in this study and the possibility of a moderator effect in the relationship between treatment and diet outcome, the current study conducted a series of post hoc analyses using pre-treatment levels of social support as a proposed moderator. Previous couple-based interventions have found that both interpersonal (e.g., relationship adjustment) and individual (e.g., neuroticism, socioeconomic status) characteristics can affect participants' response to treatment (see Gurman and Jacobson, 2002 for examples). Social support may be viewed as either a personality characteristic of the person giving support or a relationship variable born out of interpersonal dynamics. Also arguing for the use of social support as a moderator of treatments' effects on diet outcomes is the large body of research linking social support to health behaviors. Many studies have found correlations suggesting that greater social support is associated with healthier

behaviors (e.g., DiMatteo, 2004; Finnegan & Suler, 1985). Perhaps patients with partners who give more and/or better social support respond differently to interventions for healthy diets than those patients whose partners show lower levels of social support. Thus a series of analyses examined a moderation model in which instrumental and expressive social support were investigeated in interaction with treatment to predict diet outcomes.

Results provided limited support for a model of social support as a moderator of treatment's effects on diet outcome. Among the five possible diet outcomes (Kristal Food Habits Questionnaire, weight, calories, percent of calories from fat, and percent of calories from saturated fat), only changes in calories from fat and changes in calories from saturated fat were predicted from treatment condition and pretreatment levels of social support. Unexpectedly, the direction of change indicated that over the course of treatment, patients overall *increased* the percent of calories consumed from fat and saturated fat. As noted previously, one possible explanation for this worsening in diet outcomes is that people have difficulty maintaining healthy behaviors over time. In particular, patients with heart disease may have concentrated initially on eating fewer foods with fat and saturated fat because of the well-established relationship between fat and the development of heart disease (e.g., Ginsberg, 1995; Gorman, 2001; National Heart, Lung and Blood Institute, n.d.). Perhaps when they enrolled in the study, patients were motivated to change that part of the diet most salient to heart disease. However, over time, avoidance of foods high in fat or saturated fat may have become more difficult to maintain. Interestingly, social support only predicted increases in the percent of calories from fat and from saturated fat when examining interactions between social support and treatment condition. Plotting of interaction effects revealed that social support predicted increases in percent of calories from fat and saturated

fat in the individual treatment condition, while patients enrolled in the couple-based treatment showed no change in their percent of calories from fat and saturated fat as a function of social support.

The effects of social support and treatment condition on changes in the percent of calories from fat and saturated fat varied based on the content and context of social support. When partners provided lower levels of expressive support relative to other support behaviors at pre-test, patients in the individual treatment condition showed greater increases in the percent of calories in their diets from fat from pre to post treatment. However, the interaction between treatment condition and instrumental support did not predict changes in percent of calories from fat and saturated fat, suggesting that the presence of expressive support in particular is helpful in preventing unhealthy dietary change. Such a discrepancy in the impact of instrumental and expressive support is echoed in previous research that noted people tend to prefer receiving expressive support from their romantic partners over instrumental support (Cutrona & Suhr, 1994; Reynolds & Perrin, 2004). Often people making behavior changes are defensive and reactive to their partners' advice, opinions, and practical assistance (Coyne & DeLongis, 1986; Franks et al., 2006). On the other hand, most people seem to find behaviors from their partners such as empathy and compliments to be helpful in coping with individual problems (Carels & Baucom, 1999; Cutrona & Suhr, 1994; Franks et al., 2006). Perhaps men find it difficult to avoid tempting foods high in fat when their female partners are not validating their struggles, particularly when female partners are not attending treatment sessions where they might listen to the patients' concerns. In a couple-based group, the effects of low levels of expressive support outside of treatment might be neutralized by the partners' attendance of weekly group sessions in which they are

hearing about the hard work required to maintain a healthy diet. Although partners in the couple-based group do not increase their levels of expressive support during the social support observational task, their presence in treatment may serve as enough of a validation for their partners' efforts at maintaining a healthy diet and therefore eliminates the effects of expressive support on the percent of calories consumed from fat.

In a counterintuitive finding, patients in the individual treatment condition whose partners were more positive when providing instrumental and expressive support *increased* their intake of calories from fat and saturated fat more compared to partners who were less positive. Rather than reflecting particular types of behaviors as seen in expressive support, positive affect described the emotional tone with which partners delivered instrumental and expressive support. People were rated based on body language, tone of voice, physical touch, and eye contact regardless of the content of their support behaviors. Although such a result may appear to be contradictory to the previously discussed finding with expressive support, positive affect has been found to be detrimental in prior treatment outcome studies as well. Other investigators who have found that observational ratings of warmth led to detrimental outcomes have suggested that people trying to make difficult behavior change need more of a "tough love" approach. For example, Keefe, et al. (1996) found that increases in marital adjustment following a treatment outcome study for osteoarthritis were related to worse pain and coping outcomes for patients in the individual and control condition whereas patients in the couple treatment condition improved in pain-related self-efficacy. Perhaps partners with higher marital satisfaction did not challenge patients enough in individual treatment condition because they were "too nice" or did not want to cause distress in their relationships.

In the current study, male patients may have responded only to the emotional tone of the support rather than noting the content of advice or empathy. That is, they may have interpreted warmth as acceptance of their dietary behaviors regardless of their healthfulness, so that a relapse into a greater consumption of fat or saturated fat would not be challenged by their partners. However, such an assumption may have been challenged in the couple-based group, when female partners shared in the information about a proper diet. Although women in the couple-based group did not change on levels of positive affect, any adverse impact of warmth may have been balanced by their participation in the group treatment. Perhaps men felt more accountable to their female partners because of the weekly group discussions. Additionally, women may have responded to the structure of the group and displayed more than positive affect under the guidance of a therapist, although in the support observational task their support did not change.

Negative affect behaved similarly to results of past research, with a main effect for the relationship between negativity and diet outcome. More specifically, partners displaying more negative affect when delivering instrumental support resulted in patients showing greater increases in percent of calories from fat regardless of treatment condition. Advice, opinions, and practical assistance from partners may not be helpful if partners are negative in the way that they give it. Pasch, Bradbury, and Sullivan (1997) found that neuroticism (high levels of negative affect) in female support providers decreased the quality of their support to husbands during an observational task. In past treatment studies, having relatives who are more hostile when providing criticism or advice tended to be associated with higher rates of relapse among patients with mental disorders (e.g., Chambless & Steketee, 1999). In essence, a body of research on couples and families demonstrates the salience of negative

emotions and behavior in an interpersonal context, such that negative affect tends to override other variables in research on romantic relationships whereas positive affect may be salient only under certain conditions (e.g. Notarius, Benson & Sloane, 1989).

The context rating of quality did not have an impact on diet outcomes, even when considering treatment condition. Psychological explanations as well as considerations of the methodology of the current study may account for this failure to find a relationship between behavior change and how well partners deliver support. Perhaps when evaluating the helpfulness of social support from their partners, men pay closer attention to the behavioral content or emotional tone than the tact and skill with which the support is presented. Another possibility is that quality's ineffectiveness is limited to the area of health behavior change. Other researchers have noted difficulty in defining the types of support that may be considered helpful when trying to change difficult health habits. For example, a questionnaire measuring social support for smoking cessation defined good, or "positive support", and bad, or "negative support" from romantic partners (Roski, Schmid, & Lando, 1996). However, at least one study found that smokers considered both "positive" and "negative" support from their partners to be unhelpful in trying to quit smoking (Pollak & Mullens, 1997), suggesting that more descriptive research is needed to understand how to define good quality support for health behavior change. On the other hand, quality as defined in this study may be a helpful aid in other areas of individual difficulty. Manne et al. (2004) found that women who received higher quality support from male partners had lower cancer-related distress. Perhaps the skill with which partners deliver social support is an important variable in situations with more emotional than task-oriented demands. More

descriptive research would be helpful in teasing apart the components of social support in romantic relationships that have the strongest impact on different types of problems.

Methodological considerations

Revised SSBC. In order to assess social support in dyadic interactions, the current study revised the existing observational coding system, Social Support Behavior Code. By using different ratings for quality, negative affect, positive affect, and the type of behavior, the revised SSBC attempted to improve upon existing coding systems that either ignored the context within which support is delivered (i.e., Cutrona, 1996) or combine the context with the type of support to produce a single rating (i.e., Dehle, 1999; Pasch & Bradbury, 1998). The former approach assumes that particular types of behaviors are always supportive regardless of the context in which it is communicated. The failure to account for different styles of communicating the same behavior may explain inconsistent findings in the literature about the perceived helpfulness of different support behaviors. For example, instrumental support, or advice-giving and practical assistance, may be helpful when presented with tact, timing, and warmth or may be unhelpful when presented with negative affect or at unwanted times.

While this content-driven approach fails to provide enough information to judge the helpfulness of support, the second approach errs in being overly inclusive in its ratings of support. By failing to distinguish the specific components of support, a single rating combining content and context makes it impossible to pinpoint how social support is helpful or unhelpful. For example, high ratings of expressive support might indicate that the provider gave empathy, showed physical affection or positive affect, or responded appropriately to the behavior of their partners as a skilled communicator. Adding separate

context ratings to the purely categorical codes found in the original SSBC was intended to delineate the aspects of social support most altered by treatment and most influential in changing outcomes. Although the current study was unable to demonstrate that context and content ratings operated differently due to treatment effects or when predicting outcome, it is possible the revised SSBC may be a useful measurement with other samples or research questions. Therefore, the current study explored relationships between the coding system and marital adjustment, as well as relationships among the revised content and context ratings.

Marital adjustment as measured by male patients' DAS scores pre-treatment validated two of the three context ratings at pre-treatment. As expected, higher quality ratings were correlated with higher DAS scores, regardless of the type of behavior coded. Due to the cross-sectional nature of the results, these significant relationships may indicate that male patients whose female partners delivered all types of support with a higher quality were more satisfied in their relationships, or that female support providers whose male partners were more satisfied performed social support behaviors with higher quality. Ratings of negative affect also performed in ways consistent with past research, as greater negative affect was generally related to lower marital adjustment. Male patients may be less satisfied when their female partners show higher levels of negative affect while delivering social support behaviors, or women in a relationship with less happy men may deliver social support with greater negativity. Positive affect was not associated with marital adjustment. Research in romantic relationships tends to have more difficulty detecting associations between positive affect and relationship adjustment than negative affect and relationship adjustment, particularly when correlating measures across partners. Partners may expect their significant

others to demonstrate positive affect toward them, so that the presence of negative affect is more salient to their judgments about their relationships than positive affect (e.g., Weiss & Heyman, 1990). The overall pattern of findings suggests that context codes relate to marital adjustment in expected ways, with a greater ability of female partners to deliver support with good communication skills being related to higher relationship satisfaction in male partners and more negativity by women when delivering support being associated with lower male satisfaction.

Content codes (i.e., frequency of instrumental, expressive, negative, inquiry, humor, meta and unclear behaviors) generally did not relate to marital adjustment, with the exception of expressive support. Male patients whose female partners provided a higher frequency of expressive support relative to other support behaviors reported greater marital adjustment. The frequency of other types of support behaviors (e.g., instrumental, negative, inquiry, humor and meta) by female partners did not relate to male relationship adjustment. The lack of association between a categorical measure of support and marital adjustment is consistent with the rationale for adding context codes to the SSBC. Given the extensive literature documenting that expressive and instrumental support, at least, are related to greater marital adjustment, the current findings suggest that social support consists of more than the content of behaviors. Rating behaviors as supportive without regard to the context in which those behaviors were delivered likely produced heterogeneous support codes, with behaviors within each support category varying in the degree to which they were helpful or unhelpful. Expressive support's unique association with marital adjustment is consistent with both theory and results of previous studies. The definition of expressive support in this coding system as the provision of empathy and compliments may incorporate both content and

context. Although it was presumed that expressive support could be done with poor quality, by definition validation is a good communication skill often taught to couples in therapy. Perhaps even when delivered with poor tact or without being requested by partners, expressive support behaviors are so helpful and positive that they override the context in which they are provided. Indeed, past research has suggested that while instrumental support is not always associated with perceived helpfulness and marital adjustment, expressive support typically shows a positive association with outcomes (Carels & Baucom, 1999; Cutrona & Suhr, 1994). Overall, female social support behaviors defined without consideration of context did not relate to males' relationship adjustment, except for expressive support.

Although the current study attempted to code the three context and one content code separately, they all referred to different components of social support and therefore were related in meaningful ways. Given the high number of support codes and correlations, results will be discussed as general patterns even though they were not uniformly significant. The simplest way to understand the overall patterns may be to consider different possible groups of support givers. In the first group, female partners who gave a higher frequency of expressive support during the pretreatment interaction also tended to deliver higher quality support with greater positive affect and less negative affect. Perhaps these partners may be considered skilled support providers, reflecting the success of expressive support in predicting positive outcomes in the literature as well as the association between these aspects of support and marital adjustment in the current study. In a second group, female partners who gave a greater amount of instrumental support during the pretreatment interaction tended to deliver lower quality support with more negative affect. Positive affect was not

significantly related to higher levels of instrumental support. Although this group may have attempted to be supportive, they may not have good skills at delivering social support given their lower context ratings. The last group represents female partners who gave higher levels of negative support, which was associated with lower quality, higher negative affect, and lower positive affect. Perhaps people in this group were engaged more in conflict than social support. These tentative groups were formed based on a combination of correlation results and theoretical considerations. However, given the limitations of data analysis in the current study, the presence of distinct categories of support providers should be replicated with larger samples and statistical techniques geared to isolating groups or clusters of people.

The revised SSBC appeared to provide useful information about the context of social support beyond what is available in existing coding systems. However, future researchers may wish to make additional revisions to make the coding system more efficient in data collection and analysis. Using the rationale that the SSBC could describe any behavior shown during an interaction, the current project approached coding as inclusive and microanalytic. Assigning codes to every thought unit expressed by the support provider, however, was time consuming in both the training and coding phases of the project. Analyzing data based on the amount of time spent in each code, which was the primary benefit of the microanalytic approach, did not add information over and above an examination of frequency counts and mean ratings. Unless researchers wish to use a sequential lag analysis approach in which they examine the order in which support was performed, it is possible that a more global approach can be taken to coding. Perhaps rating social support once every minute or at the end of the interaction would be sufficient. In addition, researchers may wish to judge only those behaviors considered to be supportive.

Expressive support as defined by this coding system appeared to reflect primarily helpful behaviors whereas instrumental support was a more heterogeneous category. As noted, instrumental support may operate differently than expressive support regardless of how it is defined or this difference may be an artifact of the coding system. An additional consideration for revisiting the content codes is that a number of the behaviors placed in support categories (i.e., inquiries, opinions, or other off-hand comments) appeared to be more neutral in the opinion of the coders in this study and less consistent with the literature's definition of social support. These behaviors occurred less frequently in this coding system and were not included in the analyses due to their infrequent use. Future coders may wish to model their categories on Pasch and Bradbury's (1998) coding system, in which there are categories for instrumental support, expressive support, general negative behaviors, and general positive behaviors. However, we continue to recommend adding context codes to these categorical ratings in order to demonstrate the weight given to different components of social support. Results showing consistency across context ratings suggests a way of simplifying this coding task. Since people who demonstrated high quality in one behavior also demonstrated high quality in other behaviors (which held for negative and positive affect), it is recommended that one rating each of quality, negative affect, and positive affect be applied to all support behaviors performed each minute or in the overall interaction.

Generalizability. Characteristics of the sample serve as a limitation of the current study. The small number of female patients in the overall treatment outcome study limited the subsample in this study to male patients with female partners, restricting generalizability to female support providers and male recipients. Social support processes may operate differently in men and women, both as providers and recipients. For example, some research

suggests that support from romantic partners is more important in outcomes for men than women, who receive social support from a wider variety of sources (Antonucci & Akiyama, 1987; Pasch & Bradbury, 1998). On the other hand, researchers also argue that women are more relationally oriented than men and, therefore, benefit more from positive marital interactions such as social support from men (Cross & Madson, 1997b; Kiecolt-Glaser & Newton, 2001), suggesting that female patients may have shown a greater response to couple-based interventions than the current sample consisting only of male patients.

In addition to excluding female patients from the study, 18 couples were excluded due to incomplete data. Those couples who completed all assessments were more affluent, better educated, more likely to have children and be in their first marriage, and less ethnically diverse than those couples with missing data. In addition, male patients who were included in the current study weighed more and were more likely to have a history of alcohol use than those excluded. However, those male patients who were not included in the current analyses were more likely to be smokers and have a history of medical conditions than those men included in the current sample. Such differences suggest that the subsample included in the current study may not be representative of couples willing to enroll in a treatment study for heart disease, limiting the generalizability of the current findings to couples with specific demographic characteristics. On the other hand, examination of available support and diet data for both groups did not yield any significant differences between those included and those excluded on the variables of interest. Therefore, including couples with a broader range of demographic characteristics might not have changed the current findings in meaningful ways.

Measurement issues. Sample size may have attenuated the effects of treatment and social support. The small sample of 39 couples narrowed the choice of data analytic strategies that may have been more sensitive to changes. However, given the similarity in mean levels of social support and diet at pre and post treatment, it is unlikely that more power would have detected significant effects. A larger sample likely would have changed the findings only if additional participants had different characteristics than those included here.

Skewed distributions and other violations of regression assumptions limited the use of some social support and diet variables. However, the mean levels in the social support variables (negative and positive affect) were similar at pre and post, suggesting that they would not have yielded significant results in the mediation analyses any more than other support measures. The moderation analyses appeared to be more robust to violations of regression assumptions, with positive and negative affect showing some ability to predict diet outcomes. The skewed distributions primarily suggest that future studies should consider that negative and positive affect during social support interactions for heart disease have a floor effect. For example, the possible range of negative and positive affect in the current study was 1 to 5, with 1 reflecting the absence of negative or positive affect and 5 indicating high amounts of affect. The range of means in these variables was 1.18 to 1.75, suggesting that support providers on average did not show much affect during interactions. Although two diet measures (Fruit and Vegetable Screener and BMI) were not used as dependent variables because their distributions violated regression assumptions, the other five measures of diet likely were sufficient substitutes for the present analyses. The Kristal Food Habits Questionnaire included a subsection on fruit and vegetable intake and BMI is partly of

function of weight. Given that neither mediation nor moderation models using the Kristal Food Habits Questionnaire and weight as dependent variables were significant, it is unlikely that the exclusion of the Fruit and Vegetable Screener and BMI impacted the results.

Conclusion and future directions

The current study improves upon existing literature on social support and health behavior change in several ways. First, the study specifies a priori the components of the couple-based treatment expected to influence both social support and diet outcome. Whether proposing self-efficacy, motivation, or social support as the theoretical basis of change in health behaviors, future treatment outcome studies should specify the treatments that target these domains prior to implementing the interventions. Second, the current project directly tests social support as a mechanism of dietary change in a couple-based intervention. If treatment outcome studies in the health psychology domain probe potential causes of changes in health behaviors, replication and generalizability of successful treatments will likely be optimized. Third, the application of observational coding methods to social support in the health behavior domain represents a departure from the field's sole reliance on self-report measures. Furthermore, refinement of an existing coding system suggests areas for improvement in the measure of social support in couples. For example, coding negative and positive affect in the interaction separately from the presence or absence of particular support behaviors appears to add information about the relationships among treatment condition, social support, and health behaviors.

Consistent with previous literature, health behavior interventions failed to change partner social support over time (e.g., McBride et al., 2004; Wierenga, 1993). Given the apparent difficulty of altering social support with existing treatments, future researchers may

wish to examine ways to target treatments to couples with existing patterns of social support in order to maximize social support's value in promoting and maintaining health behavior change.

Table 1

Demographic Characteristics of the Male Participants in the Current and Excluded Samples

Characteristic	Current sample (39) %	(*N*)	Excluded sample (18) %	(*N*)
Ethnicity				
White, Non-Hispanic	71.8	(28)	55.6	(10)
Black	12.8	(5)	27.8	(5)
Hispanic	10.3	(4)	5.6	(1)
Asian/Pacific	5.1	(2)	11.1	(2)
Education				
Less than 8th grade	0.0	(0)	5.6	(1)
Some high school or tech school	2.6	(1)	5.6	(1)
High school/GED	12.8	(5)	33.3	(6)
Some college	28.2	(11)	33.3	(6)
College graduate	28.2	(11)	0.0	(0)
Graduate school	28.2	(11)	22.2	(4)
Salary				
< $19,999	7.7	(3)	11.1	(2)
$20,000 – $39,999	17.9	(7)	22.2	(4)
$40,000 – $59,999	12.8	(5)	27.8	(5)
$60,000 – $79,999	7.7	(3)	11.1	(2)
> $80,000	53.8	(21)	22.2	(4)
Missing[a]	0.0	(0)	5.6	(1)

Children		
None	12.8 (5)	22.2 (4)
1 or more	87.2 (34)	77.8 (14)

Note. [a]1 man in the excluded sample had missing data for salary.

Table 2

Demographic Characteristics of the Female Participants in the Current and Excluded Samples

Characteristic	Current sample (39) % (*N*)	Excluded sample (18) % (*N*)
Ethnicity		
White, Non-Hispanic	74.4 (29)	55.6 (10)
Black	12.8 (5)	27.8 (5)
Hispanic	7.7 (3)	5.6 (1)
Asian/Pacific	5.1 (2)	11.1 (2)
Education		
Less than 8th grade	2.6 (1)	0.0 (0)
Some high school or tech school	2.6 (1)	5.6 (1)
High school/GED	17.9 (7)	27.8 (5)
Some college	30.8 (12)	22.2 (4)
College graduate	72.2 (13)	11.1 (2)
Graduate school	12.8 (5)	33.3 (6)
Salary		
< $19,999	10.3 (4)	5.6 (1)
$20,000 – $39,999	15.4 (6)	22.2 (4)
$40,000 – $59,999	10.3 (4)	44.4 (8)
$60,000 – $79,999	10.3 (4)	0.0 (0)
> $80,000	48.7 (19)	0.0 (0)

Missing[a]	10.3 (3)	11.1 (2)
Children—check		
None	18.6 (6)[b]	6.7 (1)
1 or more	81.4 (35)	93.3 (14)

Note. [a]3 women in the current sample and 2 women in the excluded sample had missing data for salary. [b]2 women in the current sample had missing data for children.

Table 3

Mean Reliability of Undergraduate Coders on Ratings of the SSBC Content and Context Codes during Training and with the Current Sample

	Behavior		Quality	Negative affect	Positive affect
Coders	*k*	*%*	*IAI*	*IAI*	*IAI*
			Training		
A & B	.44	73	.84	.85	.83
B & C	.45	73	.86	.92	.93
A & C	.67	82	.82	.89	.81
			Current sample		
A & B	.64	75	.85	.92	.91
B & C	.72	85	.87	.92	.87
A & C	.85	90	.88	.92	.86

Note. *k* = kappa. *%* = percent agreement. *IAI* = Interrater Agreement Index. Coder A was male and coders B and C were female.

Kappa statistics include disagreements about the segmenting of thought units into different behaviors and the coding of behaviors during the support recipient's turn at speaking. Therefore, agreement between coders for instrumental and expressive support is higher than appears from these kappas.

Table 4

Original scores and corrections in support and diet measures for cases with outliers or missing data

		Pre-test		Post-test	
Case	Treatment	Original	Corrected	Original	Corrected
		Instrumental frequency			
3	couple	.12	.16	.36	N/A
19	couple	.53	N/A	.08	.09
34	couple	.78	.66	.45	N/A
37	couple	.57	N/A	.74	.73
		Instrumental quality			
13	individual	2.88	N/A	3.92	3.78
31	couple	2.00	2.03	1.05	1.87
		Instrumental negative affect			
3	couple	1.50	N/A	2.50	2.37
9	couple	1.69	N/A	2.40	2.37
19	couple	1.70	N/A	3.0	2.37
31	couple	2.47	2.12	2.26	N/A
37	couple	2.29	2.12	1.38	N/A
		Instrumental positive affect			

16	individual	2.67	2.42	1.17	N/A
21	individual	2.25	N/A	2.43	2.12
29	individual	2.50	2.42	1.38	N/A
			Expressive frequency		
15	individual	.57	.56	.29	N/A
16	individual	.39	N/A	.72	.50
18	individual	.61	.56	.38	N/A
21	individual	.31	N/A	.52	.50
			Expressive quality		
30	individual	3.00	N/A	2.00	2.30
34	couple	2.00	2.25	4.00	3.66
			Expressive negative affect		
3	couple	_[a]	_	2.00	1.82
9	couple	1.13	N/A	2.24	1.82
19	couple	2.50	2.03	1.75	N/A
			Expressive positive affect		
18	individual	2.53	2.47	2.21	N/A
			Kristal Food Habits Questionnaire		
3	couple	3.19	3.07	2.87	N/A

16	individual	1.53	N/A	1.33	1.48
			Total Calories		
16	individual	1378.83	N/A	missing	1814.87
24	individual	missing	1860.77	2691.98	N/A
26	individual	missing	1860.77	1925.03	N/A
31	individual	655.29	691.69	737.62	829.19
37	couple	1041.00	N/A	missing	1814.87
39	couple	3080.16	3029.85	2618.28	N/A
			Weight		
15	individual	missing	225.80	231.00	N/A
21	individual	368.00	323.80	348.00	321.71
26	individual	349.00	323.80	348.00	321.71
27	couple	missing	225.80	220.00	N/A
31	individual	353.00	323.80	343.00	321.71
			Percent of calories from fat		
9	couple	44.83	43.42	41.07	N/A
16	individual	22.64	N/A	missing	31.22
17	individual	13.68	14.34	18.52	N/A
18	individual	39.24	N/A	49.96	48.14

24	individual	missing	24.88	36.14	N/A
26	individual	missing	24.88	40.82	N/A
37	couple	23.89	N/A	missing	31.22
		Percent of calories from saturated fat			
10	couple	14.91	N/A	18.69	17.34
16	individual	4.66	N/A	missing	9.86
24	individual	missing	8.78	14.93	N/A
26	individual	missing	8.78	13.35	N/A
29	individual	10.87	N/A	19.70	17.34
37	couple	7.30	N/A	missing	9.86
39	couple	16.59	14.90	14.83	N/A

Note. Original indicates the score prior to adjustment. Corrected indicates that the score was an outlier and therefore changed to be 2 standard deviations above or below the mean or was missing and therefore changed to the mean for that time period. Corrected scores were then entered in the database and used in all subsequent analyses. N/A indicates that the original score was not changed at that time period because it was not an outlier or was not missing.

[a]Couple 3 did not perform any expressive behaviors at pre-test so there is no score for expressive negative affect at pre-test.

Table 5

Descriptive Statistics for the Social Support Behavior Code (SSBC) and Diet Measures for the Couples Treatment Condition and Individual Treatment Condition at Pre and Post-test

	Couples Treatment (21)[a]				Individual Treatment (18)[a]			
	Pre-test		Post-test		Pre-test		Post-test	
Measure	*M*	*SD*	*M*	*SD*	*M*	*SD*	*M*	*SD*
Instrumental support								
Frequency	.44	.12	.40	.18	.37	.11	.42	.14
Quality	2.90	.40	2.86	.40	3.00	.52	2.83	.42
Negative affect	1.48	.25	1.51	.45	1.39	.35	1.42	.30
Positive affect	1.47	.33	1.48	.24	1.64	.49	1.48	.35
Expressive support								
Frequency	.21	.14	.23	.09	.27	.17	.24	.14
Quality	3.03	.39	2.96	.22	3.09	.38	3.00	.38
Negative affect	1.23	.34	1.26	.29	1.35	.31	1.18	.18
Positive Affect	1.54	.39	1.56	.31	1.64	.49	1.75	.38
Diet measures								
Kristal Food Habits	2.35	.42	2.29	.33	2.16	.35	2.07	.32
Total calories	1946	634	1878	492	1688	459	1801	480
Weight	215	32.75	212	36.34	234	50.61	231	52.61
Percent calories from fat	29.06	6.82	30.43	7.17	28.01	7.09	32.85	9.06
Percent calories from saturated fat	9.20	2.94	9.73	3.34	7.89	2.69	10.28	3.63

Note. Frequency is the ratio of each type of behavior relative to all behaviors performed during the interaction and its possible range is 0 to 1. Quality, negative affect, and positive affect are mean ratings of context codes during the interaction, with a possible range of 1 to 5.

[a]One couple in the individual treatment condition and two couples in the couple treatment condition did not display any expressive support in their pre-test interactions, and one couple at post-test had no expressive support. Their data are reflected in the frequency statistics only.

Table 6

Intercorrelations between SSBC Variables as Measured by Means or Frequencies and by Amount of Time Spent Performing Each Behavior or Rating at Pre-test

Subscale	1	2	3	4	5	6	7	8
				Instrumental support				
1. Behavior, frequency	_	-.21	.35*	-.28	.68**	-.19	.37*	-.25
2. Quality, mean		_	-.45**	.50**	-.03	.89**	-.36*	.49**
3. Negative affect, mean			_	-.48**	.23	-.42**	.87**	-.49**
4. Positive affect, mean				_	-.24	.64**	-.49**	.94**
5. Behavior, time					_	-.09	.29	-.20
6. Quality, time						_	-.38*	.63**
7. Negative affect, time							_	-.57**
8. Positive affect, time								_
				Expressive support				
1. Behavior, frequency	_	.46**	-.43**	.58**	.80**	.51**	-.35*	.58**
2. Quality, mean		_	-.33*	.45**	.51**	.88**	-.19	.42*
3. Negative affect, mean			_	-.39*	-.21	-.33*	.90**	-.43**
4. Positive affect, mean				_	.49**	.46**	-.34*	.91**
5. Behavior, time					_	.51**	-.17	.45**
6. Quality, time						_	-.24	.51**
7. Negative affect, time							_	-.43**
8. Positive affect, time								_

Note. * $p < .05$. ** $p < .01$.

Table 7

Intercorrelations Between Diet (Outcome) Measures using Change Scores

Subscale	1	2	3	4	5
1. Kristal Food Habits	_	.06	-.06	-.17	-.21
2. Total calories		_	.01	.28	.35*
3. Weight			_	-.04	.10
4. Percent calories from fat				_	.68**
5. Percent calories from saturated fat					_

Note. Intercorrelations between the change scores of diet measures are presented because change scores were used in all analyses with diet as an outcome. Intercorrelations between pre-test scores of diet measures follow the same pattern as above.

*$p < .05$. **$p < .01$.

Table 8

Mean Residualized Change Scores and Effect Sizes for the Social Support Behavior Code (SSBC) and Diet Measures for the Couples Treatment Condition and Individual Treatment Condition

	Couples Treatment (21)			Individual Treatment (18)		
Measure	*M*	*SD*	*d*	*M*	*SD*	*d*
			Instrumental support			
Frequency	-.05	1.10	.38	.06	.86	.84
Quality	.07	1.01	.15	-.09	.98	.25
Negative affect[a]	.08	1.14	.08	-.09	.79	.17
Positive affect[a]	.06	.84	.08	-.07	1.16	.26
			Expressive support[b]			
Frequency	.05	.85	.001	-.06	1.15	.25
Quality	-.05	.73	.80	.06	1.25	.24
Negative affect[a]	.11	1.12	.09	-.14	.82	.67
Positive affect[a]	-.17	.81	.06	.20	1.15	.25
			Diet measures			
Kristal Food Habits	.22	1.04	.17	-.26	.88	.29
Total calories	-.11	1.03	.12	.13	.94	.24
Weight	.02	.89	.07	-.02	1.11	.07
Percent calories from fat	-.23	.78	.19	.27	1.15	.61
Percent calories from saturated fat	-.34	.81	.16	.40	1.04	.76

Note. [a]Due to violation of regression assumptions in the pre and post data for negative and positive affect, mediation analyses did not look use the change scores for these variables. The descriptive statistics for the change scores are included for the reader's interest only.

[b]2 couples in the individual condition and 2 couples in the couples condition did not perform expressive support at either pre or post. Their data are included in the frequency change scores only.

Table 9a

Step 1 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β
Constant	-.26	.23	
Treatment condition[a]	.49	.31	.25

Note. R^2 = .06. *Adjusted* R^2 = .04.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 9b

Step 1 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in Total Calories

Variable	*B*	*SE B*	β
Constant	.13	.23	
Treatment condition[a]	-.24	.32	-.12

Note. R^2 = .02. *Adjusted* R^2 = -.01.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 9c

Step 1 of Mediation Model: Summary of Multivariate Regression Analysis for Treatment Condition Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.001	.02	.99
Wilks' Lambda	1.00	.02	.99
Hotelling's Trace	.001	.02	.99
Roy's Largest Root	.001	.02	.99
		Treatment condition[a]	
Pillai's Trace	.14	2.98	.06
Wilks' Lambda	.86	2.98	.06
Hotelling's Trace	.17	2.98	.06
Roy's Largest Root	.17	2.98	.06

Note. [a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 9d

Step 1 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in Weight

Variable	*B*	*SE B*	β
Constant	-.02	.24	
Treatment condition[a]	.04	.32	.02

Note. R^2 = .00. *Adjusted* R^2 = -.03.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 10a

Step 2 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in Frequency of Instrumental Support Behaviors

Variable	*B*	*SE B*	β
Constant	.06	.24	
Treatment condition[a]	-.12	.32	-.06

Note. R^2 = .003. *Adjusted* R^2 = -.02.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 10b

Step 2 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in Quality of Instrumental Support Behaviors

Variable	*B*	*SE B*	β
Constant	-.09	.24	
Treatment condition[a]	.16	.32	.08

Note. R^2 = .01. *Adjusted* R^2 = -.02.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 10c

Step 2 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in Frequency of Expressive Support Behaviors

Variable	*B*	*SE B*	β
Constant	-.06	.24	
Treatment condition[a]	.12	.32	.06

Note. R^2 = .004. *Adjusted* R^2 = -.02.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 10d

Step 2 of Mediation Model: Summary of Simultaneous Regression Analysis for Treatment Condition Predicting Change in Quality of Expressive Support Behaviors

Variable	*B*	*SE B*	β
Constant	.06	.24	
Treatment condition[a]	-.12	.34	-.06

Note. R^2 = .004. *Adjusted* R^2 = -.03.

[a]Treatment condition is coded as 0 = individual treatment and 1 = couples treatment.

Table 11a

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Frequency of Instrumental Support Behaviors Predicting Change in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Frequency	-.16	.16	-.16

Note. R^2 = .02. *Adjusted* R^2 = -.002.

Table 11b

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Frequency of Instrumental Support Behaviors Predicting Change in Total Calories

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Frequency	.19	.16	.19

Note. $R^2 = .04$. *Adjusted* $R^2 = .01$.

Table 11c

Step 3 of Mediation Model: Summary of Multivariate Regression Analysis for Change in Frequency of Instrumental Support Behaviors Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.00	.00	1.00
Wilks' Lambda	1.00	.00	1.00
Hotelling's Trace	.00	.00	1.00
Roy's Largest Root	.00	.00	1.00
		Frequency	
Pillai's Trace	.01	.18	.84
Wilks' Lambda	.99	.18	.84
Hotelling's Trace	.01	.18	.84
Roy's Largest Root	.01	.18	.84

Table 11d

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Frequency of Instrumental Support Behaviors Predicting Change in Weight

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Frequency	.26	.16	.26

Note. $R^2 = .07$. *Adjusted* $R^2 = .04$.

Table 11e

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Quality of Instrumental Support Behaviors Predicting Change in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Quality	.26	.16	.26

Note. $R^2 = .07$. *Adjusted* $R^2 = .04$.

Table 11f

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Quality of Instrumental Support Behaviors Predicting Change in Total Calories

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Quality	-.08	.16	-.08

Note. R^2 = .01. *Adjusted* R^2 = -.02.

Table 11g

Step 3 of Mediation Model: Summary of Multivariate Regression Analysis for Change in Quality of Instrumental Support Behaviors Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.00	.00	1.00
Wilks' Lambda	1.00	.00	1.00
Hotelling's Trace	.00	.00	1.00
Roy's Largest Root	.00	.00	1.00
		Quality	
Pillai's Trace	.10	1.93	.16
Wilks' Lambda	.90	1.93	.16
Hotelling's Trace	.11	1.93	.16
Roy's Largest Root	.11	1.93	.16

Table 11h

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Quality of Instrumental Support Behaviors Predicting Change in Weight

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Quality	-.01	.16	-.01

Note. $R^2 = .00$. *Adjusted* $R^2 = -.02$.

Table 11i

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Frequency of Expressive Support Behaviors Predicting Change in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Frequency	-.10	.16	-.10

Note. R^2 = .01. *Adjusted* R^2 = -.02.

Table 11j

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Frequency of Expressive Support Behaviors Predicting Change in Total Calories

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Frequency	-.06	.16	-.06

Note. R^2 = .004. *Adjusted* R^2 = -.002.

Table 11k

Step 3 of Mediation Model: Summary of Multivariate Regression Analysis for Change in Frequency of Expressive Support Behaviors Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.00	.00	1.00
Wilks' Lambda	1.00	.00	1.00
Hotelling's Trace	.00	.00	1.00
Roy's Largest Root	.00	.00	1.00
		Frequency	
Pillai's Trace	.01	.19	.83
Wilks' Lambda	.99	.19	.83
Hotelling's Trace	.01	.19	.83
Roy's Largest Root	.01	.19	.83

Table 11l

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Frequency of Expressive Support Behaviors Predicting Change in Weight

Variable	*B*	*SE B*	β
Constant	0.00	.16	
Frequency	-.11	.16	-.11

Note. $R^2 = .02$. *Adjusted* $R^2 = -.01$.

Table 11m

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Quality of Expressive Support Behaviors Predicting Change in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β
Constant	-.01	.17	
Quality	-.04	.18	-.04

Note. R^2 = .001. *Adjusted* R^2 = -.03.

Table 11n

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Quality of Expressive Support Behaviors Predicting Change in Total Calories

Variable	*B*	*SE B*	β
Constant	-.003	.17	
Quality	.05	.18	.05

Note. R^2 = .001. *Adjusted* R^2 = -.03.

Table 11o

Step 3 of Mediation Model: Summary of Multivariate Regression Analysis for Change in Quality of Expressive Support Behaviors Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.01	.08	.92
Wilks' Lambda	1.00	.08	.92
Hotelling's Trace	.01	.08	.92
Roy's Largest Root	.01	.08	.92
		Quality	
Pillai's Trace	.01	.09	.92
Wilks' Lambda	1.00	.09	.92
Hotelling's Trace	.01	.09	.92
Roy's Largest Root	.01	.09	.92

Table 11p

Step 3 of Mediation Model: Summary of Simultaneous Regression Analysis for Change in Quality of Expressive Support Behaviors Predicting Change in Weight

Variable	*B*	*SE B*	β
Constant	.01	.17	
Quality	.24	.18	.23

Note. $R^2 = .05$. *Adjusted* $R^2 = .02$.

Table 12

Simultaneous Regression Analysis for Pre-test Instrumental Support Predicting Changes in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	-.20	.25		
Treatment condition	.53	.34	.27	.28
Frequency	.14	.33	.15	.08
Quality	-.14	.35	-.14	-.08
Negative affect	.19	.24	.20	.15
Positive affect	.16	.30	.16	.10
Treatment x frequency	-.64	.41	-.48	-.28
Treatment x quality	.44	.45	.28	.18
Treatment x negative affect	-.04	.42	-.02	-.02
Treatment x positive affect	-.39	.45	-.23	-.16

Note. $R^2 = .27$. *Adjusted* $R^2 = .04$.

Table 13

Simultaneous Regression Analysis for Pre-test Instrumental Support Predicting Changes in Total Calories

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	.03	.26		
Treatment condition	-.20	.35	-.10	-.11
Frequency	-.38	.34	-.39	-.30
Quality	.06	.37	.06	.03
Negative affect	.19	.25	.19	.14
Positive affect	-.01	.31	-.01	-.01
Treatment x frequency	.22	.43	.16	.09
Treatment x quality	-.41	.47	-.26	-.16
Treatment x negative affect	-.25	.44	-.15	-.10
Treatment x positive affect	-.42	.47	-.25	-.17

Note. $R^2 = .21$. *Adjusted* $R^2 = -.03$.

Table 14

Simultaneous Regression Analysis for Pre-test Instrumental Support Predicting Changes in Weight

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	-.06	.24		
Treatment condition	.02	.33	.01	.01
Frequency	.24	.32	.24	.14
Quality	.05	.34	.05	.03
Negative affect	-.51	.24	-.51	-.37*
Positive affect	.14	.29	.14	.09
Treatment x frequency	-.27	.40	-.20	-.13
Treatment x quality	-.34	.44	-.22	-.14
Treatment x negative affect	.94	.41	.58	.39*
Treatment x positive affect	-.04	.44	-.03	-.02

Note. $R^2 = .30$. *Adjusted* $R^2 = .09$.

*p < .05.

Table 15

Multivariate Regression Analysis for Pre-test Instrumental Support Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.02	.27	.76
Wilks' Lambda	.98	.27	.76
Hotelling's Trace	.02	.27	.76
Roy's Largest Root	.02	.27	.76
		Treatment condition	
Pillai's Trace	.15	2.37	.11
Wilks' Lambda	.86	2.37	.11
Hotelling's Trace	.17	2.37	.11
Roy's Largest Root	.17	2.37	.11
		Frequency	
Pillai's Trace	.07	1.09	.35
Wilks' Lambda	.93	1.09	.35
Hotelling's Trace	.08	1.09	.35
Roy's Largest Root	.08	1.09	.35
		Quality	

Pillai's Trace	.06	.85	.44
Wilks' Lambda	.94	.85	.44
Hotelling's Trace	.06	.85	.44
Roy's Largest Root	.06	.85	.44
		Negative affect	
Pillai's Trace	.20	3.44	.05
Wilks' Lambda	.80	3.44	.05
Hotelling's Trace	.25	3.44	.05
Roy's Largest Root	.25	3.44	.05
		Positive affect	
Pillai's Trace	.30	6.06	.01
Wilks' Lambda	.70	6.06	.01
Hotelling's Trace	.43	6.06	.01
Roy's Largest Root	.43	6.06	.01
		Treatment condition x Frequency	
Pillai's Trace	.12	1.93	.16
Wilks' Lambda	.88	1.93	.16
Hotelling's Trace	.14	1.93	.16
Roy's Largest Root	.14	1.93	.16

Treatment condition x Quality			
Pillai's Trace	.002	.03	.98
Wilks' Lambda	1.00	.03	.98
Hotelling's Trace	.002	.03	.98
Roy's Largest Root	.002	.03	.98
Treatment condition x Negative affect			
Pillai's Trace	.12	1.98	.16
Wilks' Lambda	.88	1.98	.16
Hotelling's Trace	.14	1.98	.16
Roy's Largest Root	.14	1.98	.16
Treatment condition x Positive affect			
Pillai's Trace	.20	3.57	.04
Wilks' Lambda	.80	3.57	.04
Hotelling's Trace	.26	3.57	.04
Roy's Largest Root	.26	3.57	.04

Table 16

Simultaneous Univariate Regression Analysis for Pre-test Instrumental Support Predicting Changes in Percent of Calories from Fat

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	.08	.21		
Treatment condition	-.43	.29	-.22	-.27
Frequency	-.41	.28	-.42	-.26
Quality	-.37	.30	-.38	-.22
Negative affect	.52	.31	.53	.43*
Positive affect	.83	.25	.84	.52**
Treatment x frequency	.69	.35	.51	.34†
Treatment x quality	.09	.39	.06	.04
Treatment x negative affect	-.67	.36	-.41	-.32†
Treatment x positive affect	-1.0	.39	-.59	-.43*

Note. $R^2 = .46$. *Adjusted* $R^2 = .30$.

*p < .05. **p < .01. † < .10.

Table 17

Simultaneous Univariate Regression Analysis for Pre-test Instrumental Support Predicting Changes in Percent of Calories from Saturated Fat

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	.24	.22		
Treatment condition	-.66	.30	-.34	-.38*
Frequency	-.13	.30	-.14	-.08
Quality	-.33	.32	-.34	-.19
Negative affect	.13	.22	.14	.11
Positive affect	.77	.27	.78	.47**
Treatment x frequency	.26	.37	.19	.13
Treatment x quality	.04	.41	.03	.02
Treatment x negative affect	-.10	.38	-.06	-.05
Treatment x positive affect	-.84	.41	-.49	-.36*

Note. $R^2 = .41$. *Adjusted* $R^2 = .22$.

*p < .05. **p < .01.

Table 18

Simultaneous Regression Analysis for Pre-test Expressive Support Predicting Changes in the Kristal Food Habits Questionnaire

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	-.39	.29		
Treatment condition	.69	.36	.35	.35†
Frequency	.40	.41	.37	.19
Quality	-.36	.28	-.36	-.24
Negative affect	.32	.38	.32	.16
Positive affect	.02	.29	.02	.01
Treatment x frequency	-.85	.51	-.48	-.31
Treatment x quality	1.14	.39	.83	.50**
Treatment x negative affect	.16	.45	.12	.07
Treatment x positive affect	-.04	.31	-.02	-.02

Note. $R^2 = .37$. *Adjusted* $R^2 = .15$. $N = 36$. Three couples did not perform any expressive support at pre-test.

**p < .01. † < .10.

Table 19

Simultaneous Regression Analysis for Pre-test Expressive Support Predicting Changes in Total Calories

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	-.06	.32		
Treatment condition	-.21	.40	-.11	-.10
Frequency	.25	.46	.23	.10
Quality	.15	.32	.15	.10
Negative affect	.65	.43	.65	.29
Positive affect	.02	.33	.02	.01
Treatment x frequency	-.57	.58	-.32	-.19
Treatment x quality	-.14	.43	-.10	-.06
Treatment x negative affect	-.80	.50	-.61	-.30
Treatment x positive affect	-.29	.46	-.19	-.13

Note. $R^2 = .21$. *Adjusted* $R^2 = -.06$. $N = 36$. Three couples did not perform any expressive support at pre-test.

Table 20

Simultaneous Regression Analysis for Pre-test Expressive Support Predicting Changes in Weight

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	-.04	.33		
Treatment condition	.13	.42	.07	.06
Frequency	.10	.48	.10	.04
Quality	-.08	.33	-.08	-.05
Negative affect	-.16	.45	-.16	-.07
Positive affect	.29	.34	.28	.16
Treatment x frequency	.01	.60	.01	.004
Treatment x quality	-.08	.05	-.05	-.03
Treatment x negative affect	.33	.52	.25	.12
Treatment x positive affect	.08	.48	.05	.03

Note. $R^2 = .17$. *Adjusted* $R^2 = -.12$. $N = 36$. Three couples did not perform any expressive support at pre-test.

Table 21

Multivariate Regression Analysis for Pre-test Expressive Support Predicting Changes in Percent of Calories from Fat and Percent of Calories from Saturated Fat

Effect	Value	*F*	*p*
		Intercept	
Pillai's Trace	.01	.18	.83
Wilks' Lambda	.99	.18	.83
Hotelling's Trace	.02	.18	.83
Roy's Largest Root	.02	.18	.83
		Treatment condition	
Pillai's Trace	.26	4.44	.02
Wilks' Lambda	.74	4.44	.02
Hotelling's Trace	.36	4.44	.02
Roy's Largest Root	.36	4.44	.02
		Frequency	
Pillai's Trace	.30	5.28	.01
Wilks' Lambda	.70	5.28	.01
Hotelling's Trace	.42	5.28	.01
Roy's Largest Root	.42	5.28	.01
		Quality	

Pillai's Trace	.001	.01	.99
Wilks' Lambda	1.00	.01	.99
Hotelling's Trace	.001	.01	.99
Roy's Largest Root	.001	.01	.99
	Negative affect		
Pillai's Trace	.03	.34	.71
Wilks' Lambda	.97	.34	.71
Hotelling's Trace	.03	.34	.71
Roy's Largest Root	.03	.34	.71
	Positive affect		
Pillai's Trace	.38	7.49	.003
Wilks' Lambda	.63	7.49	.003
Hotelling's Trace	.60	7.49	.003
Roy's Largest Root	.60	7.49	.003
	Treatment condition x Frequency		
Pillai's Trace	.22	3.59	.04
Wilks' Lambda	.78	3.59	.04
Hotelling's Trace	.29	3.59	.04
Roy's Largest Root	.29	3.59	.04

Treatment condition x Quality			
Pillai's Trace	.004	.05	.95
Wilks' Lambda	1.00	.05	.95
Hotelling's Trace	.004	.05	.95
Roy's Largest Root	.004	.05	.95
Treatment condition x Negative affect			
Pillai's Trace	.04	.45	.64
Wilks' Lambda	.97	.45	.64
Hotelling's Trace	.04	.45	.64
Roy's Largest Root	.04	.45	.64
Treatment condition x Positive affect			
Pillai's Trace	.23	3.81	.04
Wilks' Lambda	.77	3.81	.04
Hotelling's Trace	.31	3.81	.04
Roy's Largest Root	.31	3.81	.04

Note. $N = 36$. Three couples did not perform any expressive support at pre-test.

Table 22

Simultaneous Univariate Regression Analysis for Pre-test Expressive Support Predicting Changes in Percent of Calories from Fat

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	.63*	.26		
Treatment condition	-.78	.33	-.40	-.42*
Frequency	-1.22	.38	-1.14	-.54**
Quality	.01	.26	.01	.01
Negative affect	-.13	.35	-.13	-.07
Positive affect	1.05	.27	1.05	.61**
Treatment x frequency	1.27	.47	.72	.47*
Treatment x quality	-.07	.35	-.05	-.04
Treatment x negative affect	.23	.41	.17	.11
Treatment x positive affect	-1.05	.37	-.67	-.48**

Note. $R^2 = .47$. *Adjusted* $R^2 = .29$.

*$p < .05$. **$p < .01$.

Table 23

Simultaneous Univariate Regression Analysis for Pre-test Expressive Support Predicting Changes in Percent of Calories from Saturated Fat

Variable	*B*	*SE B*	β	Semipartial *r*
Constant	.74*	.29		
Treatment condition	-1.03	.37	-.52	-.48**
Frequency	-.94	.52	-.87	-.40*
Quality	.04	.29	.04	.03
Negative affect	-.33	.39	-.32	-.16
Positive affect	.73	.30	.73	.44*
Treatment x frequency	.92	.52	.52	.33†
Treatment x quality	-.13	.39	-.09	-.06
Treatment x negative affect	.44	.45	.33	.19
Treatment x positive affect	-.59	.41	-.38	-.27

Note. $R^2 = .36$. *Adjusted* $R^2 = .14$.

*$p < .05$. **$p < .01$. † $< .10$.

Table 24

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables	1	2	3	4	5	6	7	8
1. Male DAS	_	.01	.38*	-.42**	.26	.33*	.34*	-.27
2. Inst. Behavior		_	-.21	.35*	-.28	-.28	-.41*	.11
3. Inst. Quality			_	-.45**	.50**	.43**	.62**	-.15
4. Inst. Negative Affect				_	-.48**	-.45**	-.49**	.54**
5. Inst. Positive Affect					_	.38*	.17	-.25
6. Expr. Behavior						_	.46**	-.43**
7. Expr. Quality							_	-.33*
8. Expr. Negative affect								_
9. Expr. Positive affect								
10. Neg. Behavior								
11. Neg. Quality								
12. Neg. negative affect								
13. Neg. positive affect								
14. Inq. Behavior								
15. Inq. Quality								

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables, continued	1	2	3	4	5	6	7	8
16. Inq. Negative affect								
17. Inq. Positive affect								
18. Humor Behavior								
19. Humor quality								
20. Humor negative affect								
21. Humor positive affect								
22. Meta behavior								
23. Meta quality								
24. Meta negative affect								
25. Meta positive affect								
26. Unclear behavior[a]								

Note. Inst. = Instrumental behaviors. Expr. = Expressive behaviors. Neg. = Negative behaviors. Inq. = Inquiry behaviors. The sample size for all frequency behaviors was 39, with couples who did not perform a particular behavior in the pre-test interaction scoring a 0 on the frequency of that behavior. Sample sizes for the quality, negative affect, and positive affect of each behavior varied based on the number of couples who performed that behavior in the pre-test interaction (and therefore could receive a context rating). Sample sizes for the context

ratings of each behavior were as follows: *N*(Inst.) = 39; *N*(Expr.) = 36; *N*(Neg.) = 29; *N*(Inq.) = 26; *N*(Humor) = 18; *N*(Meta) = 10.

[a]Because they were defined as an unintelligible response, unclear behaviors were not given context ratings.

*p < .05. **p < .01.

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables	9	10	11	12	13	14	15	16
1. Male DAS	.22	-.18	.24	-.49**	.21	-.14	-.18	-.39
2. Inst. Behavior	-.42*	.19	-.20	.04	-.03	-.43**	-.37	.10
3. Inst. Quality	.42*	-.46**	.72**	-.20	.17	.04	.38	.14
4. Inst. Negative Affect	-.46**	.34*	-.28	.53**	-.46*	-.19	-.04	.11
5. Inst. Positive Affect	.68**	-.37*	.12	-.14	.32	.13	-.03	-.33
6. Expr. Behavior	-58**	-.58**	.36	.07	.29	-.34*	.11	-.10
7. Expr. Quality	.45**	-.43**	.57**	-.19	.08	.11	.45*	.19
8. Expr. Negative affect	-.39*	.57**	.04	.17	-.28	-.22	.04	.11
9. Expr. Positive affect	_	-.50**	.09	.14	-.05	.24	-.02	-.09
10. Neg. Behavior		_	-.08	-.05	-.28	-.27	-.14	.14
11. Neg. Quality			_	-.10	.07	-.08	.38	.40
12. Neg. negative affect				_	-.61**	-.22	.05	.08
13. Neg. positive affect					_	.15	.23	-.08
14. Inq. Behavior						_	.23	.01
15. Inq. Quality							_	.23

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables, continued	9	10	11	12	13	14	15	16
16. Inq. Negative affect								_
17. Inq. Positive affect								
18. Humor Behavior								
19. Humor quality								
20. Humor negative affect								
21. Humor positive affect								
22. Meta behavior								
23. Meta quality								
24. Meta negative affect								
25. Meta positive affect								
26. Unclear behavior[a]								

Note. Inst. = Instrumental behaviors. Expr. = Expressive behaviors. Neg. = Negative behaviors. Inq. = Inquiry behaviors. The sample size for all frequency behaviors was 39, with couples who did not perform a particular behavior in the pre-test interaction scoring a 0 on the frequency of that behavior. Sample sizes for the quality, negative affect, and positive affect of each behavior varied based on the number of couples who performed that behavior in the pre-test interaction (and therefore could receive a context rating). Sample sizes for the context

ratings of each behavior were as follows: *N*(Inst.) = 39; *N*(Expr.) = 36; *N*(Neg.) = 29; *N*(Inq.) = 26; *N*(Humor) = 18; *N*(Meta) = 10.

[a]Because they were defined as an unintelligible response, unclear behaviors were not given context ratings.

*p < .05. **p < .01.

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables	17	18	19	20	21	22	23	24
1. Male DAS	.30	.25	-.07	-.11	.18	-.30	-.01	.47
2. Inst. Behavior	-.32	-.34*	-.41	.37	-.33	-.30	-.58	.24
3. Inst. Quality	.25	.17	.40	-.18	.15	-.01	.63	-.04
4. Inst. Negative Affect	-.39*	.07	-.39	.29	-.37	.24	-.53	.27
5. Inst. Positive Affect	.75**	.001	.22	-.12	.60**	-.04	.40	-.08
6. Expr. Behavior	.48*	.15	.42	-.44	.33	-.08	.65*	-.55
7. Expr. Quality	-.06	.30	.67**	-.23	.19	-.02	.62	-.02
8. Expr. Negative affect	-.20	.29	-.44	.64**	-.33	.22	-.47	.69*
9. Expr. Positive affect	.58**	-.11	.36	-.40	.66**	-.12	.53	-.41
10. Neg. Behavior	-.33	-.02	-.27	.27	-.23	-.08	-.58	.41
11. Neg. Quality	-.09	.17	.79**	-.44	.08	-.07	.77*	-.19
12. Neg. negative affect	.13	-.04	.63*	-.02	.47	.32	.20	-.49
13. Neg. positive affect	-.22	-.09	-.10	-.20	-.14	-.16	.08	-.16
14. Inq. Behavior	-.15	-.27	.12	-.21	.27	-.08	.54	-.46
15. Inq. Quality	-.47*	.20	.11	-.03	-.35	.25	.16	-.03

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables, continued	17	18	19	20	21	22	23	24
16. Inq. Negative affect	-.44*	.05	.08	.23	-.25	-.004	.45	-.37
17. Inq. Positive affect	_	.15	.22	-.27	.56	.03	.32	-.30
18. Humor Behavior		_	-.05	.20	-.33	.39*	-.08	.43
19. Humor quality			_	-.52	.20	.08	.87*	-.63
20. Humor negative affect				_	-.16	.09	-.85*	.98**
21. Humor positive affect					_	-.25	.37	-.39
22. Meta behavior						_	.24	-.05
23. Meta quality							_	-.76*
24. Meta negative affect								_
25. Meta positive affect								
26. Unclear behavior[a]								

Note. Inst. = Instrumental behaviors. Expr. = Expressive behaviors. Neg. = Negative behaviors. Inq. = Inquiry behaviors. The sample size for all frequency behaviors was 39, with couples who did not perform a particular behavior in the pre-test interaction scoring a 0 on the frequency of that behavior. Sample sizes for the quality, negative affect, and positive affect of each behavior varied based on the number of couples who performed that behavior in the pre-test interaction (and therefore could receive a context rating). Sample sizes for the context

ratings of each behavior were as follows: *N*(Inst.) = 39; *N*(Expr.) = 36; *N*(Neg.) = 29; *N*(Inq.) = 26; *N*(Humor) = 18; *N*(Meta) = 10.

[a]Because they were defined as an unintelligible response, unclear behaviors were not given context ratings.

*p < .05. **p < .01.

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables	25	26
1. Male DAS	.46	-.40*
2. Inst. Behavior	-.43	-.15
3. Inst. Quality	.07	-.07
4. Inst. Negative Affect	-.34	-.05
5. Inst. Positive Affect	.70*	.04
6. Expr. Behavior	.20	-.01
7. Expr. Quality	.48	.02
8. Expr. Negative affect	-.10	-.11
9. Expr. Positive affect	.53	-.01
10. Neg. Behavior	.21	-.08
11. Neg. Quality	.27	-.04
12. Neg. negative affect	-.54	.18
13. Neg. positive affect	.63	-.09
14. Inq. Behavior	.11	.08
15. Inq. Quality	.03	.03

Table 24, continued

Intercorrelations between Marital Adjustment as Reported by Male Patients at Pre-test and Social Support Content and Context Codes as Performed by Female Partners at the Pre-test Interaction

Variables, continued	25	26
16. Inq. Negative affect	-.37	-.11
17. Inq. Positive affect	.33	.03
18. Humor Behavior	.19	-.28
19. Humor quality	.07	-.24
20. Humor negative affect	.17	.24
21. Humor positive affect	.78	-.004
22. Meta behavior	-.25	.06
23. Meta quality	-.07	.04
24. Meta negative affect	.31	.02
25. Meta positive affect	_	.09
26. Unclear behavior[a]		_

Note. Inst. = Instrumental behaviors. Expr. = Expressive behaviors. Neg. = Negative behaviors. Inq. = Inquiry behaviors. The sample size for all frequency behaviors was 39, with couples who did not perform a particular behavior in the pre-test interaction scoring a 0 on the frequency of that behavior. Sample sizes for the quality, negative affect, and positive affect of each behavior varied based on the number of couples who performed that behavior in the pre-test interaction (and therefore could receive a context rating). Sample sizes for the context

ratings of each behavior were as follows: *N*(Inst.) = 39; *N*(Expr.) = 36; *N*(Neg.) = 29; *N*(Inq.) = 26; *N*(Humor) = 18; *N*(Meta) = 10.

[a]Because they were defined as an unintelligible response, unclear behaviors were not given context ratings.

*p < .05. **p < .01.

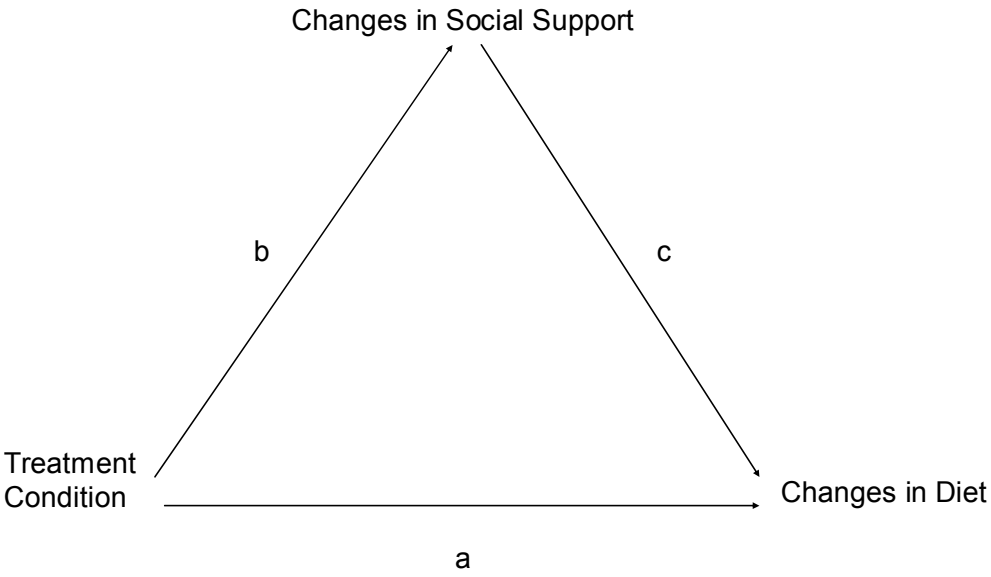

Figure 1: A conceptual model of social support mediating treatment effects on diet

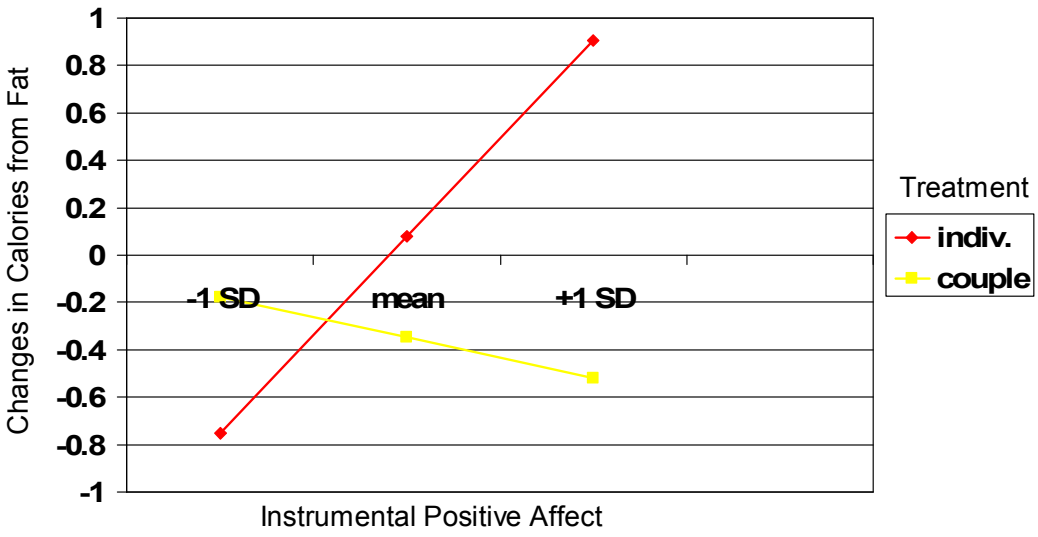

Figure 2: Treatment and instrumental positive affect predicting changes in calories from fat

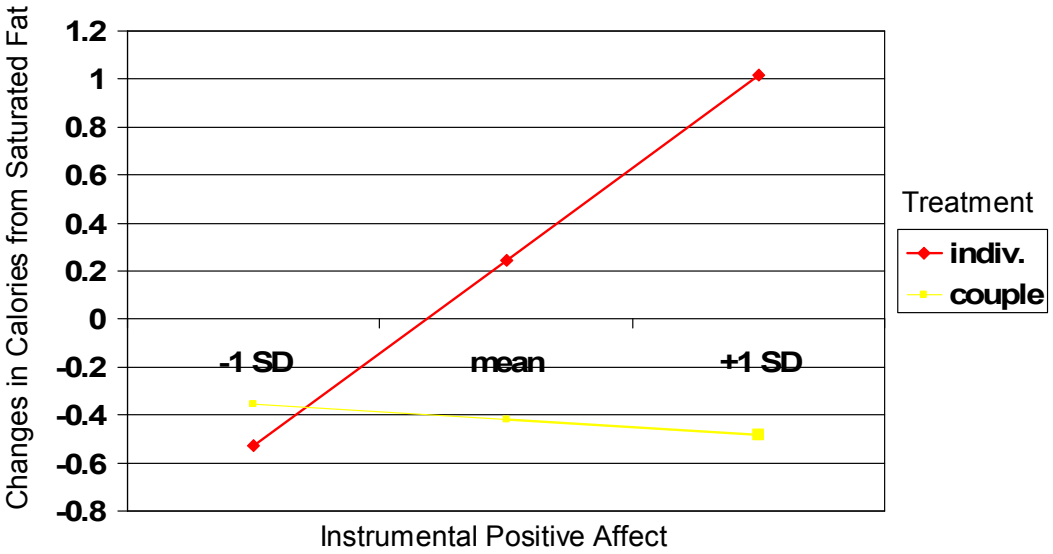

Figure 3: Treatment and instrumental positive affect predicting changes in saturated fat

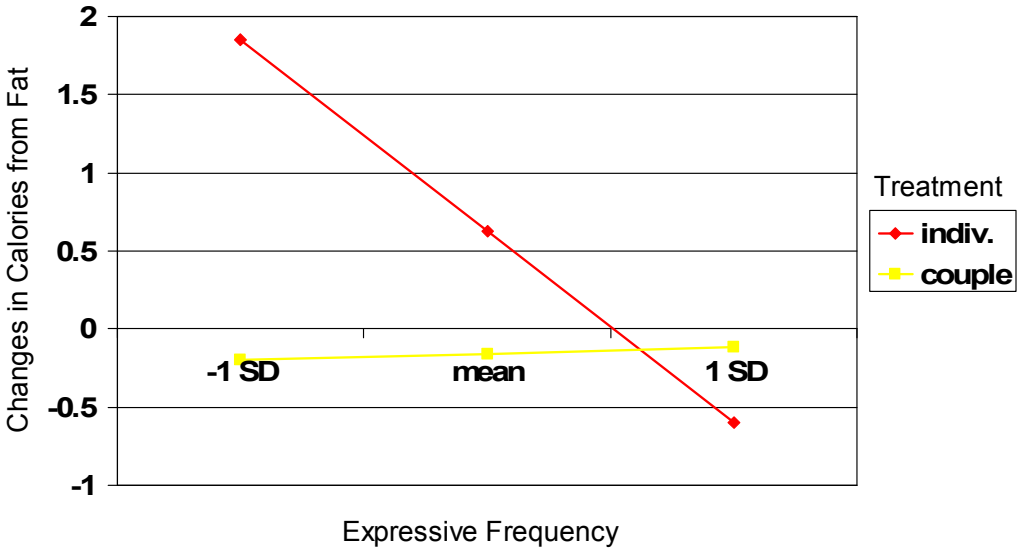

Figure 4: Treatment and expressive frequency predicting change in calories from fat

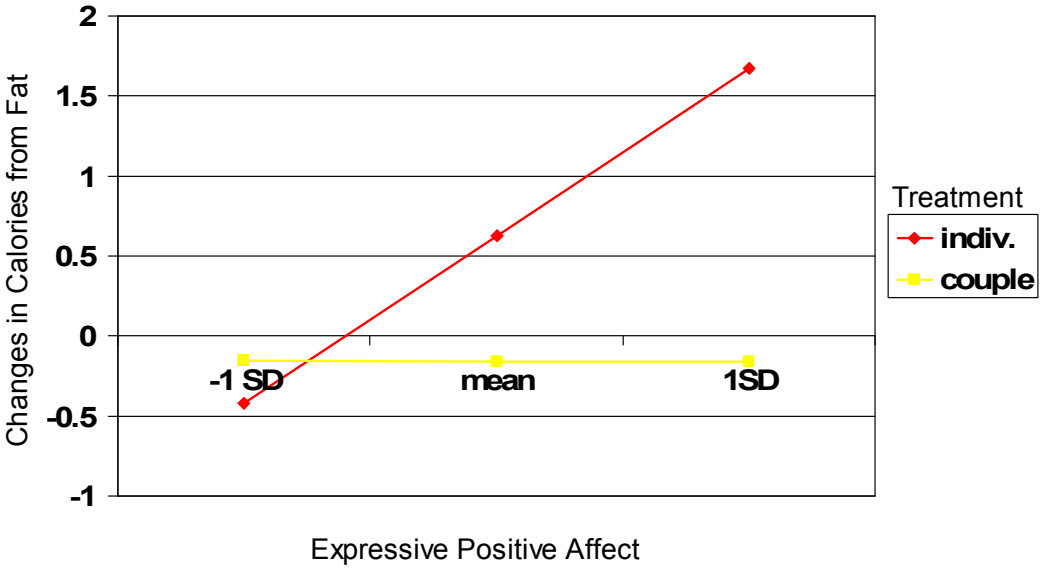

Figure 5: Treatment and expressive positive affect predicting changes in percent of calories from fat

References

Aiken, L.S., & West, S.G. (1991). *Multiple regression: Testing and interpreting interactions.* Newbury Park, CA: Sage.

Allgower, A., Wardle, J., & Steptoe (2001). Depressive symptoms, social support, and personal health behaviors in young men and women. *Health Psychology, 20*, 223-227.

Allison, M.J., & Keller, C. (2004). Self-Efficacy Intervention Effect on Physical Activity in Older Adults. *Western Journal of Nursing Research, 26* (1), 31-46.

Antonucci, T.C., & Akiyama, H. (1987). An examination of sex differences in social support among older men and women. *Sex Roles, 17*(11/12), 737-749.

Arnett, D.K., McGovern, P.G., Jacobs, Jr., D.R., Shahar, E., Duval, S., Blackburn, H., & Luepker, R.V. (2002). Fifteen-year trends in cardiovascular risk factors (1980-82 through 1995-1997): The Minnesota Heart Survey. *American Journal of Epidemiology, 156* (10), 929-935.

Bailey, B.J. & Kahn, A. (1993). Apportioning illness management authority: How diabetic individuals evaluate and respond to spousal help. *Qualitative Health Research, 3* (1), 55-73.

Bandura, A. (1997). *Self-efficacy: The exercise of control*. New York, NY, US: W. H. Freeman/Times Books/ Henry Holt & Co.

Baranowski, T, Nader, P.R., Dunn, K., & Vanderpool, N.A. (1982). Family self-help: Promoting change in health behaviors. *Journal of Communication, 32* (3), 161-172.

Barnett,V.D., & Lewis, T. (1994). *Outliers in Statistical Data*, *3rd edition*. Chichester, NY: John Wiley & Sons.

Barrera, M., Glasgow, R.E., McKay, H.G., Boles, S.M., and Feil, E.G. (2002). Do Internet-Based Support Interventions Change Perception of Social Support? An Experimental Trial of Approaches for Supporting Diabetes Self-Management. *American Journal of Community Psychology, 30*(5), 637-654.

Behavior Change Consortium, National Institutes of Health (n.d.). *Recommended nutrition measures.* Retrieved January 30, 2007 from http://www1.od.nih.gov/behaviorchange/measures/nutrition.htm.

Bennett, P., Mayfield, T., Norman, P., Lowe, R., & Morgan, M. (1999). Affective and social-cognitive predictors of behavioural change following first myocardial infarction. *British Journal of Health Psychology, 4* (3), 247-256.

Bennett, S.J., Perkins, S.M., Lane, K.M., Deer, M., Brater, D.C., & Murray, M.D. (2001). Social support and health-related quality of life in chronic heart failure patients. *Quality of Life Research, 10*, 671-682.

Black, D.R. (1989). Identifying predictor variables of weight loss outcome: Implications for a stepped program and weight management. *Psychology and Health, 3*, 207-216.

Black, D.R., Gleser, L.J., & Kooyers, K.J. (1990). A meat-analytic evaluation of couples weight-loss programs. *Health Psychology, 9* (3), 330-347.

Bolger, N.A., Zuckerman, A, & Kessler, A.. (2000). Invisible support and adjustment to stress. *Journal of Personality and Social Psychology, 79* (6), 953-961.

Bosworth, H.B., Siegler, I.C., Olsen, M.K., Brummett, B.H., Barefoot, J.C., Williams, R.B., Clapp-Channing, N.E., & Mark, D.B. (2000). Social support and quality of life in patients with coronary artery disease. *Quality of Life Research, 9*, 829-839.

Brownell, K.D., Heckerman, C.L., Westlake, R.J., Hayes, S.C., & Monti, P.M. (1978). The effect of couples training and partner co-operativeness in behavioral treatment of obesity. *Behaviour Research and Therapy, 16*, 323-333.

Burke, V., Giangiulio, N., Gillam, H.F., Beilin, L.J., Houghton, S. (2004). Changes in Cognitive Measures in a Randomized Controlled Trial of a Health Promotion Program for Couples Targeting Diet and Physical Activity. *American Journal of Health Promotion, 18* (4), 300-311.

Burry-Stock, J.A., Shaw D.G., Laurie, C., & Chissom, B.S. (1996). Rater agreement indexes for performance assessment. *Educational and Psychological Measurement, 56* (2), 251-262.

Byrne, B.M. (2004). Testing for multigoup invariance using AMOS: A road less traveled. *Structural Equation Modeling, 11* (2), 272-300.

Calfas, K.J., Sallas, J.F., Oldenburg, B., & Ffrench, M. (1997). Mediators of change in physical activity following and intervention in primary care: PACE. *Preventive Medicine, 26*, 297-304.

Carels, R.A., & Baucom, D.H. (1999). Support in marriage: Factors associated with on-line perceptions of support helpfulness. *Journal of Family Psychology, 13*(2), 131-144.

Cella, D., Hahn, E.A., & Dineen, K. (2002). Meaningful change in cancer-specific quality of life scores: Differences between improvement and worsening. *Quality of Life Research, 11*, 207-221.

Centers for Disease Control and Prevention (n.d.). *BMI—Body Mass Index: Home.*

Retrieved January 30, 2007 from http://www.cdc.gov/nccdphp/dnpa/bmi.

Chambless, D.L., & Steketee, G. (1999). Expressed emotion and behavior therapy outcome: A prospective study with obsessive-compulsive and agoraphobic outpatients. *Journal of Consulting and Clinical Psychology, 67*(5), 658-665.

Clark, M., Hampson, S.E., Avery, L., & Simpson, R. (2004). Effects of a brief tailored intervention on the process and predictors of lifestyle behaviour change in patients with type 2 diabetes. *Psychology, Health and Medicine, 9* (4), 440-449.

Cohen, S., & McKay, G. (1984). Social support, stress, and the buffering hypothesis: A theoretical analysis. In A. Baum, S.E. Taylor, and J.E. Singer (Eds.), *Handbook of psychology and Health, Vol. IV*, Erlbaum, Hillsdale, NJ.

Cohen, S., & Syme, S.L. (Eds.) (1985). *Social support and health.* San Diego, CA: Academic Press.

Connell, C.M., Davis, W.K., Gallant, M.P., & Sharpe, P.A. (1994). Impact of social support, social cognitive variables, and perceived threat on depression among adults with diabetes. *Health Psychology, 13*, 263-273.

Coyne, J.C., & DeLongis, A. (1986). Going beyond social support: The role of social relationship in adaptation. *Journal of Consulting and Clinical Psychology, 54*, 454-460.

Coyne, J.C., & Smith, D.A. (1991). Couples coping with myocardial infarction: A contextual perspective on wifes' distress. *Journal of Personality and Social Psychology, 61*, 404-412.

Coyne, J.C., Wortman, C.B., & Lehman, D.R. (1988). The other side of support: Emotional overinvolvement and miscarried helping. In B.H. Gottlieb (Ed.), *Marshaling social support: Formats, processes and effects,* (pp. 305-330). Newbury Park, CA: Sage.

Creasia, J.L. (1992). Outcomes for cardiac patients and perceptions of caregiver support. *Family Community Health, 15* (2), 31-40.

Cross, S.E., & Madson, L. (1997b). Elaboration of models of the self: Reply to Baumeister and Sommer (1997) and Martin and Ruble (1997). *Psychological Bulletin, 122*(1), 51-55.

Cutrona, C.E. (1996). Behavioral manifestations of social support: A microanalytic investigation. Journal of 51(1), 201-208.

Cutrona, C.E, (1996). *Social support in couples: Marriage as a resource in times of stress.* Thousand Oaks, CA, US: Sage Publications, Inc.

Cutrona, C.E., Cohen, B.B., & Ingram, S. (1990). Contextual determinants of the perceived supportiveness of helping behaviors. *Journal of Social and Personal Relationships, 7*, 553-562.

Cutrona, C.E., & Suhr, J.A. (1992). Controllability of stressful events and satisfaction with spouse support behaviors. *Communication Research, 19*(2), 154-174.

Cutrona, C.E. & Suhr, J.A. (1994). Social support communication in the context of marriage: An analysis of couples' supportive interactions. In B.R. Burleson, T.A. Albrecht, & I.G. Sarason (Eds.), *Communication of Social Support: Messages, Interactions, Relationships, and Community* (pp.113-135). Thousand Oaks,CA: Sage.

Dallow, C.B, & Anderson, J. (2003). Using self-efficacy and a transtheoretical model to develop a physical activity intervention for obese women. *American Journal of Health Promotion, 17* (6), 373-381.

Deci, E.L., & Ryan, R.M. (1985). *Intrinsic Motivation and Self-determination in Human Behavior.* New York: Plenum.

Dehle, C. (1999). Partner support rating system (PSRS), Version 3. Unpublished coding manual.

Dennis, K.E., & Goldman, A.P. (1996). Weight control self-efficacy types and transitions affect weight-loss outcomes in obese women. *Addictive Behaviors, 21*(1), 103-116.

Dennis, K.E., Tomoyasu, N., McCrone, S.H., Goldberg, A.P., Bunyard, L., Qi, B.B. (2001). Self-efficacy targeted treatments for weight loss in postmenopausal women. *Scholarly Inquiry for Nursing Practice,* 15 (3), 259-276.

DiMatteo, M.R. (2004). Social support and patient adherence to medical treatment: A meta-analysis. *Health Psychology, 23* (2), 207-218.

DiMatteo, M.R., Lepper, H.S., & Croghan, T.W. (2000). Depression is a risk factor for noncompliance with medical treatment: A meta-analysis of the effects of anxiety and depression on patient adherence. *Archives of Internal Medicine, 160*, 2101-2107.

Doherty, W.J., Schrott, H.G., Metcalf, L., & Iasiello-Vailas, L. (1983). Efect of spouse support and health beliefs on medication adherence. *Journal of Family Practice, 17*, 837-841.

Dunbar-Jacob, J., & Schlenk, E. (2001). Patient adherence to treatment regimen. In A.Baum, T.A. Revenson, & J.E. Singler (Eds.), *Handbook of Health Psychology*, (pp. 571-580). Mahwah, NJ: Erlbaum.

Dunkel-Schetter, C., Folkman, S., & Lazarus, R.S. (1987). Correlates of social support

receipts. *Journal of Personality and Social Psychology, 53*(1), 71-80.

Elizur, Y., & Hirsch, E. (1999). Psychosocial adjustment and mental health two months after coronary artery bypass surgery: A multisystemic analysis of patients' resources. *Journal of Behavioral Medicine, 22*(2), 157-177.

Finnegan, D.L., & Suler, J.R. (1985). Psychological factors associated with maintenance of improved health behaviors in postcoronary patients. *Journal of Psychology, 119*(1), 87-94.

Franks, M.M., Stephens, M.A.P., Rook, K.S., Franklin, B.A., Keteyian, S.J., & Artinian, N.T. (2006). Spouses' provision of health-related support and control to patients participating in cardiac rehab. *Journal of Family Psychology, 20*(2), 311-318.

Franks, M.M., Wendorf, C.A., Gonzalez, R., Ketterer, M. (2004). Aid and influence: Health-promoting exchanges of older married partners. *Journal of Social and Personal Relationships, 21* (4), 431-445.

Gardner, R.E., & Hausenblas, H.A (2004). Understanding Exercise and Diet Motivation in Overweight Women Enrolled in a Weight-Loss Program: A Prospective Study Using the Theory of Planned Behavior. *Journal of Applied Social Psychology, 34* (7), 1353-1370.

Garrow, J.D., & Webster, J. (1985). Quetelet's index (W/H2) as a measure of fatness. *I International Journal of Obesity, 9*(2), 147-153.

Glasgow, R.E., Boles, S.M., McKay, K.G., Feil, E.G., & Barrera, M. (2003). The D-Net diabetes self-management program: Long-term implementation, outcomes, and generalization results. *Preventive Medicine, 36*, 410-419.

Glasgow, R.E., Terborg, J.R., Strycker, L.A., Boles, S.M., & Hollis, J.F. (1997). Take Heart II: Replication of a worksite health promotion trial. *Journal of Behavioral Medicine, 20*(2), 143-161.

Glasgow, R.E., Toobert, D.J., Hampson, S.E., Brown, J.E. et al. (1992). Improving self-care among older patients with Type II diabetes: The "Sixty Something . . ." study. *Patient Education and Counseling, 19* (1): 61-74.

Gorman, C. (2001). An educational intervention for reducing the intake of dietary fats and cholesterol among middle-aged and older women. *Educational Gerontology, 27*, 417-427.

Gurman, A.S., & Jacobson, N.S. (Eds.) (2002). *Clinical Handbook of Couple Therapy, Third Edition.* New York, NY: The Guilford Press.

Hilbert, G.A. (1985). Spouse support and myocardial infarction patient compliance.

Nursing Research, 34 (4), 217-220.

Itkowitz, N.I., Kerns, R.D., & Otis, J.D. (2003). Support and coronary heart disease: The importance of significant other responses. *Journal of Behavioral Medicine, 26*(1), 19-30.

Johnson, R., Hobfoll, S.E., & Zalcberg-Linetzy, A. (1993). Social support knowledge and behavior and relational intimacy: A dyadic study. *Journal of Family Psychology, 6*(3), 266-277.

Kahn, E.B., Ramsey, L.T., Brownson, R., Heath, G.W., Howze, E.H., Powell, K.E., Stone, E.J., Rajab, M.W., & Corso, P. (2002). The effectiveness of interventions to increase physical activity: A systematic review. *American Journal of Preventive Medicine, 22*(4S), 73-107.

Kaplan, R.M., & Hartwell, S.L. (1987). Differential effects of social support and social networks on physiological and social outcomes in men and women with type II diabetes mellitus. *Health Psychology, 6*, 387-298.

Kavanagh, D.J., Gooley, S., Wilson, P.H. (1993). Prediction of adherence and control in diabetes. *Journal of Behavioral Medicine, 16* (5), 509-522.

Keefe, F.J., Caldwell, D.S., Baucom, D.H., Salley, A., Robinson, E., Timmons, K., Beaupre, P., Weisbergm J., A & Helms, M. (1996). Spouse-assisted copings skills training in the management of osteoarthritic knee pain. *Arthritis Care and Research, 9*(4), 279-291.

Kerig, P.K., & Baucom, D.H. (Eds.) (2004). *Couple Observational Coding Systems.* Mahwah, N.J.: Lawrence Erlbaum Associates.

Kiecolt-Glaser, J.K., & Newton, T.L. (2001). Marriage and health: His and hers. *Psychological Bulletin, 127*(4), 472-503.

Kristal, A.R., Shattuck, A.L., & Henry, H.J. (1990). Patterns of dietary behavior associated with selecting diets low in fat: Reliability and validity of a behavioral approach to dietary assessment. *Journal of the American Dietetic Association, 90*, 214-220.

Kulik, J.A., & Mahler, H.I.M. (1993). Emotional support as a moderator of adjustment and compliance after coronary artery bypass surgery: A longitudinal study. *Journal of Behavioral Medicine, 16* (1), 45-63.

Kulik, J.A., & Mahler, H.I.M. (1989). Social support and recovery from surgery. *Health Psychology, 8*(2), 221-238.

LaFramboise, L.M., Todero, C.M., Zimmerman, L., & Agrawal, S. (2003). Comparison

of Health Buddy with Traditional Approaches to heart failure management. *Family and Community Health, 26*(4), 275-288.

Levy, S.S., & Cardinal, B.J (2004). Effects of a Self-determination Theory-based Mail-mediated Intervention on Adults' Exercise Behavior. *American Journal of Health Promotion, 18* (5), 345-349.

Manne, S., Alfieri, T., Taylor, K., & Dougherty, J. (1999). Preferences for spousal support among individuals with cancer. *Journal of Applied Social Psychology, 29(*4), 722-749.

Manne, S., Ostroff, J., Sherman, M., Heryman, R.E., Ross, S., & Fox, K. (2004). Couples' support-related communication, psychological distress, and relationship satisfaction among women with early stage breast cancer. *Journal of Consulting and Clinical Psychology, 72*(4), 660-670.

McBride, C. M., Baucom, D. H., Peterson, B., Pollak, K. I., Palmer, C. A., Westman, E., et al. (2004). A partner-assisted approach to promote pre- and postpartum smoking abstinence. *American Journal of Preventive Medicine, 27,* 232-238.

MacKinnon, D. P., Lockwood, C. M., Hoffman, J. M., West, S. G., & Sheets, V. (2002). A comparison of methods to test mediated and other intervening variable effects. *Psychological Methods, 7*(1), 83-104.

Meagher, S.M., Gregor, F., & Stewart, M. (1987). Dyadic social support for cardiac surgery patients: A Canadian approach. *Social Science Medicine, 25*(7), 833-837.

Miller, N.H., Hill, M., Kottke, T., & Ockene, I.S. (1997). The multilevel compliance challenge: Recommendations for a call to action. *Circulation, 95*, 1085-1090.

Morisky, D.E., DeMuth, N.M., Field-Fass, M., Green, L.W., & Levine, D.M. (1985). Evaluation of family health education to build social support for long-term control of high blood pressure. *Health Education Quarterly, 12*(1), 35-50.

Murphy, J.K., Williamson, D.A., Buxton, A.E., Moody, S.C., Absher, N., & Warner, M. (1982). The long-term effects of spouse involvement upon weight loss and maintenance. *Behavior Therapy, 13*, 681-693.

National Heart, Lung, and Blood Institute. (n.d.) *Heart and vascular diseases.* Retrieved January 30, 2007, from http://www.nhlbi.nih.gov/health/public/heart/index.htm.

Neely, L.C., Lakey, B., & Cohen, J.L. (2006). Trait and social processes in the link between social support and affect: An experimental laboratory investigation. *Journal of Personality, 74*(4), 1015-1046.

Notarius, C.I., Benson, P.R., & Sloane, D. (1989). Exploring the interface between

perception and behavior: An analysis of marital interaction in distressed and nondistressed couples. *Behavioral Assessment, 11*(1), 39-64.

O'Leary, A. (1985). Self-efficacy and health. *Behaviour Research and Therapy, 23* (4), 437-451.

O'Neill, P.M., Curry, H.S., Hirsch, A.A., Riddle, F.E., Taylor, C.I., Malcolm, R.J., & Sexauer, J.D. (1979). Effects of sex subject and spouse involvement on weight loss in behavioral treatment program: A retrospective investigation. *Addictive Behaviors, 4*, 167-177.

Oren, M.L., Carella, M., & Helma, T. (1996). Diabetes support group--Study results and implications. *Employee Assistance Quarterly, 11* (3), 1-20.

Pasch, L.A., & Bradbury, T.N. (1998). Social support, conflict, and the development of marital dysfunction. *Journal of Consulting and Clinical Psychology, 66*(2), 219-230.

Pasch, L.A., Bradbury, T.N., & Sullivan, K.T. (1997). Social support in marriage: An analysis of intraindividual and interpersonal components. In G.R. Pierce, B. Lakey, I.G. Sarason, & B.R. Sarason (Eds.), *Sourcebook of Social Support and Personality*, (pp. 229-256). New York, NY: Plenum Press.

Pearce, J.W., LeBow, M.D., & Orchard, J. (1981). Role of spouse involvement in the behavioral treatment of overweight women. *Journal of Consulting and Clinical Psychology, 49*, 236-244.

Pearlin, L.I., & McCall, M.E. (1990). Occupational stress and marital support: A description of microprocesses. In S. Gore & J. Eckenrode (Eds.), *Stress between work and family,* (pp. 39-60). New York, NY: Plenum Press.

Pelletier, L.G., Dion, S.C., Slovinec-D'Angelo, M., & Reid, R. (2004). Why do you regulate what you eat? Relationships between forms of regulation, eating behaviors, sustained dietary behavior change, and psychological adjustment. *Motivation and Emotion, 28* (3), 245-277.

Plotnikoff, R.C., & Higginbotham, N. (1996). Predicting low-fat diet intentions and behaviors for the prevention of coronary heart disease: An application of protection motivation theory among an Australian population. *Psychology and Health, 10*, 397-408.

Pollak, K.I., & Mullen, P.D. (1997). An exploration of the effects of partner smoking, type of social support, and stress on postpartum smoking in married women who stopped smoking over pregnancy. *Psychology of Addictive Behaviors, 11*(3), 182-189.

Prochaska, D.O., & DiClemente, C.C. (1982). Trantheoretical therapy: Toward a more

integrative model of change. *Psychotherapy Theory, Research, and Practice, 19*, 276-288.

Rankin-Esquer, L.A., Deeter, A.K., Froelicher, E., & Taylor, C.B. (2000). Coronary artery disease: Intervention for intimate relationship issues. *Cognitive and Behavioral Practice, 7*, 212-220.

Reynolds, J.S., & Perrin, N.A. (2004). Mismatches in social support and psychosocial adjustment to breast cancer. *Health Psychology, 23* (4), 425-430.

Roski, J., Schmid, L.A., & Lando, H.A. (1996). Long-term associations of helpful and harmful spousal behaviors with smoking cessation. *Addictive Behaviors, 21*(2)*,* 173-185.

Ross, S.E., Moore, L.A., Earnest, M.A., Wittevrongel, L., Lin, C.T. (2004). Providing a Web-based Online Medical Record with Electronic Communication Capabilities to Patients With Congestive Heart Failure: Randomized Trial. *Journal of Medical Internet Research, 6* (2).

Senecal, C., Nouwen, A., & White, D., (2000). Motivation and dietary self-care in adults with diabetes: Are self-efficacy and autonomous self-regulation complementary or competing constructs? *Health Psychology, 19* (5), 452-457.

Schilling, E.A., Baucom, D.H., Burnett, C.K., Allen, E., & Ragland, L. (2003). Altering the course of marriage: The effect of PREP communication skills acquisition on couples' risk of becoming martially distressed. *Journal of Family Psychology, 17*(1), 41-53.

Shepherd, J. (1996). The West of Scotland Coronary Prevention Study (WOSCOPS): benefits of pravastin therapy in compliant subjects. *Circulation, 94*(supp), I-539.

Sher, T.& Bellg, A. (2001). A couples intervention for cardiovascular risk reduction. Unpublished manuscript.

Sher, T.G., Bellg, A.J., Braun, L., Domas, A., Rosenson, R., & Canar, W.J. (2002). Partners for Life: A theoretical approach to developing an intervention for cardiac risk reduction. *Health Education Research, 17* (5), 597-605.

Shinn, M., Lehmann, S., & Wong, N.W. (1984). Social interaction and social support. *Journal of Social Issues, 40* (4), 55-76.

Shumaker, S.A. & Brownell, A. (1984). Toward a theory of social support: Closing conceptual gaps. *Journal of Social Issues, 40*, 11-36.

Snyder, D.K., Wills, R.M., & Grady-Fletcher, A. (1991). Long-term effectiveness of

behavioral versus insight-oriented marital therapy: A 4-year follow-up study. *Journal of Consulting and Clinical Psychology, 59*(1), 138-141.

Stanley, S.M., Amato, P.R., Johnson, C.A., & Markman, H.J. (2006). Premarital education, marital quality, and marital stability: Findings from a large, random household survey. *Journal of Family Psychology, 20*(1), 117-126.

Stotts, A.L., DeLaune, K.A., Schmitz, J.M., & Grabowski, J. (2004). Impact of a motivational intervention on mechanisms of change in low-income pregnant smokers. *Addictive Behaviors, 29* (8), 1649-1657.

Taal, E., Rasker, J.J., Seydel, E.R., & Wiegman, O. (1993). Health status, adherence with health recommendations, self-efficacy, and social support in patients with rheumatoid arthritis. *Patient Education and Counseling, 20*, 63-76.

Terbog, J.R., Hibbard, J., & Glasgow, R.E. (1994). Behavior change at the worksite: Does social support make a difference? *American Journal of Health Promotion, 10* (2), 125-131.

Thoits, P.A., Hohman, A.A., Harvey, M.R., Fletcher, B. (2000). Similar-other support for men undergoing coronary artery bypass surgery. *Health Psychology, 19*(3), 264-273.

Thompson, F. E., Subar, A. F., Radimer, K., Smith, A. F., Midthune, D., Rosenfeld, S., & Kipnis, V. (in press). Performance of two new cognitively enhanced fruit and vegetable short assessment forms (Abstract). *Public Health Nutrition.*

Toobert, D.J., Glasgow, R.E., Nettekoven, L.A., & Brown, J.E. (1998). Behavioral and psychosocial effects of intensive lifestyle management for women with coronary heart disease. *Patient Education and Counseling, 35* (3), 177-188.

Toobert, D.J., Strycker, L.A., Glasgow, R.E., Barrera, M., & Bagdade, J.D., (2002). Enhancing support for health behavior change among women at risk for heart disease: The Mediterranean lifestyle trial. *Health Education Research, 17* (5), 574-585.

Uchino, B.N., Uno, D., & Holt-Lunstad, J. (1999). Social support, physiological processes, and health. *Current Directions in Psychological Science, 8*, 145-148.

Umberson, D. (1987). Family status and health behaviors: Social control as a dimension of social integration. *Journal of Health and Social Behavior, 28*, 306-319.

United States Department of Health and Human Services: Centers for Disease Control and Prevention. (1996). *Physical activity and health: A report of the Surgeon General.* Atlanta: author.

Waldinger, R.J. & Schulz, M.S. (2006). Linking hearts and minds in couple interactions:

Intentions, attributions, and overriding sentiments. *Journal of Family Psychology, 20*(3), 494-504.

Weiss, R.L., & Heyman, R.E. (1990). Observation of marital interaction. In F.D. Fincham and T.N. Bradbury (Eds.), *The Psychology of Marriage: Basic Issues and Applications,* (pp. 87-117). New York, NY: The Guilford Press.

Wierenga, M. (1993). Lifestyle modification for weight control to improve diabetes health status. *Patient Education and Counseling, 23*(4), 33-40.

Williams, G.C., Grow, V.M., Freedman, Z.R., Ryan, R.M., & Deci, E.L. (1996). Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology, 70*(1), 115-126.

Winkleby, M.A., Flora, J.A., & Kraemer, H.C. (1994). A community-based heart disease intervention: Predictors of change. *American Journal of Public Health, 84* (5), 767-772.

Witmer, J.M., Hensel, M.R., Holck, P.S., Ammerman, A.S., & Will, J.C. (2004). Heart Disease Prevention for Alaska Native Women: A Review of Pilot Study Findings. *Journal of Women's Health, 13* (5), 569-578.

Wright, J.D., Kennedy-Stephenson, J., Wang, C.Y., McDowell, M.A., Johnson, C.L., & National Center for Health Statistics, CDC (2004). Trends in intake of energy and macronutrients – United States – 1971-2000. *Morbidity and Mortality Weekly Report, 53*(4), 80-82.