

Partners for Life: a theoretical approach to developing an intervention for cardiac risk reduction

T. G. Sher, A. J. Bellg¹, L. Braun¹, A. Domas¹, R. Rosenson² and W. J. Canar

Abstract

Long-term maintenance of behavioral change to reduce health risk factors is essential to producing a positive effect on medical outcomes. This study examines whether an ongoing, long-term relationship can be used to help patients diagnosed with coronary artery disease adhere to a risk-reducing behavioral intervention and maintain healthy behavioral changes. One hundred and sixty patients with diagnosed coronary artery disease will be randomized to a standard behavioral treatment group or to a standard behavioral treatment group including a couples intervention and followed for 18 months. The treatment in both groups follows tenets of cognitive behavioral and Self-Determination Theories as well as the Transtheoretical Model of Behavior Change. In addition, the couples intervention is designed to (1) change the patient's environment to facilitate cardiac risk-reducing behavioral changes, (2) optimize social reinforcement and motivation for behavior change, and (3) decrease relationship stress. Behavioral outcomes assessed include adherence to an exercise regimen, adherence to dietary recommendations and adherence to lipid-lowering medication. Lipid values, psychological variables and relationship variables are assessed throughout the study and at follow-up. While

we expect both groups of cardiac patients to successfully adapt new health behaviors, we expect the couples intervention to be superior in helping maintain long-term health behaviors.

Rationale and significance

Behavioral change to reduce health risk in general, and cardiovascular disease risk in particular, is meaningful only when it can be sustained long-term. Although generally applied preventive medical treatments such as lipid-lowering medications can lower the risk of cardiac events, the most significant improvements in risk reduction, secondary prevention outcomes and disease outcomes in cardiac populations are associated with long-term adherence to prescribed medical treatment (Shepherd, 1996; Miller *et al.*, 1997). However, after many years and attempts to address adherence issues, cardiac risk-reducing medical treatments and lifestyle changes are still poorly maintained over time (Haynes, 2001). For example, the US Department of Health and Human Services (US Department of Health and Human Services, 1996) reports that patient adherence to multifactorial cardiac rehabilitation services including exercise, dietary change, smoking cessation and taking prescribed medications is only 25–40% after 6 months.

Finding better ways to help patients with coronary artery disease sustain long-term change is therefore essential to effective risk factor intervention and has become an increasing focus of scientific study.

Illinois Institute of Technology, Institute of Psychology, Chicago, IL 60616, ¹Rush-Presbyterian-St Luke's Medical Center, Rush Heart Institute, Chicago, IL 60612 and ²Northwestern University Medical Center, Chicago, IL 60611, USA

Research is now being conducted to respond to the many calls for increasing compliance with behavioral recommendations for patients diagnosed with coronary artery disease. For example, following a recent review of existing adherence strategies found effective in clinical research, the American Heart Association (AHA) Expert Panel on Compliance has recommended adherence-enhancing strategies involving patient education, contracts, self-monitoring, tailoring interventions to individual needs, telephone follow-ups and social support (Miller *et al.*, 1997). Each of these recommendations is both empirically and theoretically derived. The Partners for Life project was designed to incorporate these suggestions to promote long-term change and reduce the risk of further heart disease in patients diagnosed with coronary artery disease.

Partners have been included in the behavioral change process in previous studies for both exercise (Oldridge and Jones, 1986) and weight loss (Black *et al.*, 1990). However, across these studies, the partner's involvement has traditionally been defined by attendance alone. Perhaps for this reason, significant successes in the weight loss area especially have not been clearly replicated (Brownell *et al.*, 1978; Pearce *et al.*, 1981; Murphy *et al.*, 1982).

Despite some promising early findings on the importance of the inclusion of a partner into behavioral change programs, to date no study has evaluated the effect of a couples *intervention* on behavioral change recommendations for cardiac patients. The Partners for Life model centers around one primary mediating structural component: active inclusion of the heart patient's long-term intimate partner in the intervention. Specifically, Partners for Life aims to enhance the relationship and interactions between patients and their partners while they engage in behavioral interventions to reduce cardiac risks. The program is intended to determine whether a multidisciplinary approach including a long-term relationship can result in sustained and meaningful behavioral change.

The specific goal of the intervention is to significantly enhance long-term adherence to exercise,

dietary recommendations and taking lipid-lowering medication as prescribed through the inclusion of an intimate partner in the intervention. Partners for Life includes the partner as an agent of change. Additionally, it treats the relationship as a potential mediator for behavioral change, i.e. although previous studies have included a spouse or partner in the treatment, the partner has not been a focus of the treatment nor has the treatment been directed at multiple risk factors for coronary disease. It should be noted that this intervention is being conducted on those patients who present to the study either directly or through their cardiologist with pre-existing disease as evidenced by an invasive procedure (e.g. CABG and angioplasty), or by a previous myocardial infarction. All patients admitted into the study have been approved to participate by both their cardiologist and the study's medical director.

A couples approach to behavioral change

The patient's ongoing, long-term relationship can influence a range of psychosocial variables related to health behaviors. Previous studies on medical populations have demonstrated that partner attitudes and behavior can support or undermine motivation for medication treatment or lifestyle change (Keefe *et al.*, 1996). The partner's specific behaviors can also affect the ability to adhere to a treatment plan or recommendation, e.g. it is particularly difficult to quit smoking when a spouse smokes or change to a low-fat diet in a family whose traditions involve high-fat foods. What is not clear from previous research is what specific elements in an intimate relationship play a role in engaging in and maintaining healthy behavior. For example, within a couple coping with a myocardial infarction, patient behavior and quality of life can be influenced by how well the patient and partner manage their own distress, attend to various instrumental tasks imposed by the illness or its treatment, and understand and grapple with each other's emotional needs (Coyne and Smith, 1991).

Choosing appropriate theoretical approaches

Partners for Life was driven and informed by three broad-based and multifaceted theories: the theoretical principles underlying Cognitive-Behavioral Couples Therapy (CBCT), Self-Determination Theory and the Transtheoretical Model of Behavioral Change.

CBCT

The first and most important theory incorporated in the couples intervention involves the theoretical principles behind CBCT (Baucom *et al.*, 1998). Cognitive-behavioral issues related to communication styles in particular have a significant impact on relationships. For instance, research on couples' communication has provided evidence that unhappy couples engage in a higher frequency and intensity of hostile exchanges and a lower frequency of supportive or affectional emotional exchanges compared to happy couples (Rankin-Esquer *et al.*, 1997). Additionally, partners who experience greater arousal during conflicted interactions are at significantly greater risk of declines in marital satisfaction and health outcomes at a later date (Levenson and Gottman, 1985). There is even an association between conflicted interactions and cardiac disease. Although the mechanism for this relationship remains unknown at present, it has been conjectured that persistent failure to resolve relationship conflict might contribute to enhanced sympathetic tone believed to play an early role in hypertension and atherogenesis (Ewart *et al.*, 1991).

Recently, in an extensive review of the couples and illness literature, Schmaling and Sher reached four conclusions that form the basis of incorporating CBCT principles in this investigation (Schmaling and Sher, 1997):

- (1) There is a reciprocal relationship between health and couple satisfaction variables, with improvement in one likely to affect the other.
- (2) Clinicians can benefit from the addition of a partner into a treatment plan for long-term success.

- (3) In order for treatments to be maximally effective, the needs of the partner must also be considered.
- (4) Psychological interventions can be geared to help couples cope with the effects of an illness on themselves, each other, and the relationship in general.

These existing ideas from the literature on the influence of CBCT are expanded upon in the couples intervention itself.

Self-Determination Theory

The second theory incorporated in the couples study is a motivational theory relevant to the internalization and maintenance of long-term change, Self-Determination Theory (Deci and Ryan, 1985). Motivation for health-related change is becoming a more salient issue in health education (Botelho and Skinner, 1995). Self-Determination Theory is a motivational theory based on the idea that fundamental needs for autonomy, competence and relatedness must be met in order to result in the successful, unconflicted internalization of new behaviors.

This particular theory was considered to be highly relevant to the Partners for Life process because of the often conflicted or controlling motives for behaviors (behaviors engaged in because of guilt, fear, pressure or similar reasons) and behavior change following a cardiac event. Studies examining motivations for engaging in health behaviors have found that autonomous motives for engaging in behaviors (behaviors engaged in by the person's choice, and promoted by persons perceived as being informative and understanding of patients' issues) have positively influenced long-term weight loss (Williams *et al.*, 1996), smoking cessation (Curry *et al.*, 1990), and involvement and drop-out in alcohol treatment (Ryan *et al.*, 1995).

Within this project, Self-Determination Theory explicitly added the concept of promoting 'autonomy-supportive' interactions (conveying support and information without being controlling) between partners to facilitate long-term internalization of new behaviors to the basic concepts and processes

of CBCT. Project therapists were also trained to engage in autonomy-supportive interactions with study participants for the same reason.

Transtheoretical Model of Behavioral Change

A third theoretical approach played a relatively minor role in developing the intervention, but was considered important to monitoring the patients' perceptions of the interventions in the study. Decisional balance questionnaires based on the Transtheoretical Model of Behavioral Change (Prochaska and DiClemente, 1982) are being used to monitor patient perceptions of the advantages and disadvantages of engaging in the desired behaviors.

Translating theory into objectives: study goals and hypotheses

Based on the two primary theories informing the intervention, the couples component of Partners for Life was designed to address three broad, theoretically derived aspects of couple functioning related to reducing further health risks and promoting long-term change.

First, the couples intervention focuses on what each partner can do to change the physical and social environment to facilitate adopting and maintaining risk-reducing behaviors. This varies for each couple depending on their situation, and can include meal planning and preparation, incorporating walking into everyday activities, placing medications in a visible place, and planning how to deal with social situations such as eating at a restaurant or at a party.

Second, couples learn to optimize social reinforcement and motivation for behavior change between the partners, i.e. both the patient and the partner are taught how to encourage and reinforce behaviors in the other that are experienced as genuinely supportive (not controlling) and personally meaningful for change and maintenance. For example, couples are taught to problem-solve to determine how each partner likes to be reminded about behavior changes or supported and reinforced for making positive changes.

Third, couples are taught general skills to decrease stress between them related to the patient's illness and other factors. It is well understood that relationship tension, even in satisfied relationships, contributes to stress in a significant way. Additional stress results from dealing with issues around a heart problem that may affect a couple's finances, sexual functioning or plans for retirement. Communication strategies involving problem solving and emotional expressiveness training are taught to couples to help them deal with tensions and resolve disagreements on making behavioral change.

With these three areas in mind, the following hypotheses were generated. First, compared with patients in the individuals groups, patients in the couples group would be more likely to:

- Improve adherence to an exercise program and sustain long-term involvement in exercise.
- Improve adherence to a weight loss or weight maintenance program (if needed), make positive dietary changes such as lowering fat intake, and sustain long-term weight loss and dietary changes.
- Improve long-term adherence to lipid-lowering medication.

In addition, it is believed that patients in the couples group, compared with patients in the individuals group, would gain additional benefits including: improved patient mood, health functioning and quality of life; and improved medical outcomes such as the occurrence of acute events, hospitalizations and changes in symptom patterns and medications.

Translating theory into intervention: study design

Participants

Participants are being recruited from a major metropolitan area. Primarily, patients are identified through their cardiologist (at any of four participating hospitals), although newspaper advertisements and media attention also invited patients to self-identify and call in to the project to be screened.

Over the course of the study, 160 patients will be recruited and randomized into either the couples or the individuals group. Eligibility criteria include a history of a cardiac event (myocardial infarction, 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. Additionally, all participants need to be eligible for the following interventions: weight loss (or dietary modification based on current AHA recommendations), exercise and lipid-lowering medication.

Methods and measures

The intervention is conducted in groups, with the couples intervention groups consisting of up to five patients, their partners and a therapist, and individuals groups consisting of up to 10 patients and a therapist. Each couples group and individuals group meets for 18 sessions (12 weekly sessions followed by six alternate week sessions over a total of 24 weeks). In both the couples intervention groups and the individuals groups, information regarding all three behavioral goals are addressed and integrated into presentations and group discussions. In both couples and individuals groups, the groups discuss nutrition, exercise, medication adherence and general cardiac rehabilitation (see Table I).

The groups take the form of a brief didactic presentation, and questions and answers about the presentation followed by either break-out sessions for the couples group or a group discussion for the individual group. The break-out groups for the couples consist of couple-level discussions of the topic of the day as well as practice time for the couple skills that are being taught. The specifics of how each couple addresses the session topic are left to the couple to decide. General issues and topics, such as weekly homework assignments and problem-solving solutions, are discussed in the larger group format. The therapists in these groups serves as a resource for the couples' discussion, observing and suggesting changes on the content of the discussion as well as the process as the need

dictates. Discussion for the individuals takes the form of a support group with the therapist serving again as a resource person. Topic areas for both groups include nutrition guidance, exercise 'do's and don'ts' and the value of taking medications as prescribed. These topics are the primary focus of the first 12 sessions for all groups. The remaining six sessions focus on maintenance and relapse prevention.

The couples intervention also emphasizes the bi-directional nature of behavior change, i.e. both the patient and the partner are instructed and encouraged to make changes to meet the goals of the treatment. These changes are made in an effort to increase positive behaviors within and between the partner and patient as well as decrease negative behaviors within and between the partner and the patient. The couples intervention group content consists of communication skills training using general illness and rehabilitation topics. Communication training involves primarily two components: problem solving and emotional expressiveness training (Keefe *et al.*, 1996).

The individuals group has a more educational focus on issues related to cardiac risk reduction. Although primarily consisting of presentations, the therapist also conducts group discussions around these issues, and attempts to resolve questions and difficulties for group members. Aside from the components of the intervention specifically related to couples such as communication strategies, social support strategies and general couples issues—the nutrition, exercise and medication adherence components remain unchanged for the individuals.

While the overall structure facilitates implementation of the theoretical elements of the intervention, there are also specific elements in the design of the study that are relevant to implementing the theories. These include the theory-related potential mediating variables discussed below (and illustrated in Figure 1) that the couples intervention was specifically developed to influence. Key measures of these and other variables are completed at baseline, 6- (post-treatment), 12- and 18-month follow-ups.

Table I. *Partners for Life intervention model*

	Intervention (18 sessions)	Primary outcome	Secondary outcomes
Individuals Group (control)	information on: nutrition exercise medication adherence maintenance and relapse prevention	long-term adherence to nutrition, exercise and medication	psychological functioning relationship functioning quality of life medical outcomes lipid lowering
Couples Group (intervention)	information on: nutrition exercise medication adherence maintenance and relapse prevention motivation and communication skills training: problem solving emotional expressiveness training (EET)		

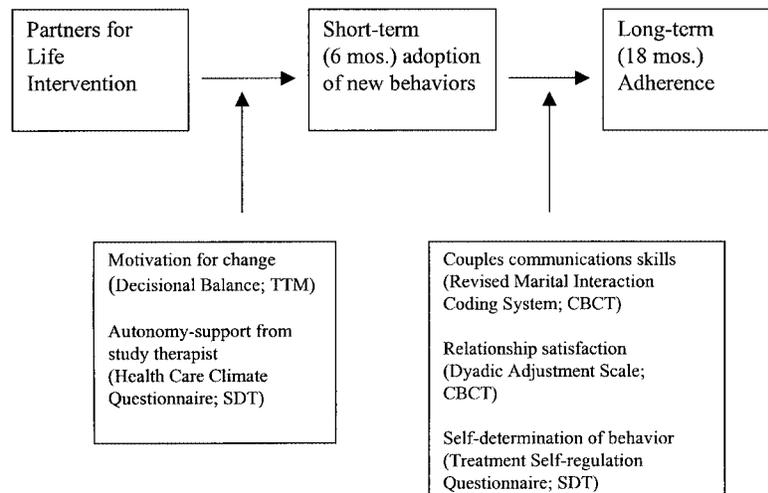


Fig. 1. Logical model of hypothesized association of the partners for life intervention with the primary outcome. CBCT: Cognitive-Behavioral Couples Therapy Theory. SDT: Self-Determination Theory. TTM: Transtheoretical Model of Behavior Change.

CBCT

The specific focus on cognitive behavioral relationship therapy combines techniques from three types of couples treatments, as specified by Baucom *et al.* (Baucom *et al.*, 1998). First, part of the intervention takes a partner-assisted intervention

approach. In these interventions, the partner is used as a surrogate therapist or coach in assisting the identified patient (Baucom *et al.*, 1998). Second, the focus of the intervention is disorder-specific in that it addresses the couple’s relationship in terms of the ways in which a couple interacts around the

individual's disorder that might contribute to the maintenance or exacerbation of the disorder. In this way, the interventions target the couple's relationship, but only as they appear to directly influence either the disorder or its treatment (Baucom *et al.*, 1998). Third, the couples component intervenes at the level of the couple's relationship in general. In this type of intervention, principles of CBCT are used with the intent of facilitating behavioral change. The assumption in this third area is that the functioning of the couple contributes in a broad sense to the development or maintenance of individual symptoms (Baucom *et al.*, 1998).

Relationship measures monitor changes relevant to the relationship skills intended to be affected by the couples intervention. The Dyadic Adjustment Scale (Spanier, 1976) is perhaps the most widely used measure of relationship satisfaction among married and co-habiting couples (Baucom and Epstein, 1990). It has demonstrated content, criterion-related and construct validity (Spanier, 1976).

The Revised Marital Interaction Coding System (RMICS) (Heyman *et al.*, 1993) is used at the beginning and end of the study to evaluate improvements in couples' communication skills. A problem-solving discussion between patients and their partners in both the Couples Group and the Individuals Group is videotaped and rated by independent raters who are trained to reliability in the RMICS system. The RMICS is an observational coding system used with videotaped couple interactions and adapted from the Marital Interaction Coding System-IV (MICS-IV) (Heyman *et al.*, 1995). Both the DAS and the RMICS are considered to be primary mediators likely to represent how successful the couples intervention is at giving cardiac patients the tools to maintain long-term behavior change.

Self-Determination Theory

To facilitate more constructive motivational interactions, couples in the study also learn the

distinction between motivational statements perceived as controlling ('nagging') or mistrustful ('policing') and those perceived as autonomy-supportive. Autonomy-supportive interactions facilitate unconflicted internalization of new behavior (Williams *et al.*, 1996), while nagging and policing have been found to be detrimental to behavior change in couples (Baucom, pers. commun.). Similarly, teaching partners to recognize and respond to the patient's stage of change for making behavioral change is also essential for success and are a key part of the couples training. For example, during the action stage of phase 2 cardiac rehabilitation, partners are taught how to support patients with autonomy-supportive statements (e.g. providing information or having non-pressuring conversations about making the behavior change).

The Treatment Self-Regulation Questionnaire (TSRQ; for diet and exercise) was adapted from self-regulation questionnaires introduced and validated by Ryan and Connell (Ryan and Connell, 1989). It assesses the degree to which behaviors tend to be self-determined. There are three subscales to the scale: the autonomous regulatory style, the controlled regulatory style and amotivation (which refers to being unmotivated). These subscales correspond to motivational concepts contained within Self-Determination Theory. The autonomous style represents the most self-determined form of motivation, and has consistently been associated with maintained behavior change and positive health care outcomes.

The TSRQ has been used in several studies with situations ranging from morbidly obese patients participating in a very low calorie weight-loss program (Williams *et al.*, 1996), to diabetic patients improving their diets and exercising more regularly (Williams *et al.*, 1996), to adult outpatients adhering to medication prescriptions (Williams *et al.*, 1998), among several others. The TSRQ has been designed so that it may be adapted to evaluate motivation for specific health behaviors. It was adapted for diet and exercise in the current study, and we considered it to be highly relevant to maintenance of long-term change.

The Health Care Climate Questionnaire (HCCQ) assesses the degree to which patients or participants experience their physician, their health care providers, their counselors or their health care program leaders to be autonomy supportive relative to controlling with respect to particular issues, behaviors or treatments. The HCCQ was developed and validated in prior research into motivation in non-health care settings [e.g. (Deci *et al.*, 1989)], but has been adapted for participants in the current study. In this version, the questionnaire asks about the participants' experience of the group leader. As such, we believe it will be most highly associated with initial adoption of behavior change and less strongly associated with long-term maintenance.

Transtheoretical Model of Behavioral Change

The Transtheoretical Model of Behavioral Change has had widespread influence in the last several years on the development of behavioral interventions. A key component of this theory for Partners for Life relates to participants' decisional balance—the motivation that participants have for engaging in particular behaviors.

Decisional balance examines the ratio between a person's perceived pros and cons for engaging in a health behavior, which have been found to be predictive of stage of change and adherence to treatment. The two decisional balance questionnaires were adapted from existing instruments to assess pros and cons for engaging in exercise (Marcus *et al.*, 1992) and for losing weight (O'Connell and Velicer, 1988). Again, because this variable assesses motivation for engagement, we considered it to be predictive primarily of initial adoption of behaviors.

Summary and conclusions

We believe that the findings of the current investigation will help us better understand the role that a partner plays in cardiac risk reduction in both the short and long term. This study is a unique contribution to the couples literature and to the health risk prevention and maintenance literature.

CBCT has been little used or studied in couples in which one person has a physical illness. Also, although previous health risk intervention studies have included partners, no study has comprehensively attempted to incorporate multiple dimensions of the relationship in order to promote behavior change as well as better illness adjustment. The proposed study explores the inclusion of a partner as an agent of behavioral change in the environment, as a source of social reinforcement and motivation, and as a companion whose illness-related needs and distress should be addressed for the benefit of both partners. In addition, there have been few studies examining the application of Self-Determination Theory principles in couples and none looking at these motivational factors in relation to changing health behaviors. This study opens a promising new area for motivational research into health behavior change.

Cardiac risk reduction is a lifetime endeavor. By enlisting the most important relationship in a cardiac patient's life to help minimize risk factors over the long term, we believe we can contribute to decreasing morbidity and mortality from cardiac disease.

Acknowledgements

This grant was funded by the National Institutes of Health: Heart, Lung and Blood Institute grant 5 RO1 HL62158-02.

References

- Baucom, D. H. and Epstein, N. H. (1990) *Cognitive-Behavioral Marital Therapy*. Brunner/Mazel, New York.
- Baucom, D. H., Shoham, V., Mueser, K. T., Daiuto, A. D. and Stickle, T. (1998) Empirically supported couple and family interventions for marital distress and adult mental health problems. *Journal of Consulting and Clinical Psychology*, **66**, 53–88.
- Black, D. R., Gleser, L. J. and Kooyers, K. J. (1990) A meta-analytic evaluation of couples weight-loss programs. *Health Psychology*, **9**, 330–347.
- Botelho, R. J. and Skinner, H. (1995) Motivating change in health behavior: implications for health promotion and disease prevention. *Primary Care*, **22**, 565–589.

- Brownell, K. D., Heckerman, C. L. and Westlake, R. J. (1978) The effect of couples training and partner cooperativeness in the behavioral treatment of obesity. *Behavior research and therapy*, **16**, 323–333.
- Coyne, J. C. and Smith, D. A. (1991) Couples coping with a myocardial infarction: a contextual perspective on wives' distress. *Journal of Personality and Social Psychology*, **61**, 404–412.
- Curry, S., Wagner, E. H. and Grothaus, L. C. (1990) Intrinsic and extrinsic motivation for smoking cessation. *Journal of Consulting and Clinical Psychology*, **58**, 310–316.
- Deci, E. L. and Ryan, R. M. (1985) *Intrinsic Motivation and Self-determination in Human Behavior*. Plenum, New York.
- Deci, E. L., Connell, J. P. and Ryan, R. M. (1989) Self-determination in a work organization. *Journal of Applied Psychology*, **74**, 580–590.
- Ewart, C. K., Taylor, C. B., Kraemer, H. C. and Agras, W. S. (1991) High blood pressure and marital discord: not being nasty matters more than being nice. *Health Psychology*, **10**, 155–163.
- Haynes, R. B. (2001) Improving patient adherence: state of the art, with a special focus on medication taking for cardiovascular disorders. In Burke L. E. and Ockene, I. S. (eds), *Compliance in Healthcare and Research*. Futura, Armonk, NY, pp. 3–21.
- Heyman, R. E., Vivian, D., Weiss, R. L., Hubbard, K. and Ayerle, C. H. (1993) Coding marital interaction at three levels of abstraction. Paper presented at the *Association for the Advancement of Behavior Therapy*, Atlanta, GA.
- Heyman, R. E., Weiss, R. L. and Eddy, J. M. (1995) Marital Interaction Coding System: revision and empirical validation. *Behavior and Research Therapy*, **33**, 737–746.
- Keefe, F. J., Caldwell, D. S., Baucom, D. H., Salley, A., Robinson, E., Timmons, K., Beaupre, P., Weisberg, J. and Helms, M. (1996) Spouse-assisted coping skills training in the management of osteoarthritic knee pain. *Arthritis Care and Research*, **9**, 279–291.
- Levenson, R. W. and Gottman, J. M. (1985) Physiological and affective predictors of change in relationship satisfaction. *Journal of Personality and Social Psychology*, **49**, 85–94.
- Marcus, B. H., Rakowski, W. and Rossi, J. S. (1992) Assessing motivational readiness and decision-making for exercise. *Health Psychology*, **11**, 257–261.
- Miller, N. H., Hill, M., Kottke, T. and Ockene, I. S. (1997) The multilevel compliance challenge: recommendations for a call to action. *Circulation*, **95**, 1085–1090.
- Murphy, J. K., Williamson, D. A., Buxton, A. E. *et al.* (1982) The long-term effects of spouse involvement upon weight loss and maintenance. *Behavior Therapy*, **13**, 681–693.
- O'Connell, D. and Velicer, W. F. (1988) A decisional balance measure and the stages of change model for weight loss. *International Journal of the Addictions*, **23**, 729–750.
- Oldridge, N. B. and Jones, N. L. (1986) Preventive use of exercise rehabilitation after myocardial infarction. *Acta Medica Scandinavica (Supplement)*, **711**, 123–129.
- Pearce, J. W., LeBow, M. D. and Orchard, J. (1981) Role of spouse involvement in the behavioral treatment of overweight women. *Journal of Consulting and Clinical Psychology*, **49**, 236–244.
- Prochaska, D. O. and DiClemente, C. C. (1982) Transtheoretical therapy: toward a more integrative model of change. *Psychotherapy Theory, Research and Practice*, **19**, 276–288.
- Ryan, R. M. and Connell, J. P. (1989) Perceived locus of causality and internalization: examining reasons for acting in two domains. *Journal of Personality and Social Psychology*, **57**, 749–761.
- Ryan, R. M., Plant, R. W. and O'Malley, S. (1995) Initial motivations for alcohol treatment: relations with patient characteristics, treatment involvement and drop-out. *Addictive Behaviors*, **20**, 297–297.
- Schmaling, K. B. and Sher, T. G. (1997) Physical health and relationships. In Kim Halford, W. and Markman, H. J. (eds), *Clinical Handbook of Marriage and Couples Interventions*. Wiley, New York, pp. 323–345.
- Shepherd, J. (1996) The West of Scotland Coronary Prevention Study (WOSCOPS): benefits of pravastatin therapy in compliant subjects. *Circulation*, **94** (Suppl.), 1–539.
- Spanier, G. B. (1976) Measuring dyadic adjustment: new scales for assessing the quality of marriage and similar dyads. *Journal of Marriage and the Family*, **38**, 15–28.
- US Department of Health and Human Services (1996) *Physical Activity and Health: A Report of the Surgeon General*. Centers for Disease Control and Prevention, Atlanta, GA.
- Williams, G. C., Grow, V. M., Freedman, Z. R., Ryan, R. M. and Deci, E. L. (1996) Motivational predictors of weight loss and weight-loss maintenance. *Journal of Personality and Social Psychology*, **70**, 115–126.
- Williams, G. C., Rodin, G. C., Ryan, R. M., Grolnick, W. S. and Deci, E. L. (1998) Autonomous regulation and long-term medication adherence in adult outpatients. *Health Psychology*, **17**, 269–276.

Received on February 14, 2001; accepted on 31 December 2001