1-1-2012

The effects of motivational interviewing on marital and pain adjustment in chronic pain patients and their spouses

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THE EFFECTS OF MOTIVATIONAL INTERVIEWING ON MARITAL AND PAIN ADJUSTMENT IN CHRONIC PAIN PATIENTS AND THEIR SPOUSES

by

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DISSERTATION

Submitted to the Graduate School

of Wayne State University,

Detroit, Michigan

in partial fulfillment of the requirements

for the degree of

DOCTOR OF PHILOSOPHY

2012

MAJOR: PSYCHOLOGY (Clinical)

Approved by:

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Advisor Date

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ACKNOWLEDGMENTS

I would like to thank Dr. Annmarie Cano for her time and dedication in the preparation of this dissertation. Her support throughout this project was invaluable and was greatly appreciated. I would also like to thank the members of my dissertation committee, Dr. Mark Lumley, Dr. Peter Lichtenberg, and Dr. Michael Geisser for their assistance in enhancing the quality of this project. I also appreciate the financial support for this project received from the Wayne State University Graduate School, Wayne State University Psychology Department, Dr. Annmarie Cano, and Dr. Mark Lumley. Finally, I would like to thank all of my family and friends for their encouragement and emotional support.

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CHAPTER 1

INTRODUCTION

Chronic pain is a costly health condition that is estimated to affect 150 million Americans (Turk, 2006). The annual costs attributed to chronic pain alone are estimated at $215 billion (American Academy of Orthopaedic Surgeons, 1999). Numerous studies have shown that chronic pain affects a variety of aspects of life including mood (Blyth et al., 2001; Cano et al., 2004; Currie & Wang, 2004; Jakobsson et al., 2003; Leonard et al., 2006; Miller & Cano, 2009; Verhaak et al., 1998), daily activities (Mobily et al., 1994; Scudds & Ostbye, 2001; Thomas et al., 2004; Williamson & Schulz, 1992), and relationships (Ahern & Follick, 1985; Block & Boyer, 1984; Cano et al., 2004; Geisser et al., 2005; Manne & Zautra, 1990; Schwartz et al., 1990). Further, not only does the individual with chronic pain suffer; spouses often suffer as well (Ahern & Follick, 1985; Block & Boyer, 1984; Geisser et al., 2005; Kemler & Furnee, 2002; Manne & Zautra, 1990; Schwartz et al., 1990). As discussed below, the impact of pain on each partner individually and on the couple suggests that many couples experience relationship distress that is rarely the goal of existing treatments for pain. The purpose of this study is to investigate whether a brief motivational interviewing technique will improve psychosocial functioning in couples affected by chronic pain.

In this literature review, I first describe the biopsychosocial model of pain, which posits that pain is affected by social and psychological components. I then describe the ways in which pain is related to these components. For instance, spouse responses and marital satisfaction seem to impact pain-related distress including pain, disability, and mood. In turn, the pain can also affect the spouse in terms of their daily activities,

emotional adjustment, and marital satisfaction. There is likely a bidirectional pattern of effects between patient and spouse. Intervention research has also focused on social and psychological factors that are related to pain. In describing the intervention research, I will first discuss the individual interventions that have been effective for pain management. In addition to individual treatments, interventions have expanded to include the spouse. However, it appears that the spousal treatments may not provide clinical utility above individual treatments. I conclude with the suggestion that there may be an additional component—motivational interviewing—that can be added to existing interventions to increase the effectiveness of treating chronic pain.

Biopsychosocial Models of Pain

The biopsychosocial model of pain suggests that illness is comprised of multiple factors; specifically, biological, psychological, and social factors (Gatchel et al., 2007). This model promotes the idea that psychological and social processes interact with the brain and influence health and illness. One psychological factor thought to be involved in the experience of pain is emotional distress, such as depression or anxiety. Specifically, pain is strongly related to depression and anxiety (Blyth et al., 2001; Cano et al., 2004; Currie & Wang, 2004; Jakobsson et al., 2003; Leonard et al., 2006; Miller & Cano, 2009; Verhaak et al., 1998). In addition, those with greater pain severity generally report more symptoms of depression (Cano et al., 2004; Currie & Wang, 2004; Leonard et al., 2006; Miller & Cano, 2009) and anxiety (Cano et al., 2004). Not only is pain related to psychiatric symptoms, it is also related to mood-states. Anger is common among chronic pain patients and having a negative mood is likely to affect treatment motivation and compliance with treatment recommendation in chronic pain patients

(Gatchel et al., 2007). Thus, it is important to be aware of the patient's mood when treating chronic pain. Social processes are also thought to affect the pain experience; unfortunately, Gatchel et al. (2007) do not provide as much attention to social processes, such as interpersonal relationships, social support, and family environment, in their model. This is surprising because they call their model the biopsycho*social* model.

Other models have reported the importance of social influences in pain. For example, Fordyce (1976) suggests that pain can be acquired and maintained through operant means. The operant model suggests that pain behaviors can result by receiving direct and positive reinforcement. In addition, pain can be affected by avoidance learning. For example, a person in pain may learn to avoid behaviors that once caused them pain. Finally, pain behaviors may occur more frequently because they are receiving more reinforcement than their well behaviors.

Turk, Meichenbaum, and Genest (1983) extend this model by suggesting that cognitions play a role in pain. This means that patients have the opportunity to question, reappraise, and have control over their maladaptive beliefs, feelings, and behaviors. For instance, patients' beliefs about their pain are related to their pain adjustment. Furthermore, families can play a role in the patients' cognitions (Kerns & Otis, 2003). Family members may selectively reinforce certain thoughts and behaviors exhibited by the patient. For example, a spouse may give positive attention to a pain behavior, such as grimacing, which would reinforce this behavior and potentially lead to increased pain behaviors. Additionally, family members' own cognitions may influence

how they react (Kerns & Otis, 2003). A spouse may develop beliefs about strategies for coping with the pain and act in accordance with these beliefs.

Theories about pain recognize that pain can be influenced through psychological and social means. Therefore, it is important to investigate psychological and social components in chronic pain patients to improve the mental and physical health of patients and their spouses. In the current study, there was an attempt to intervene at the psychological and social levels of this model to examine potential effects on pain ratings. Specifically, the aim is to increase empathy and mindfulness (psychological) in the context of interpersonal relationships and social support (social). The rest of this review will center on the empirical support for psychosocial approaches to pain. In addition, I will make the case that these psychosocial factors are the most promising targets of intervention in couples facing pain.

Research Evidence Supporting the Social Context of Pain

The Marital Relationship and Pain-Related Distress

Research has supported biopsychosocial theories on the role of significant others and relationships on the pain experience. In a review of chronic pain treatments, Keefe et al. (1992) found that patients with high levels of social support adapt to pain more effectively. Not only is social support related to pain, but Bookwala (2005) also suggests that marital quality affects physical health. Additionally, marital satisfaction has been found to be related to pain and pain outcomes. For example, marital satisfaction in the spouse was predicted by the patients' pain ratings, spouse affective distress, and both patient and spouse ratings of psychosocial disability. Specifically, marital dissatisfaction

was related to higher ratings of psychosocial disability, lower pain, and higher spouse affective distress (Geisser et al., 2005).

Another way the spouse of a pain patient can influence pain is through their responses to the pain patient (Bookwala, 2005; Cano et al., 2000; Cano & Leonard, 2006; Flor et al., 1987; Flor et al., 1989; Leonard et al., 2006; Lousberg et al., 1991; McCracken, 2005; Stroud et al., 2006; Turk et al., 1992; Williamson et al., 1997). For example, negative and overly helpful spousal responses to pain are related to greater pain severity, interference in daily functioning, and increased frequency of pain behaviors (Block et al., 1980; Cano et al., 2000; Flor et al., 1987; Flor et al., 1989; Leonard et al., 2006; Lousberg et al., 1991; McCracken, 2005; Turk et al., 1992; Williamson et al., 1997).

Spousal responses also affect the daily functioning of the pain patient. Many studies have established a positive relationship between negative spouse responses and the number of physical problems, chronic health problems, functional impairment, psychosocial impairment, poorer perceived health, and reduced activity levels (Bookwala, 2005; Leonard et al., 2006; Turk et al., 1992). Flor et al. (1987) found that the best predictor of both pain and activity levels in the patient was the patient's perception of spouse responses. Specifically, solicitous responses from the spouse were negatively related to the patient's activity levels and having a more responsive spouse was associated with a reduction of activities by the patient. In addition, perceived spousal responses are not only related to interference in daily functioning, but also to depressive symptomology (Stroud et al., 2006). McCracken (2005) suggests that

these spousal responses may lead the patient to avoid some behaviors, which could be an explanation as to why spousal responses are related to decreased activity levels.

These findings support operant and transactional models of pain. Because the spouses' responses can affect the pain experience of the patients, inclusion of the spouses in the treatment of pain could be beneficial to the patients (Cano & Leonard, 2006). Therefore, these results suggest that including a marital component in the treatment for pain patients could be beneficial in improving pain-related distress.

Pain Impacts the Spouse

Not only can the spouse impact the patient's pain, the pain can affect the spouse as well. In a Dutch population, spouses of patients with chronic pain reported significantly different time allowances on activities compared to controls (Kemler & Furnee, 2002). Particularly, spouses spent less time on personal needs and leisure activities and more time on house-keeping and household maintenance. This suggests that having a spouse in pain alters the amount of time that spouses are able to spend on certain activities.

Psychologically, spouses are affected in terms of distress, emotional adjustment and mood, and marital satisfaction (Ahern & Follick, 1985; Block & Boyer, 1984; Geisser et al., 2005; Manne & Zautra, 1990; Schwartz et al., 1990). Ahern & Follick (1985) reviewed literature that studied distress in spouses of those with chronic pain. They concluded that spouses of pain patients had higher distress levels, that they were more depressed and had a higher prevalence of anxiety, and that they had more mal-adjustment in their marriages. In addition, about 40% reported dissatisfaction with an area of marital functioning. Schwartz et al. (1990) found that 28% of spouses of patients

with chronic pain reported a significantly depressed mood. Further, the spouse's depressed mood was positively associated with patient's average pain, patient's reported levels of anger and hostility, and the spouse's level of marital satisfaction. Geisser et al. (2005) found several relationships between patient pain and spousal well-being. First, patient ratings of psychosocial disability were related to greater emotional distress and lower marital satisfaction for the spouse. Second, spouse affective distress was positively related to spouse ratings of physical disability. Finally, also related to spouse affective distress was spouse ratings of psychosocial disability and lower spouse marital satisfaction. Block and Boyer (1984) suggest that spouses should be included in the treatment of chronic pain, regardless of positive or negative marital adjustment.

These findings provide support for the idea that spouses are affected by the patients' pain. This is not surprising given that these people are in a relationship, and relationships affect the functioning of the individual. It is important to further examine the association between the spouse and pain to understand the extent of the bidirectional relationship. In addition to the bidirectional relationship, there also appears to be an escalating pattern. In a review about distress in spouses of patients with chronic pain (Ahern & Follick, 1985), it was suggested that the emotions of the spouse can affect the treatment of the patient. The spouses who suffer emotionally from their partners' pain may be more inclined to support the treatment efforts of the patient. Therefore, if spouses are negatively affected by their partners' pain, this may impact the way the spouse responds to the patient, consequently affecting the patient. Understanding these

relationships can lend support for additional interventions that include the spouse in the treatment of pain and could provide benefits to both the spouse and the pain patient.

In summary, marital variables appear to have an effect on the pain experience in a variety of ways. Additionally, spouses are also affected by the patients' pain. Because of this, it appears that psychosocial treatments ought to address relationships. In my review of pain interventions (see below), I will describe empirically tested treatments that enhance mood and reduce pain as well as the extent to which these treatments adequately address marital quality.

Chronic Pain Interventions

Cognitive-behavioral therapy (CBT) and behavioral therapy are efficacious for the treatment of pain (Gatchel et al., 2007; Keefe et al., 1992; Novy, 2004). Cognitive-behavioral therapy may be effective because it may change the pain beliefs of the patient. Patients with chronic pain often have misconstrued beliefs about the cause and the course of their pain (Keefe et al., 1992) and these pain beliefs are related to their adjustment of chronic pain (Jensen et al., 1994; Turner, et al., 2000). Beliefs about pain, such as that pain is a signal of damage, that it can lead to disability, that it is uncontrollable, and that activity should be avoided, have been shown to be maladaptive in dealing with pain (Jensen et al., 1994; Turner et al., 2000). Alternatively, a high internal locus of control is associated with lower pain levels (Keefe et al., 1992). A patient's pain beliefs may also predict how he or she responds to treatment (Keefe et al., 1992). Specifically, self-efficacy was related to physical performance of physical movements and treatment outcome.

While behavioral chronic pain management has been effective in terms of treating the patient, marital and family therapies have been included as components of behavioral treatment for chronic pain as well (Ahern & Follick, 1985). Spouse distress can determine the nature of treatment outcome for the patients and therefore including the family can be beneficial for the patient. For example, Keefe et al. (1996) found benefits for spouse-assisted coping skills training (S-CST), which is a cognitive-behavioral skills training intervention that includes the spouse as a coach or assistant. S-CST consists of teaching couples communication skills that are effective for reinforcing coping skills, such as relaxation, imagery, and distraction. The patient and spouse then practice these skills during normal tasks at home. Next, the couples are taught how to set mutual goals and increase their planned pleasant activities. Finally, couples learn strategies to maintain their practice of these pain-coping skills. Couples that engaged in S-CST had lower levels of pain, psychological disability, and pain behaviors than those in an educational spousal support control group. In addition, they also had higher scores on coping attempts, marital adjustment, and self-efficacy.

Other approaches to treatment have also been used with couples. For instance, couples therapy, following the family systems approach, with chronic low back pain patients improved patient's marital communication and decreased psychological distress (Saarijarvi, 1991). Cano and Leonard (2006) discussed the use of Integrative Behavioral Couples Therapy (IBCT) with patients with chronic pain and their spouses. IBCT built empathy and emotional acceptance, which has been known to improve marital satisfaction and psychological distress. They suggest that using IBCT can result with couples having fewer arguments, improved problem-solving, and more positive

behavior exchanges. Additionally, Cano and Leonard (2006) suggest that IBCT can enhance the patient's pain management strategies and increase spousal empathy for the patient's pain. Thus, a variety of approaches might be used to promote health and well-being in couples faced with pain.

While several studies have showed the benefits of including the spouse in the treatment, there is also evidence to suggest that using a couple treatment may not offer benefits that exceed those from individual treatment (Cano & Leonard, 2006; Keefe et al., 1996; Moore & Chaney, 1985). Moore and Chaney (1985) compared individuals, couples, and waitlist controls in a chronic pain treatment. The individual and couple groups both showed treatment gains compared to waitlist controls regarding pain severity, somatization, physical and psychosocial dysfunction, utilization of health care, and marital satisfaction. However the couple group was not significantly different from the treatment gains from the individual group.

Similar results were found for S-CST (Keefe et al., 1996). While Keefe et al. (1996) found benefits for S-CST compared to the control group (an educational intervention that included the spouse), there were not significant differences between the CST group that included the spouse and the CST group without the spouse. This suggests that spousal involvement in these interventions did not facilitate treatment.

On the other hand, couple interventions may have an indirect effect on pain patients (Martire et al., 2007). Including the spouse in an educational and support focused treatment may not have impacted the patient; however the spouses benefited from the treatment with reductions in stress. With the couple approach being useful for the spouses, it is possible that this will indirectly help the patient over time. Future

research needs to be conducted to determine the extent to which including the spouse is beneficial for the treatment of chronic pain.

It is also possible that the reason that couple treatments, primarily S-CST, do not have substantial effects is because important aspects have not been targeted in treatment. Based on findings from the pain empathy literature (Goubert et al., 2005), newer models of interaction in pain (Cano & Williams, in press), and IBCT (Cano & Leonard, 2006; Cordova et al., 1998; Jacobson et al., 2000), there may be a subsample of couples for whom skills deficits is not the issue. Rather, lack of empathy may explain why these treatments are not more effective. Cano and Leonard (2006) suggest that increasing empathy and emotional acceptance may be useful for enhancing couples' communication and problem-solving, which could then lead to greater marital satisfaction.

Therefore, other types of interventions or assessments that tap into previously unmeasured constructs might be useful in promoting the introspection needed to try to alter outcomes. Since pain is affected through social and psychological means, and research has suggested that pain is affected by the marital relationship, treatments should include both partners to improve pain and pain-related distress. As suggested above, couple-based interventions might be more effective if they promote empathy. Motivational enhancement therapy may be one method of achieving this end.

Motivational Enhancement Therapy (MET)

Motivational Interviewing in Couples: The Marriage Checkup

Motivational enhancement therapy (MET) consists of a motivational interviewing technique that was developed by Miller and Rollnick (1991). Motivational interviewing is

a therapeutic approach composed of asking open-ended questions and eliciting change talk. It is intended to encourage people to increase their intrinsic motivation to work toward change. While MET was originally developed for substance abuse, it has been applied to a multitude of issues (Novy, 2004). For example, MET is effective in the treatment of couples who were at risk for deterioration (Cordova et al., 2001). Specifically, motivational interviewing has been conducted with couples to improve marital satisfaction and reduce marital distress. This application is relevant to the current proposal, which seeks to test a couples-based MET technique to alleviate the distress of couples with pain.

An example of how motivational interviewing has been applied to couples is seen with the Marriage Checkup study (Cordova et al., 2001). The Marriage Checkup (MC) is composed of a thorough relationship assessment, followed by individualized feedback for the couple. The MC was developed to attract couples that may be at risk for deterioration but probably would not seek therapy for marital issues. However, it is thought to be useful for all couples regardless of risk. It uses the motivational interviewing approach previously described by Miller and Rollnick (1991), which was designed to increase a person's desire to change. Feedback was provided to the couples that adhered to the six active ingredients of effective brief motivational interviewing, which are: providing structured feedback of current status, highlighting the client's personal responsibility for change, providing clear advice, offering alternatives, demonstrating empathy, and emphasizing the client's self-efficacy to pursue change on their own. It is thought that the MC provides benefits to couples because it focuses on

increasing the couple's motivation to pursue change in their relationship (Cordova et al., 2001).

For a thorough relationship assessment, the MC utilizes the Oral History Interview (OHI) (Buehlman et al., 1992), which asks about the history of the couple's relationship. The OHI predicted divorce among 52 couples at a 3 year follow-up, at which 13.5% were divorced (Buehlman et al., 1992). The variables used in prediction for divorce were husband fondness, husband negativity, husband expansiveness, husband we-ness, wife we-ness, chaotic couples, glorifying couples, husband disappointment, and wife disappointment, which were all coded from the oral history interview. Based on these variables, a discriminant function analysis was able to correctly identify 93.62% cases of marital stability (whether the couple was married or divorced 3 years later).

The Marriage Checkup has been effective in improving couples' well-being (Cordova et al., 2001). Marital satisfaction, as measured by the Global Distress Scale, improved from prior to the intervention to post-checkup. In addition, marital satisfaction remained improved one month later, and couples were no longer significantly more distressed than the nondistressed comparison group. Other than marital satisfaction, the MC was also effective in reducing distress, increasing intimacy, increasing partner acceptance, and motivation to change when compared to controls over time (Cordova, Scott, et al., 2005). Furthermore, changes in intimacy mediated the relationship between treatment group (either treatment or control) and change in marital satisfaction. This finding could mean that those in the intervention group improved on marital satisfaction because the intervention increased the intimacy among the partners. Results from the MC suggest that there are positive long-term outcomes from this

intervention (Gee et al., 2002). At the 2 year follow-up, distress had decreased for both husbands and wives from pre-MC to the follow-up. The participants maintained their improvements that they had immediately after the intervention, even 2 years after the intervention ended. Furthermore, of the couples with follow-up data, 29% had sought treatment, most of which had received a recommendation for treatment at the feedback session. This suggests that the intervention was successful in encouraging formal help-seeking behaviors.

While the MC has been effective with couples in distress, it has not been tested with couples facing chronic pain. In addition, results from the MC have not explored potential reasons for the changes in marital satisfaction and distress. The current study will not only investigate whether an adapted version of the MC improves marital satisfaction, it will also explore whether this intervention will result in better pain adjustment, which hypothesizes lower pain ratings and fewer depressive symptoms. Furthermore, I will examine potential mechanisms through which changes in satisfaction occur. I expect that the MC will also be effective with couples coping with chronic pain because it will likely increase empathy and mindfulness for each partner as well as make personal values more salient to the couple.

Other Potential Benefits of the MC in Chronic Pain Couples

As shown above, the MC leads to enhanced marital satisfaction and decreases in distress. Cordova et al. (2001) proposes that the MC is beneficial because it increases couples' motivation to pursue change through MET. In addition to this, the MC is likely to result in change because it addresses values and increases empathic emotional responses and mindfulness. Furthermore, it is possible that the changes in

values, empathic emotional responses, and mindfulness from MET are associated with the changes in pain, mood, and marital satisfaction.

Values Based Action (VBA)

Perhaps another benefit of the MC is that it addresses values. For example, the MC may motivate couples to reflect on what is important to them in their life. Values-based action is what individuals consider to be important goals for themselves and the way in which they want to live their life (McCracken & Yang, 2006). In a study of 140 patients, the most valued domains among patients with chronic pain were family and health and the least valued domains were friends and growth or learning (McCracken & Yang, 2006). The highest success in living out one's values was reported in the family and friends domain and the least success was in the domains of health and in growth or learning. The pain patients' success in living according to their values was negatively correlated with their disability, depression, and pain-related anxiety (McCracken & Yang, 2006). Furthermore, values and the acceptance of pain predicted patient emotional and physical functioning approximately 18.5 weeks later (McCracken & Vowles, 2008). This suggests the importance of incorporating values into the treatment of chronic pain, especially family and health values, as they may affect treatment outcomes.

While values are important to patients with chronic pain, this has not been examined in a couples context. Given that the MC will be used in this study, which focuses on the couples' history including their history of coping with pain, it is expected that the MC will result in greater importance of health and relationship values. I expect

that the MC will help couples to address what is important to them, particularly the health and relationship domains, and in turn, affect mood, pain, and marital satisfaction.

Empathy

The MC may also affect empathic emotional responses. According to Goubert et al. (2005) empathy is when one infers the experience of another. The inferred experience can include cognitive, affective and behavioral components. Barnett et al. (1981) proposed that the arousal of empathy is associated with an increase in prosocial behavior. Empathic understanding is often associated with empathic responses, be they emotional, behavioral, or both. For instance, an empathic spouse may engage in more helpful behaviors.

While it seems ideal for the spouse to behave empathically towards the pain patient, it is not always easy to understand another's pain. Many underestimate other's pain (Chambers et al., 1998) and disability (Cano et al., 2004; Cano et al., 2005). If pain is underestimated, the person in pain may feel misunderstood and may be less likely to talk about their pain to avoid being stigmatized (Goubert, 2005). In addition, the underestimation of pain may lead to inadequate care (Chambers et al., 1998; Goubert, 2005). On the other hand, some overestimate pain (Cano et al., 2004; Redinbaugh et al., 2002). If this occurs, the partner could become overprotective which could interfere with the normal, daily functioning of the person with pain (Goubert, 2005) or the inaccurate estimates could lead to unnecessary distress of the spouse (Redinbaugh et al., 2002).

Empathic responses can take the form of validation or invalidation (Fruzzetti & Iverson, 2004). Discussing pain could result in emotional self-disclosure that helps the

spouse understand the patient's distress and in turn, elicits empathy and validation. Johansen and Cano (2007) found that when anger, a form of invalidation, was expressed in a conversation, there was greater pain severity reported. Additionally, empathy in observers can affect their ratings of others' pain (Green et al., 2009). For example, observers' higher empathic concern was related to greater pain severity ratings during a cold pressor task.

Not only are empathic and unempathic responses correlated with pain ratings, they are also correlated with marital satisfaction (Busby & Gardner, 2008; Cano et al., 2008; Mitchell et al., 2008; Rowan et al., 1995). Greater emotional validation, which is an empathic response, from the spouse and the person with pain was positively related to greater satisfaction for both spouses (Cano et al., 2008). In contrast, emotional invalidation, an unempathic response, from the person in pain was negatively related to marital satisfaction in both spouses and invalidation from the spouse was negatively related to marital satisfaction for the spouse only. Moreover, in a sample of community couples without pain, when husbands' provided emotional disclosure and responded empathically, it significantly predicted feelings of marital intimacy for both the husbands and their partners (Mitchell et al., 2008).

Interventions have been useful in improving empathic responses and marital satisfaction. For example, Boettcher (1978) examined couples in marital counseling. As empathic responding improved, so did marital satisfaction. Empathic responding may have a mediating effect on marital satisfaction through perceptions of partners' relationship behaviors, such as good communication, warmth, and insensitivity (Davis & Oathout, 1987). As previously discussed, Cano and Leonard (2006) suggest that

increasing empathic responding may be helpful for enhancing couples' communication and problem-solving.

The promotion of empathic responses by the partner would likely relate to better functioning in chronic pain couples. Empathic responses occur after the emotional response; therefore, knowing the emotional responses can lead to targeting the behavioral responses. Thus, one aim of this intervention in the current study is to increase empathic emotional responses. Additionally, increasing empathic emotional responses may relate to better mood, higher marital satisfaction, and lower ratings of pain severity.

Mindfulness

A third potential benefit of the MC is that it could increase mindfulness. Wachs and Cordova (2007) define mindfulness as being open and receptive to the present moment. Bishop et al. (2004) describe mindfulness as a two-component model: 1) attention to the immediate experience and 2) an orientation toward the experience that is characterized by "curiosity, openness, and acceptance." Because the MC is intended to encourage people to increase their intrinsic motivation to work toward change, this allows for people to focus on their feelings, thoughts, and beliefs during that present moment. Additionally, being asked insightful questions may make people more aware of how they feel. Therefore, MET may also encourage people to be mindful of their current state.

The study of mindfulness is a newer development within pain research, and preliminary research has found it to be associated with better patient functioning, including less pain, emotional distress, disability, and medication use (McCracken et al.,

2007). Furthermore, mindfulness predicted better functioning in the physical, social, emotional, and cognitive domains. More specifically, two areas of mindfulness, Acting with Awareness and Present Focus, were significantly negatively related to pain, pain distress, psychosocial disability, physical disability, and depression (McCracken & Thompson, 2008). A link was also found between mindfulness and anxiety sensitivity (McCracken & Keogh, 2009). Anxiety sensitivity is related to greater pain, disability and distress and it appears that acceptance, mindfulness, and values-based action may reduce the effect of anxiety sensitivity. This suggests that mindfulness has an indirect effect on pain by altering anxiety sensitivity. Additionally, there is evidence for the benefits of including mindfulness in chronic pain treatments. For example, there are treatment gains in terms of pain, sleep, attention, and mood (Kabat-Zinn, 1984; Kabat-Zinn, 1985; Morone et al., 2008; Plews-Ogan et al., 2005).

Mindfulness is also positively related to marital adjustment (Wachs & Cordova, 2007) and can contribute to relationship well-being (Barnes et al., 2007). Higher mindfulness is associated with higher relationship satisfaction and a better ability to respond to relationship stress (Barnes et al., 2007). This is possibly because the partners are more open to seeing the other's perspective (Burpee & Langer, 2005). In addition, mindfulness is related to marital satisfaction even more so than other variables including demographic factors and perceived spousal similarity (Burpee & Langer, 2005). It is thought that individuals who are mindful may be less threatened by change and may be more open to new experiences. These results suggest that mindfulness may lead to more fulfilling relationships.

To determine whether increasing mindfulness would result in enhanced marital quality, Carson et al. (2004) developed and tested a mindfulness-based relationship enhancement intervention in a sample of relatively happy, nondistressed couples. This was a group-based intervention that was composed of six to eight couples per group that met for eight weeks. The couples received training in mindfulness meditation. Compared to waitlist controls, those in treatment increased relationship satisfaction, autonomy, relatedness, closeness, acceptance of each other and decreased relationship stress. Benefits were maintained after 3 months. One possible explanation of this finding was that participants who engaged in exciting, self-expanding activities together during the intervention had greater improvements in regards to relationship satisfaction (Carson et al., 2007). In other words, participating in activities that foster mindfulness also results in enhanced relationship satisfaction. One of the aims of the current study is to investigate the extent to which the MC increases mindfulness. Furthermore, increased mindfulness may relate to better mood, higher marital satisfaction, and lower ratings of pain severity.

The Current Study

The purpose of the current study is to develop and test a version of the MC tailored to couples affected by chronic pain. The current study will determine what changes arise because of this intervention and explore potential reasons for why these changes occur.

There are several main hypotheses in this study:

1) Compared to couples who participate in an education-only control group, couples receiving a pain-related adaptation of the MC will report greater marital

satisfaction, lower pain ratings, greater positive mood, and lower negative mood following the intervention and at the one-month follow-up.

2) Compared to couples who participate in an education-only control group, couples receiving a pain-related adaptation of the MC will report a greater importance of relationship and health values for each partner. The intervention will also result in group differences in empathy and mindfulness for each partner. Specifically, it is expected that those in the intervention group will report greater mindfulness, greater empathy toward the partner (i.e., sympathetic, compassion), and less personal distress (i.e., alarmed, worried) than those in the control group.

3) Among those receiving the pain-related adaptation of the MC, it is expected that empathy, mindfulness and the importance of relationship and health values will be the mechanisms through which marital satisfaction, mood, and pain improve.

CHAPTER 2

METHOD

Participants

Couples were contacted by mail to determine interest in participating. Participants for this study were recruited from the community using a database of prior participants in research studies conducted by the Relationships and Health Lab at Wayne State University and the Stress and Health Lab at Wayne State University. Approved flyers were also displayed at the Rehabilitation Institute of Michigan. Upon contact, potential subjects were offered a brief description of the study and screened for eligibility. The participants were screened by trained graduate and undergraduate research assistants at the laboratory. Couples who were not married or had been living together for less than 2 years were excluded in order to remain consistent with previous research. Participants were also excluded from the study if either they or their spouses were: (1) below the age of 21, (2) actively psychotic, (3) suffering from a terminal illness (i.e., cancer), or (4) had significant cognitive deficits as determined by an adapted version (the verbal questions) of the Mini-Mental Status Exam (MMSE: Folstein, Folstein, & McHugh, 1975). These questions were administered over the phone during the screening process. A score of 18/22 or below excluded participants from the study.

There were 72 couples that were assessed for eligibility. Of these, 25 couples did not participate because they did not meet inclusion criteria (n = 5), declined to participate (n = 19), or provided an invalid telephone number (n = 1). See Appendix 1 for the CONSORT flow chart.

Participants consisted of 47 couples (94 total participants) in which at least one member had a chronic pain condition. The sample was comprised of half males and half females, with 41.5% (n = 39) Caucasian, 53.2% (n = 50) African Americans, and 5.3% (n = 5) other. The mean age was 51.76 (*SD* = 15.23). Couples needed to be married (87.2%, n = 41) or living together for at least 2 years (12.8%, n = 7). The married couples were married for 19.85 years (*SD* = 15.05). The chronic pain must have been present almost daily for a minimum of 3 months. For each couple, one member was identified as the patient and the other as the spouse of the patient. There were 48.9% (n = 23) of couples where both members had a chronic pain condition. For these couples, the individual with the most severe pain, as reported by both partners, was identified as the pain patient and the other partner was referred to as the spouse. Many of the patients did not know their formal pain diagnosis (57.4%, n = 27); however pain diagnoses included arthritis (25.5%, n = 12), fibromyalgia (12.8%, n = 6), rheumatoid arthritis (4.3%, n = 2), neuropathy (4.3%, n = 2), and tendonitis (2.1%, n = 1). The total is greater than 47 because several participants had two pain diagnoses. Regardless of pain diagnosis, each participant with pain reported each site where he or she experiences pain. Refer to Table 1 for the locations of chronic pain endorsed.

Table 1

Locations of Chronic Pain

Location	Prevalence			
	Patient %	(n)	Spouse %	(n)
Head	12.8	6	4.3	1
Neck	12.8	6	0	0
Upper back/Shoulders	38.3	18	21.7	5
Lower back	83.0	39	65.2	15
Abdomen	6.4	3	8.7	2
Legs/Hip	40.4	19	34.8	8
Knee	38.3	18	39.1	9
Arm/Wrist	23.4	11	47.8	11
Foot/Ankle	19.1	9	30.4	7

Patient N = 47
Spouse N = 23
Note. The total number of diagnoses is more than 47 and 23 for the patient and spouse, respectively, because participants could endorse more than one pain location.

On average, the pain was present for 12.02 years (*SD* = 12.34) for the patient and 7.60 years (*SD* = 3.98) for the spouse, if the spouse reported pain.

Procedure

Eligible couples made an appointment to come to the Relationships and Health Laboratory. Couples were sent a confirmation letter along with driving directions, questionnaire packets, and informed consent. These were sent about 2 weeks prior to their appointment.

Prior to the couple arriving to their appointment, they were randomly assigned to the control group or intervention group using a random number generator (0 for control, 1 for intervention). While the experimenter did not know the group that the couple was assigned to when the materials were mailed to the couple, the experimenter did know the group assignment when the couple arrived for their appointment. The experimenter

was not able to be blinded to group assignment at this time because if the couple was in the intervention group, the experimenter needed to begin to calculate totals from the measures completed at home to begin to formulate the feedback for the intervention portion.

Upon the couple's arrival, participants were greeted and escorted to the laboratory. Written informed consent was obtained from each spouse, and any questions regarding confidentiality or the study protocol were answered. Each spouse separately completed additional measures including the measures for mood, mindfulness, and empathy, as well as a shorter version of measures that assessed marital satisfaction and pain severity. The spouses were then brought back together and engaged in the Oral History Interview (OHI). Following the OHI, the couples engaged in a 10 minute conversation about how they would like to cope with pain together in the future. Information was collected from the OHI and the interaction to assist in the construction of the individualized feedback for the couples receiving the targeted feedback about their relationship.

After the OHI and interaction, the couple then received oral and written feedback regarding strengths and weaknesses of their relationship and pain coping skills (see example in Appendix 2) or education about pain using the Gate Control Theory (see Appendix 3). Details about this intervention are offered below.

Finally, each spouse was separated and completed the same measures they did before the OHI. After completing these tasks, the couple was compensated $50 for their time and effort and escorted out of the laboratory.

Approximately one month later, the couples received a mail-in postage-paid survey that included the same questionnaires they completed during their appointment. The patient and spouse each received separate measures to complete and the couples were instructed to complete the questionnaires separately. Upon the completion of these questionnaires, couples were mailed $20 for their time and effort and received a debriefing letter.

The Intervention

As previously mentioned, the couples were randomly assigned using a random number generator (0 for control, 1 for intervention), prior to arriving for their appointment. The couples were assigned to either the intervention group that received the motivational interviewing feedback (51.1%, n = 24) or the control group (48.9%, n = 23), which consisted of receiving educational feedback about pain. Of the 47 couples that completed the initial appointment, 82.5% (n = 41) of couples completed the one-month follow-up; therefore 17.5% (n = 6) of couples were lost to attrition. Of those that completed the follow-up, 22 couples (53.7%) were in the control group and 19 couples (46.3%) were in the intervention group.

The couples in the control group received oral and written education about the Gate Control Theory of Pain (see Appendix 3). The couples in the intervention group received oral and written feedback regarding strengths and weaknesses of their relationship and pain coping skills (see example in Appendix 2). In addition, the feedback for the intervention group also included two to four strategies that were offered to the couples to assist them in improving their relationship and pain coping (see Appendix 2). These strategies were chosen by the research assistant based on the

couples' areas of weakness. The feedback given to the intervention group was significantly longer than the feedback given to the control group, $t(45) = -11.81$, $p < .001$. On average, the intervention group received 12 more minutes of attention during feedback than the control group (intervention $M = 17.13$, $SD = 4.71$; control $M = 5.04$, $SD = 1.40$).

The process of giving the feedback and strategies adhered to the six active ingredients of effective brief motivational interviewing, which are: providing structured feedback of current status, highlighting the client's personal responsibility for change, providing clear advice, offering alternatives, demonstrating empathy, and emphasizing the client's self-efficacy to pursue change on their own. This feedback session was considered the active ingredient of the MC intervention. Thus, change was expected to occur here.

Five trained research assistants rated the adherence to motivational interviewing techniques during the feedback period. This was to ensure that the research assistant conducting the feedback was following the principles of motivational interviewing. The adherence measure has nine items; four of the items are on a 1-2 rating scale and the other five items are rated on a 1-3 rating scale. See Appendix 4 for this scale. Of the 47 videos, 43 were coded using this scale. Four were not able to be coded because one couple asked to not be videotaped, the video equipment was not working for a second couple, and the discs for the other two couples would not play back. There was 100% compliance on this scale for the intervention group. However, it is important to note that on occasion, the research assistant used some of the treatment techniques with the control group. Specifically, five couples in the control group were each asked an open-

ended question, the research assistant made one reflective statement with six couples in the control group, and made one empathic statement with four different couples in the control group.

For reliability purposes, about one in four (27.7%, n = 13) of these videos were coded by a second rater. The raters had perfect agreement on each of the nine items, as well as the sum of each of the items, $r(13) = 1.00$, $p < .001$.

Materials

Background Information

Demographic Information. Each participant was asked to report gender, date of birth, date of marriage, ethnicity/race, education, and income.

Depression. The Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977) is a 20-item questionnaire that assesses depressive symptoms. The scale ranges from rarely or never to mostly or all of the time. Scores can range from 0 to 60. See Appendix 5 for the questionnaire.

Interview

Oral History Interview (Buehlman, et al., 1992). This is a semi-structured interview in which the interviewer asks about a couple's relationship history (e.g., "Tell me about how the two of you met"), about the good and bad times in their relationship (e.g., "What moments stand out as the really good times in your marriage?"), how they think a marriage works (e.g., "Why do you think some marriages work and others don't?") and how their marriage has changed over time (e.g., "How would you say your marriage is different from when you first got married?"). The OHI interview was adapted to include 5 of the original questions and 5 additional questions about pain were added

to the interview that were relevant to this sample. The total interview for the current study was comprised of 10 questions and was estimated to take 20-40 minutes. See Appendix 6 for the full interview. A feedback session regarding the couples' strengths and weaknesses followed the OHI for the couples in the intervention group and was based on the information collected during this interview.

Primary Outcome Variables

Marital Satisfaction. The Dyadic Adjustment Scale (DAS) is a 32-item measure that assesses marital satisfaction and includes the following subscales: Dyadic Consensus, Dyadic Satisfaction, Dyadic Cohesion, and Affectional Expression. Scores can range from 0 to 151 with higher scores representing greater marital satisfaction (Spanier, 1976). See Appendix 7 for the measure.

Pain Severity. The Brief Pain Inventory (Cleeland, 1989) was used to assess the severity of pain. Pain severity was expected to be lower for the intervention group compared to the control group following the intervention. The Brief Pain Inventory items also question which parts of the body chronic pain exists. Reliability and validity analyses of the scale found that the scale was internally reliable, with the Cronbach alpha ranging from .86 to .96, was consistent over time, and had good construct, convergent, and predictive validity in assessing people that suffer from chronic pain (Mendoza et al., 2006). See Appendix 8 for this measure.

Mood. Mood was measured with an 18 item scale that is composed of 9 positive emotion adjectives and 9 negative emotion adjectives. Items are rated on a five point scale from not at all accurate to extremely accurate. Reliability for positive emotion ranges from .89 to .93 and reliability for negative emotion ranges from .87 to .92 (Cohen

et al., 2003). Positive mood was expected to be greater and negative mood was expected to be lower in the in patients and spouses in the intervention group compared to those in the control group after the intervention. See Appendix 9 for this scale.

Secondary Outcome / Process Variables

The following variables were considered the secondary outcome variables in Hypothesis 2 and to be the mechanisms of change for the primary outcome variables in Hypothesis 3.

Values. The Chronic Pain Values Inventory (CPVI) is designed to assess the importance and success in six different domains of values: family, intimate relations, friends, work, health, and growing and learning. Items are rated on a 0 to 5 point Likert scale for importance from not at all important to extremely important and for success from not at all successful to extremely successful. This measure appears to be valid as it was significantly correlated with measures of avoidance and acceptance (McCracken & Yang, 2006). Values were measured as they were expected to be indirectly addressed by the intervention and were expected to be a pathway through which this intervention is able to affect marital satisfaction, mood, and pain ratings. See Appendix 10 for this questionnaire.

Empathic Emotional Responses. This is a list of 14 adjectives that are rated on a 1 to 7 scale that assesses empathy (Batson et al., 1997). Specifically, six adjectives are related to the empathy factor (e.g., sympathetic, compassionate) and eight adjectives are related to the personal distress factor (e.g., alarmed, worried). There is sufficient reliability for both the empathy and personal distress factors, alpha = .85 and .93, respectively (Batson et al., 1997). Empathy was assessed because it was expected to

be greater for the couples in the intervention group than the control group following the intervention. See Appendix 11 for this measure.

Mindfulness. The Toronto Mindfulness Scale (TMS) assesses situational mindfulness (Lau et al., 2006). Mindfulness was measured because it was expected to be greater for couples in the intervention group than the control group at the post-intervention assessment. Participants responded to these questions about how they felt during the present moment as well as when they participated in the feedback (i.e., "Right now I am…"; "During the interview I was…"; "During the feedback I was…"). This scale is composed two factors, curiosity and decentering, with a total of 15 items. Curiosity is the awareness of the present moment with a quality of curiosity, and decentering is the awareness of one's own experience. The internal consistency of the curiosity and decentering factors are .86 and .87, respectively (Lau et al., 2006). In addition, these factors were correlated with other measures of mindfulness. See Appendix 12 for this scale.

CHAPTER 3

ANALYSIS PLAN

Preliminary Analyses

Descriptive analyses were run on each variable to locate missing data, determine the means, standard deviations, and ranges of each variable as well as examine the variables for skewness and kurtosis. Next, analyses were conducted to determine if any outliers were present in the dataset. Additionally, analyses were conducted to determine if gender, age, and race should be controlled for in subsequent analyses regarding the outcome variables.

Finally, analyses were conducted to determine if the control and intervention groups were significantly different on any of the primary or secondary outcome variables at baseline.

Hypothesis 1: Primary Outcome Variables

Bivariate correlations were conducted separately for the patients and spouses on the primary outcome variables at baseline to determine whether the primary outcome variables were related to each other. Correlations among the primary variables were again calculated at post-intervention, separately for the intervention group and control group; however since these were conducted for descriptive purposes only and were not related to the hypotheses, these tables are located as Ancillary Tables 1-2. This was also repeated for the one-month follow-up. See Ancillary Tables 3-4.

To determine whether the intervention affected marital satisfaction, mood, and pain ratings, analyses were conducted to compare the control and intervention groups for each partner after the intervention and at the one-month follow-up. Specifically,

separate analyses of variance, controlling for baseline scores, (ANCOVAs) were conducted to determine if the intervention group reported significantly greater positive and lower negative mood, greater marital satisfaction, and lower pain ratings than the control group at post-intervention and the one-month follow-up.

Partial eta squared, which is the proportion of the variability due to a particular variable, was calculated to determine effect sizes. According to Becker (2000), .01 is considered to be a small effect size, .06 is a moderate effect size, and .14 and higher is a strong effect. These values are equivalent to the Cohen's d values for small, medium, and large effect sizes.

Given the repeated measures design, paired samples t-tests were also conducted among those in the intervention group to determine if there were significant changes in the primary outcome variables from baseline to post-intervention and baseline to follow-up. These analyses were conducted in addition to the ANCOVAs to determine whether significant within group differences existed from baseline to post-intervention and baseline to the one-month follow-up, even if the intervention and control groups were not significantly different. Paired samples t-tests were also conducted for those in the control group to determine if there were any significant changes on the primary variables over time among this group. Effect sizes were calculated for the paired samples t-tests using the effect-size correlation, which utilizes the original standard deviations as opposed to the paired t-test standard deviation value as suggested by Becker (2000).

Hypothesis 2: Secondary Outcome Variables

As with the first hypothesis, bivariate correlations were conducted separately for the patients and spouses on the secondary outcome variables at baseline to determine whether the secondary outcome variables were related to each other. These correlations were repeated for the post-intervention scores and the one-month follow-up, separately for patients and spouses in the intervention group and for each partner in the control group. As with the primary outcome variables, these were conducted for descriptive purposes only and were not related to the hypotheses. See Ancillary Tables 5-8.

Additionally, correlations were also conducted to determine which primary and secondary variables were related to each other. These correlations were calculated separately for patients and spouses at the baseline, post-intervention, and at the one-month follow-up. See Ancillary Tables 9-16.

Similarly to the primary outcome variables, separate ANCOVAs were also conducted to determine whether each partner in the intervention group had lower personal distress and greater empathy, mindfulness, and the importance of values compared to the control group at the post-intervention assessment. To date, research has not examined whether motivational interviewing techniques result in improvements in these variables, despite the fact that researchers posit these effects. These ANCOVAs were conducted for each partner, controlling for baseline scores, at post-intervention and the one-month follow-up. The dependent variables in these analyses were the importance of health values, the importance of family values, the two factors of mindfulness (curiosity and decentering), and the two factors of empathic emotional responses (empathy and personal distress).

As with the first hypothesis, paired samples t-tests were also conducted among those in the intervention group to determine if there were significant increases or decreases in the secondary outcome variables from baseline to post-intervention and baseline to follow-up. Paired samples t-tests were also conducted for those in the control group.

Hypothesis 3: Correlates of primary and secondary outcome variables

Unstandardized residuals were computed for each partner on each of the primary and secondary variables to determine residual change scores for each of the variables. Then, each of the primary outcome residual change scores was correlated with each of the secondary outcome residual change scores to determine whether the changes in secondary outcome variables (considered to be the mechanisms of change) were related to the changes in the primary variables. These correlations were conducted both with the intervention and control groups to compare patterns of significant correlations.

These analyses can provide ground breaking information about the MC because if there is covariation among these variables, then these analyses suggest that a possible reason for the change in primary variables could be due to the secondary variables.

CHAPTER 4

RESULTS

Preliminary Analyses

Descriptive analyses were run for each variable to find missing data. Missing data were replaced with the mean value on the scale if the participant was missing 10% or less of the items on a particular measure. Research suggests that replacing data in these cases is acceptable (Shrive & Stewart, 2006). If more than 10% of the data within a scale was missing, a total was not calculated for this scale for the respective participant. Participants with missing totals on a particular measure were included in all analyses except for those that included the variable with the missing total. A total of 6 participants were excluded from various analyses because of this. Specifically, one spouse was missing the importance of relationship and health values at baseline, one spouse was missing all of the mindfulness scores at the one-month follow-up, two spouses were missing marital satisfaction at the one-month follow-up, and one spouse was missing the importance of relationship values at the one-month follow-up.

The dataset was screened for univariate and multivariate outliers using z-scores and Mahalanobis distance. There were no univariate or multivariate outliers on any of the variables. Skewness and kurtosis statistics were conducted. Several variables were significantly positively skewed (i.e., negative mood for the patient and spouse and personal distress for the patient and spouse) or negatively skewed (i.e., the importance of the relationship for the patient and spouse). In addition, several variables were significantly kurtotic (i.e., negative mood for the patient and spouse, personal distress for the patient and spouse, and the importance of the relationship for the patient).

However, because the results using the transformed variables were the same as those of the untransformed variables, the original, raw data were used for the analyses for ease of interpretation.

Potential covariates were investigated among the data. Analyses were conducted to determine whether the intervention and control groups were significantly different on gender, age, and race. A chi-square analysis determined that there were no gender differences between the intervention and control groups for who was the patient, $\chi^2(1, N = 47) = 0.03$, $p = .86$, or who was the spouse, $\chi^2(1, N = 47) = 0.03$, $p = .86$. A chi-square analysis also found no differences in race for patients, $\chi^2(1, N = 45) = 0.02$, $p = .57$, and spouses, $\chi^2(1, N = 44) = 0.03$, $p = .38$, when comparing the intervention and control groups. Only those participants who self-reported as African American or Caucasian were included in this analysis since only 5 participants (2 patients and 3 spouses) reported themselves as being of another racial group, leaving too many expected cell counts lower than 5. Thus, this analysis was repeated comparing White vs. non-White participants and there was still no difference in race for patients, $\chi^2(1, N = 47) = 0.02$, $p = .57$, or for spouses, $\chi^2(1, N = 47) = 0.03$, $p = .38$. An independent samples t-test also did not find any differences in age between the intervention and control groups for either patients, $t(45) = 0.04$, $p = .97$, or spouses, $t(45) = -0.44$, $p = .67$.

Finally, independent samples t-tests were conducted to determine if the control and intervention groups were significantly different on any of the primary or secondary outcome variables at baseline. There were no significant differences on any of the primary or secondary outcome variables at baseline between the intervention and control groups.

Since six couples (17.5%) did not complete the one-month follow-up, independent samples t-tests were conducted to determine if the participants who did not complete the follow-up were significantly different on any of the outcome variables at baseline or post-intervention than those who did complete the follow-up. While there were generally not any significant differences at baseline or the post-intervention between these groups, there were two significant differences. Of those that did not complete the follow-up, the spouses had higher positive mood at baseline (M = 27.67, SD = 5.65) than the spouses who did complete the follow-up (M = 19.56, SD = 7.47), $t(45) = -2.54$, $p = .01$. At the post-intervention, the patients who did not complete the follow-up had significantly higher scores for the importance of relationship values (M = 5.00, SD = 0.00), than the patients who did complete the follow-up (M = 4.39, SD = .74), $t(40) = 5.29$, $p < .001$.

Hypothesis 1: Primary Outcome Variables

Prior to testing the first hypothesis, bivariate correlations were computed among the primary variables of marital satisfaction, pain severity, positive mood, and negative mood for both the patients and the spouses (see Table 2).

Table 2

Correlations of Primary Variables at Baseline

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Marital Satisfaction	---	-.20	.49**	-.45**
Pain Severity	-.20	---	-.41**	.32*
Positive Mood	.51**	-.27	---	-.44**
Negative Mood	-.58**	.40**	-.46	---

Note. N = 94 (n = 47 patients; n = 47 spouses). *p < 05. **p < .01.
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Marital satisfaction was positively related to positive mood and negatively related to negative mood for both patients and spouses. Pain severity was negatively related to patients' positive mood, and positively related to negative mood for both patients and spouses. Finally, positive mood was inversely related to negative mood for both patients and spouses.

The first hypothesis predicted that couples who received a pain-related adaptation of the MC will report greater marital satisfaction, lower pain ratings, greater positive mood, and lower negative mood following the intervention and at the one-month follow-up compared to the education-only control group.

Post-intervention. An ANCOVA revealed significant differences on marital satisfaction between the control and intervention group after the intervention for both the patients, $F(1, 44) = 17.67$, $p < .001$, and the spouses, $F(1, 44) = 17.59$, $p < .001$,

controlling for baseline marital satisfaction. Specifically, the patients in the intervention group had higher marital satisfaction after the intervention than those in the control group as did the spouses in the intervention group compared to the control group (see Tables 3 and 4).

Table 3

Post-Intervention Scores for the Primary Variables for Patients

Variable	Intervention		Control			Partial Eta
	Mean	(SD)	Mean	(SD)	F	Squared
Marital Satisfaction	4.25	(1.36)	3.30	(1.36)	17.67**	.29
Pain Severity	4.58	(2.59)	5.22	(3.27)	5.09*	.10
Positive Mood	22.00	(8.08)	17.60	(8.50)	8.35**	.16
Negative Mood	2.00	(2.87)	4.96	(7.88)	9.09**	.17

Note. N = 47. *p < 05. **p < .01.

Table 4

Post-Intervention Scores for the Primary Variables for Spouses

Variable	Intervention		Control			Partial Eta
	Mean	(SD)	Mean	(SD)	F	Squared
Marital Satisfaction	4.21	(1.32)	3.39	(1.41)	17.59**	.29
Pain Severity	4.29	(2.74)	5.61	(3.01)	10.39**	.19
Positive Mood	26.17	(5.87)	17.43	(8.25)	20.19**	.32
Negative Mood	1.79	(3.39)	2.78	(4.35)	7.91**	.15

Note. N = 47. ** $p < .01$.

There were also significant differences for pain ratings. The patients in the intervention group rated their pain as being significantly less severe than the patients in the control group following the intervention, $F(1, 44) = 5.09$, $p = .03$, controlling for baseline pain ratings (see Table 3). The spouses in the intervention group also rated their partner's pain as significantly lower than the control group did, $F(1, 44) = 10.39$, $p = .002$, controlling for baseline ratings of their partner's pain (see Table 4).

Finally, analyses on positive and negative mood were conducted to determine if there were differences between the intervention and control. Patients in the intervention group rated their positive mood significantly higher than those in the control group, $F(1, 44) = 8.35$, $p = .01$ (see Table 3), as did the spouses in the intervention group compared to the spouses in the control group, $F(1, 44) = 20.19$, $p < .001$ (see Table 4), controlling for baseline positive mood. For negative mood, patients in the intervention group had significantly lower scores post-intervention than patients in the control group, $F(1, 44) = 9.09$, $p = .004$, controlling for baseline negative mood (see Table 3). Similarly, spouses

in the intervention group also had significantly lower negative mood than the control group, $F(1, 44) = 7.91$, $p = .01$ (see Table 4).

One-month follow-up. ANCOVAs were also conducted for each of the primary outcome variables at the one-month follow-up, controlling for baseline scores. As previously mentioned, 41 couples (82.7%) completed the one-month follow-up. Of these, 22 couples (53.7%) were in the control group and 19 couples (46.3%) were in the intervention group. While marital satisfaction did not differ between patients in the intervention and control groups, $F(1, 38) = 2.96$, $p = .09$, (partial eta squared = .05), there was a significant difference for spouses, $F(1, 36) = 4.21$, $p = .05$, (partial eta squared = .11). The spouses in the experimental group ($M = 3.95$, $SD = 1.58$) had higher ratings for marital satisfaction than those in the control group ($M = 3.40$, $SD = 1.47$). Pain ratings did not differ between the intervention and control groups for either patients, $F(1, 38) = 2.06$, $p = .16$ (partial eta squared = .04) or spouses, $F(1, 38) = 1.01$, $p = .32$ (partial eta squared = .02) at the one-month follow-up. Finally, there were not any significant differences between the intervention and control groups at the one-month follow-up for positive mood among patients, $F(1, 38) = 1.78$, $p = .19$ (partial eta squared = .05), or spouses, $F(1, 38) = 0.60$, $p = .44$ (partial eta squared = .02), or for negative mood among patients, $F(1, 38) = 1.02$, $p = .32$ (partial eta squared = .03), or spouses, $F(1, 38) = 0.11$, $p = .74$ (partial eta squared = .00).

Repeated Measures.

Although the group mean difference findings above suggest that changes were occurring in the intervention group, this conclusion cannot be supported unless additional analyses were conducted. Therefore, paired samples t-tests were conducted

among those in the intervention group to determine if there were significant changes in the primary outcome variables from baseline to post-intervention and baseline to the one-month follow-up. Paired samples t-tests were also conducted for patients and spouses in the control group.

Intervention Group: Baseline to Post-intervention. Paired samples t-tests were conducted with the intervention group to see if there were significant differences over time among the variables (See Tables 5 and 6). The primary outcome variables were compared from baseline to post-intervention, and then compared again from baseline to the one-month follow-up. From baseline to post-intervention, marital satisfaction increased for both patients, $t(23)= -4.63$, $p < .001$, and spouses, $t(23)= -4.03$, $p = .001$, pain severity decreased for patients, $t(23)= 3.39$, $p = .002$, positive mood increased for both patients, $t(23)= -3.24$, $p = .004$, and spouses, $t(23)= -3.17$, $p = .004$, and negative mood decreased for patients, $t(23)= 3.56$, $p = .002$, and spouses, $t(23)= 3.20$, $p = .004$. There was no significant difference in the spouses' ratings of their partners' pain from baseline to post-intervention among those in the intervention group, $t(23)= 1.68$, $p = .11$.

Table 5

Primary Outcome Variable Scores from Baseline to Post-Intervention for Patients in the Intervention Group

Variable	Baseline		Post-Intervention			
	Mean	(SD)	Mean	(SD)	t	Effect size
Marital Satisfaction	3.13	(1.57)	4.25	(1.36)	-4.63**	-.36
Pain Severity	5.79	(2.64)	4.58	(2.59)	3.39**	.23
Positive Mood	17.33	(7.30)	22.00	(8.08)	-3.24**	-.29
Negative Mood	6.50	(7.85)	2.00	(2.87)	3.56**	.36

Note. N = 24. ***p* < .01.

Table 6

Primary Outcome Variable Scores from Baseline to Post-Intervention for Spouses in the Intervention Group

Variable	Baseline		Post-Intervention			
	Mean	(SD)	Mean	(SD)	t	Effect size
Marital Satisfaction	3.21	(1.57)	4.21	(1.32)	-4.03**	-.33
Pain Severity	4.96	(3.01)	4.29	(2.74)	1.68	.12
Positive Mood	21.71	(7.37)	26.17	(5.87)	-3.17**	-.32
Negative Mood	3.81	(4.84)	1.79	(3.39)	3.20**	.23

Note. N = 24. **p* < 05. ***p* < .01.

Intervention Group: Baseline to the One-month Follow-up. From baseline to one-month follow-up (see Tables 7 and 8), marital satisfaction increased for both the patient, $t(18) = -3.62$, $p = .002$, and the spouse, $t(18) = -2.28$, $p = .04$. However, there were no significant differences from baseline to the one-month follow-up for pain severity (patient: $t[18] = 1.26$, $p = .23$; spouse: $t[18] = -0.46$, $p = .65$), positive mood (patient:

t[18]= -0.84, *p* = .41; spouse: *t*[18]= -1.43, *p* = .17) or negative mood (patient: *t*[18]= 0.78, *p* = .45; spouse: *t*[18]= 0.06, *p* = .96).

Table 7

Primary Outcome Variable Scores from Baseline to Follow-up for Patients in the Intervention Group

Variable	Baseline		Follow-Up			
	Mean	(SD)	Mean	(SD)	t	Effect size
Marital Satisfaction	3.05	(1.72)	4.10	(1.33)	-3.62**	-.32
Pain Severity	5.74	(2.84)	5.10	(2.64)	1.26	.12
Positive Mood	18.47	(6.99)	19.91	(8.21)	-0.84	-.09
Negative Mood	6.53	(8.28)	5.07	(6.51)	0.80	.10

Note. N = 19. *p < 05. **p < .01.

Table 8

Primary Outcome Variable Scores from Baseline to Follow-Up for Spouses in the Intervention Group

Variable	Baseline		Follow-Up			
	Mean	(SD)	Mean	(SD)	t	Effect size
Marital Satisfaction	3.11	(1.73)	3.95	(1.58)	-2.28*	-.25
Pain Severity	5.11	(2.88)	5.42	(1.87)	-0.46	-.06
Positive Mood	20.00	(6.81)	22.59	(8.19)	-1.43	-.17
Negative Mood	4.76	(5.03)	4.68	(4.08)	0.06	.01

Note. N = 19. *p < 05. **p < .01.

Control Group: Baseline to Post-intervention. These analyses were also conducted among those in the control group to identify if any changes occurred over

time. While patients in the control group did not change their pain ratings from baseline to post-intervention, $t(23)= 0.13$, $p = 90$, the spouses ratings of their partners' pain increased from baseline ($M = 4.74$, $SD = 3.22$) to post-intervention ($M = 5.61$, $SD = 3.01$), $t(23)= -2.93$, $p = .01$. No other significant changes from baseline to post-intervention among patients or spouses in the control group were found for marital satisfaction, (patients: $t[23]= 0.30$, $p = .77$, or spouses: $t[23]= 1.14$, $p = .27$), positive mood (patients: $t[23]= 0.69$, $p = .50$, spouses: $t[23]= 1.66$, $p = .11$) or negative mood (patients: $t[23]= 0.50$, $p = .63$, spouses: $t[23]= -1.29$, $p = .21$).

Control Group: Baseline to the One-month Follow-up. There were no significant changes from baseline to the one-month follow-up among those in the control group for any of the variables: marital satisfaction (patients: $t[21]= -1.68$, $p = .11$, spouses: $t[19]= 0.25$, $p = .80$), pain severity (patients: $t[21]= -0.90$, $p = .38$, spouses: $t[21]= 0.25$, $p = .80$), positive mood (patients: $t[21]= 0.90$, $p = .38$, spouses: $t[21]= -0.67$, $p = .51$), and negative mood (patients: $t[21]= -0.69$, $p = .50$; spouses: $t[21]= -1.90$, $p = .07$).

In summary, there were many group differences at post-intervention indicating that the intervention group had better results after the intervention than the control group; however, there were few group differences at the one-month follow-up. Additionally, when looking at changes over time, the intervention group showed many improvements from baseline to post-intervention whereas the control group only showed few improvements. As with the group differences, generally, these results were not maintained at the one-month follow-up.

Hypothesis 2: Secondary Outcome Variables

Prior to testing the second hypothesis, bivariate correlations were computed among the secondary variables of positive empathy, personal distress, mindfulness-curiosity, mindfulness-decentering, total mindfulness, importance of relationship values and importance of health values for descriptive purposes at baseline (see Table 9).

Table 9

Correlations of Secondary Variables at Baseline

Variable	Empathy	Personal Distress	Mind-Cur	Mind-Dec	Mind-Tot	Val-R	Val-H
Empathy	---	-.37*	.24	.00	.14	.41*	.34*
Personal Distress	.04	---	.02	.16	.09	-.30*	-.04
Mindfulness-Cur	.21	.25	---	.65**	.92**	.28	.37*
Mindfulness-Dec	.21	.17	.48**	---	.89**	.22	.34*
Mindfulness-Tot	.25	.25	.89	.83	---	.28*	.39*
Values-R	.35*	.04	.10	.16	.15	---	.43**
Values-H	.34*	-.11	.23	.15	.22	.37*	---

Note. N = 94 (n = 47 patients; n = 47 spouses). *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Greater empathy was correlated with greater importance of health and relationship values for both the patients and spouses. For the patients only, less personal distress was related to greater empathy and the importance of relationship values. Mindfulness-curiosity, mindfulness-decentering, and total mindfulness were all positively related to each other for the patients and the spouses as well as the

importance of health values for the patients only. Total mindfulness was also related to the importance of relationship values for the patients. Greater importance of health values was related to greater importance of relationship values for both patients and spouses.

Correlations were also calculated between the primary and secondary variables at baseline for patients (see Table 10) and spouses (see Table 11).

Table 10

Correlations of Primary and Secondary Variables for the Patients at Baseline

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.63**	-.09	.41**	-.21
Personal Distress	-.48	.27	-.40**	.71**
Mindfulness-Cur	.21	-.06	.32*	-.06
Mindfulness-Dec	.20	-.04	.20	.09
Mindfulness-Tot	.23	-.05	.29*	.01
Values-R	.45**	-.20	.24	-.37
Values-H	.22	-.14	.23	-.09

Note. N = 47. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 11

Correlations of Primary and Secondary Variables for the Spouses at Baseline

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.56**	-.11	.40**	-.54**
Personal Distress	-.08	.15	.03	.39**
Mindfulness-Cur	.28	-.09	.27	-.14
Mindfulness-Dec	.26	.03	.26	-.11
Mindfulness-Tot	.32*	-.04	.31*	-.15
Values-R	.23	-.17	.19	-.42**
Values-H	.24	-.11	.16	-.40**

Note. N = 47. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

For both patients and spouses, greater marital satisfaction was related to greater empathy. Greater marital satisfaction was also related to greater importance of health values for patients only, and greater total mindfulness for spouses. Pain severity was not significantly related to any of the secondary outcome variables for patients or spouses at baseline. Positive mood was positively related to empathy and total mindfulness for both patients and spouses and was also positively related to mindfulness-curiosity for patients. Greater positive mood was related to less personal distress for the patients. Negative mood was positively correlated with personal distress and negatively correlated with the importance of relationship values for both patients and spouses. For the spouses only, negative mood was negatively correlated with empathy and importance of health values for the spouses.

According to the second hypothesis, couples receiving a pain-related adaptation of the MC were expected to have greater positive empathy toward their partner, lower personal distress, greater mindfulness, and greater importance of health and relationship values than couples in the education control group.

Post-intervention. An ANCOVA revealed significant differences for both patients and spouses on several of the secondary outcome variables (see Tables 12 and 13).

Table 12

Post-Intervention Scores for the Secondary Variables for Patients

Variable	Intervention		Control			Partial Eta
	Mean	(SD)	Mean	(SD)	F	Squared
Empathy	33.94	(7.22)	32.90	(6.18)	0.80	.02
Personal Distress	11.02	(5.97)	13.70	(9.84)	4.61*	.10
Mindfulness-Cur	13.04	(6.78)	11.48	(5.52)	1.70	.04
Mindfulness-Dec	13.76	(6.34)	13.52	(5.86)	0.16	.00
Mindfulness-Tot	26.81	(12.29)	25.00	(10.54)	0.87	.02
Values-R	4.50	(.59)	4.43	(.84)	0.40	.01
Values-H	4.25	(.90)	4.09	(1.00)	0.26	.01

Note. N = 47. *p < 05.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 13

Post-Intervention Scores for the Secondary Variables for Spouses

Variable	Intervention		Control			Partial Eta
	Mean	(SD)	Mean	(SD)	F	Squared
Empathy	34.38	(8.11)	31.00	(8.24)	16.39**	.27
Personal Distress	11.21	(3.65)	12.96	(8.20)	1.79	.04
Mindfulness-Cur	12.63	(5.86)	8.75	(6.20)	5.63*	.11
Mindfulness-Dec	13.58	(5.19)	12.34	(6.28)	4.19*	.09
Mindfulness-Tot	26.21	(9.32)	21.08	(11.79)	6.35*	.13
Values-R	4.58	(.58)	4.43	(.66)	1.29	.03
Values-H	4.08	(.97)	4.04	(1.02)	0.52	.01

Note. N = 47. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

There was a significant difference in positive empathy for the spouses between the intervention and control groups, $F(1, 44) = 16.39$, $p < .001$. Specifically, spouses in the intervention group had significantly higher scores than the control group in empathy following the intervention, controlling for baseline scores (see Table 13). However, the patients in the intervention group did not differ in their scores on positive empathy toward their partner after the intervention compared to the control group, $F(1, 44) = 0.80$, $p = .38$ (see Table 12), controlling for baseline empathy. While there were no significant differences for the spouses on personal distress, $F(1, 44) = 1.79$, $p = .19$ (see Table 13), the patients in the intervention group had significantly lower personal distress

than the patients in the control group, controlling for baseline personal distress, $F(1, 44) = 4.61$, $p = .04$ (see Table 12).

There were also significant differences for mindfulness. The spouses in the intervention group rated all three of their mindfulness scores: curiosity, $F(1, 44) = 5.63$, $p = .02$, decentering, $F(1, 44) = 4.19$, $p = .047$, and total mindfulness $F(1, 44) = 6.35$, $p = .02$, as significantly greater than the spouses in the control group following the intervention, controlling for baseline mindfulness scores (see Table 13). However, there were no significant differences for the patients on curiosity, $F(1, 44) = 1.70$, $p = .20$, decentering, $F(1, 44) = 0.16$, $p = .70$, or total mindfulness, $F(1, 44) = 0.87$, $p = .36$, controlling for baseline mindfulness scores (see Table 12).

Finally, analyses on the importance of relationship and health values were conducted to determine if there were differences between the intervention and control groups for both patients and spouses. There were no significant differences between the intervention and control groups for patients, $F(1, 44) = 0.40$, $p = .53$, or spouses, $F(1, 44) = 1.29$, $p = .26$, on the importance of relationship values, controlling for baseline scores. There were also no significant differences between the intervention and control groups for the importance of health values for either patients, $F(1, 44) = 0.26$, $p = .61$, or spouses, $F(1, 44) = 0.52$, $p = .48$.

One-month follow-up. ANCOVAs were repeated for each of the secondary outcome variables at the one-month follow-up, controlling for baseline scores. There was a significant difference between the intervention ($M = 12.58$, $SD = 3.39$) and control groups ($M = 10.38$, $SD = 5.46$) for mindfulness-decentering for the spouses, $F(1, 38) = 5.03$, $p = .03$, and a trend for total mindfulness, $F(1, 38) = 3.62$, $p = .07$ (intervention: M

= 26.37, *SD* = 7.80; control: *M* = 20.84, *SD* = 9.64), suggesting those in the intervention group have increased mindfulness-decentering. However, there was not a significant difference for spouses for mindfulness-curiosity, $F(1, 38) = 1.81$, $p = .19$. There were no differences between the intervention and control groups for any of the mindfulness scores for patients: decentering, $F(1, 38) = 0.13$, $p = .72$, curiosity, $F(1, 38) = 1.30$, $p = .26$, or total mindfulness, $F(1, 38) = 0.69$, $p = .41$.

There were no significant differences in positive empathy between the intervention and control groups for either patients, $F(1, 38) = 0.16$, $p = .69$ or spouses, $F(1, 38) = 0.09$, $p = .77$, or for personal distress for either patients, $F(1, 38) = 2.48$, $p = .12$, or spouses, $F(1, 38) = 0.13$, $p = .72$) at the one-month follow-up.

Finally, patients' scores in the intervention group did not differ from those in the control group on the importance of relationship values at the one-month follow-up, controlling for baseline scores, $F(1, 38) = 1.61$, $p = .21$; $F(1, 38) = 0.98$, $p = .33$, respectively. There were also no significant differences for the importance of health values for either patients, $F(1, 38) = 0.12$, $p = .73$, or spouses, $F(1, 38) = 1.30$, $p = .26$.

Repeated Measures.

Because the mean group differences at post-intervention do not show whether the variables changed over time, paired samples t-tests were conducted among those in the intervention group to determine if there were significant increases in the secondary outcome variables from baseline to post-intervention and baseline to follow-up. Paired samples t-tests were also conducted for those in the control group.

Intervention Group: Baseline to Post-intervention. Paired samples t-tests were conducted with the intervention group to see if there were significant differences over

time among the secondary outcome variables. The secondary outcome variables were compared from baseline to post-intervention, and then compared again from baseline to the one-month follow-up. For baseline to post-intervention, while there was not a significant change in positive empathy for the patients, $t(23)= -1.80$, $p = .09$, there was a significant decrease in personal distress, $t(23)= 3.19$, $p = .004$ (see Tables 14 and 15).

Table 14

Secondary Outcome Variable Scores from Baseline to Post-Intervention for Patients in the Intervention Group

Variable	Baseline		Post-Intervention			
	Mean	(SD)	Mean	(SD)	t	Effect size
Empathy	31.00	(10.59)	33.94	(7.22)	-1.80	-.16
Personal Distress	15.68	(10.09)	11.02	(5.97)	3.19**	.27
Mindfulness-Cur	10.62	(7.14)	13.04	(6.78)	-2.22*	-.17
Mindfulness-Dec	11.72	(6.42)	13.76	(6.34)	-2.72*	-.16
Mindfulness-Tot	22.36	(12.38)	26.81	(12.29)	-2.72*	-.18
Values-R	4.42	(.83)	4.50	(.59)	-0.57	-.06
Values-H	4.17	(.82)	4.25	(.90)	-0.57	-.05

Note. N = 24. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 15

Secondary Outcome Variable Scores from Baseline to Post-Intervention for Spouses in the Intervention Group

Variable	Baseline		Post-Intervention			
	Mean	(SD)	Mean	(SD)	t	Effect size
Empathy	29.46	(10.26)	34.38	(8.11)	-3.48**	-.26
Personal Distress	16.94	(10.98)	11.21	(3.65)	2.54*	.33
Mindfulness-Cur	10.83	(6.03)	12.63	(5.86)	-1.20	-.15
Mindfulness-Dec	10.03	(4.82)	13.58	(5.19)	-4.52**	-.33
Mindfulness-Tot	20.87	(9.21)	26.21	(9.32)	-3.38**	-.28
Values-R	4.29	(.83)	4.58	(.58)	-1.90	-.20
Values-H	3.79	(1.18)	4.08	(.97)	-1.32	-.13

Note. N = 24. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

For the spouse, there was a significant increase in positive empathy, $t(23)= -3.48$, $p = .002$, as well as a significant decrease in personal distress, $t(23)= 2.54$, $p = .02$, from baseline to post-intervention.

Mindfulness scores also changed from baseline to post-intervention (see Tables 14 and 15). Specifically, for patients, mindfulness-curiosity, $t(23)= -2.22$, $p = .04$, mindfulness-decentering, $t(23)= -2.72$, $p = .01$, and total mindfulness, $t(23)= -2.72$, $p = .01$, increased from baseline to post-intervention. For spouses, there was a significant increase in mindfulness-decentering, $t(23)= -4.52$, $p = .01$, from baseline to post-intervention, which also lead to a significant increase in total mindfulness for spouses,

t(23)= -3.38, *p* = .003. However, there was not a significant change for mindfulness-curiosity for spouses, *t*(23)= -1.70, *p* = .22.

From baseline to post-intervention, there were no significant changes for either the patient, *t*(23)= -0.57, *p* = .58, or spouse, *t*(23)= -1.90, *p* = .07, for the importance of relationship values or the importance of health values (Patient: *t*[23]= -0.57, *p* = .58; Spouse: *t*[23]= -1.32, *p* = .20; see Tables 14 and 15).

Intervention Group: Baseline to the One-month Follow-up. Paired samples t-tests were also conducted with the intervention group to see if there were significant differences from baseline to the one-month follow-up for the secondary outcome variables (see Tables 16 and 17).

Table 16

Secondary Outcome Variable Scores from Baseline to Follow-Up for Patients in the Intervention Group

Variable	Baseline		Follow-Up			
	Mean	(SD)	Mean	(SD)	t	Effect size
Empathy	29.95	(11.13)	31.74	(8.58)	-0.73	-.09
Personal Distress	15.57	(9.85)	13.21	(6.49)	1.03	.14
Mindfulness-Cur	9.47	(7.37)	12.25	(6.34)	-2.25*	-.20
Mindfulness-Dec	11.05	(6.92)	12.23	(5.34)	-0.79	-.10
Mindfulness-Tot	20.52	(13.29)	24.51	(10.89)	-1.56	-.16
Values-R	4.31	(.89)	4.63	(.60)	-1.56	-.21
Values-H	4.11	(.88)	4.00	(1.25)	0.35	.05

Note. N = 19. *$p < 05$.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 17

Secondary Outcome Variable Scores from Baseline to Follow-Up for Spouses in the Intervention Group

Variable	Baseline		Follow-Up			
	Mean	(SD)	Mean	(SD)	t	Effect size
Empathy	28.00	(10.65)	31.84	(6.70)	-1.57	-.21
Personal Distress	18.35	(11.68)	16.53	(12.65)	0.50	.11
Mindfulness-Cur	11.79	(5.91)	13.79	(5.28)	-1.36	-.18
Mindfulness-Dec	9.72	(4.52)	12.58	(3.39)	-2.77*	-.34
Mindfulness-Tot	21.52	(9.48)	26.37	(7.80)	-2.27*	-.27
Values-R	4.22	(1.06)	4.56	(.62)	-1.46	-.19
Values-H	3.74	(1.19)	4.05	(1.08)	-1.03	-.14

Note. N = 19. *p < 05.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

For patients, mindfulness-curiosity increased from baseline to the one-month follow-up, $t(18)= -2.25$, $p = .04$ (see Table 16). There were also significant increases for spouses in for mindfulness-decentering, $t(18)= -2.77$, $p = .04$, and total mindfulness, $t(18)= -2.27$, $p = .04$, from baseline to the one-month follow-up (see Table 17). However, there were no significant differences for the patients for mindfulness-decentering, $t(18)= -0.79$, $p = .44$, or total mindfulness, $t(18)= -1.56$, $p = .14$, or for the spouses for mindfulness-curiosity, $t(18)= -1.36$, $p = .19$.

There were no other significant differences from baseline to the one-month follow-up including positive empathy (patient: $t[18]= -0.73$, $p = .48$; spouse: $t[18]= -1.57$,

p = .14), personal distress (patient: *t*[18]= 1.03, *p* = .32; spouse: *t*[18]= 0.50, *p* = .62), the importance of relationship values, (patient: *t*[18]= -1.56, *p* = .14, spouse: *t*[17]= -1.46, *p* = .16) or the importance of health values, (patient: *t*[18]= 0.35, *p* = .73; spouse: *t*[18]= -1.03, *p* = .32).

Control Group: Baseline to Post-intervention. Paired samples t-tests were also conducted among those who were randomly assigned to the control group to identify any changes over time from baseline to post-intervention and from baseline to the one-month follow-up. From baseline to post-intervention, there was a significant difference in positive empathy for the spouse, *t*(22)= 2.81, *p* = .01. Specifically, positive empathy decreased for the spouses in the control group from baseline (*M* = 33.39, *SD* = 7.90) to post-intervention (*M* = 31.00, *SD* = 8.24). However, there were no differences in positive empathy for patients, *t*(22)= -0.95, *p* = .35.

There were also no significant differences for any of the other variables including personal distress (patients: *t*[22]= 1.66, *p* = .11; spouses: *t*[22]= 1.60, *p* = .13), mindfulness-decentering (patients: *t*[22]= -1.57, *p* = .13; spouses: *t*[22]= -1.60, *p* = .10), mindfulness-curiosity (patients: *t*[22]= -0.81, *p* = .43; spouses: *t*[22]= 0.95, *p* = .15), total mindfulness (patients: *t*[22]= -1.29, *p* = .21; spouses: *t*[22]= -0.41, *p* = .68), the importance of relationship values (patients: *t*[22]= 0.37, *p* = .71; spouses: *t*[22]= -0.70, *p* = .49), and for the importance of health values (patients: *t*[22]= 0.00, *p* = 1.00; spouses: *t*[22]= -0.37, *p* = .72).

Control Group: Baseline to the One-month Follow-up. From baseline to the one-month follow-up, there were no significant differences on any of the variables for either patients or spouses in the control group: empathy (patients: *t*[21]= -1.42, *p* = .17;

spouses: *t*[21]= 0.21, *p* = .84), personal distress(patients: *t*[21]= -0.97, *p* = .35; spouses: *t*[21]= -0.77, *p* = .45), mindfulness-curiosity (patients: *t*[21]= -1.19, *p* = .25; spouses: *t*[20]= -1.09, *p* = .29), mindfulness-decentering (patients: *t*[21]= -0.30, *p* = .77; spouses: *t*[20]= .09, *p* = .13), total mindfulness (patients: *t*[21]= -0.99, *p* = .36; spouses: *t*[20]= -0.58, *p* = .47), the importance of relationship values (patients: *t*[21]= 0.30, *p* = 77; spouses: *t*[20]= -0.27, *p* = .79), and for the importance of health values (patients: *t*[21]= 0.00, *p* = 1.00; spouses: *t*[20]= 0.78, *p* = .45).

Hypothesis 3: Correlates of primary and secondary outcome variables

The third hypothesis focused on the group that received the intervention. It was expected that empathy, mindfulness and the importance of relationship and health values would be the mechanisms through which marital satisfaction, mood, and pain improve.

Post-intervention. Residual change scores for primary outcome variables and secondary outcome (i.e., mechanism) variables were calculated from baseline to post-intervention. These residual scores were then correlated to determine whether changes in the hypothesized mechanism variables were correlated with changes in the primary variables. Correlations were calculated separately for the intervention and control groups.

Intervention group. None of the changes in secondary outcome variables was significantly related to the changes in marital satisfaction for the patients (see Table 18). In contrast, greater improvement in spouses' mindfulness-curiosity was significantly related to greater improvement in spouses' marital satisfaction (see Table 19).

Table 18

Correlations of the Residual Scores from Baseline to Post-intervention for Primary and Secondary Variables for the Patients in the Intervention Group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	-.04	-.44*	.69**	-.41*
Personal Distress	-.06	.30	-.16	-.07
Mindfulness-Cur	.10	-.04	.28	-.40†
Mindfulness-Dec	.04	.17	.23	.05
Mindfulness-Tot	.10	.03	.28	-.24
Values-R	-.10	-.16	.14	-.36
Values-H	.01	-.25	-.06	.13

Note. N = 24. *p < 05. **p < .01. †p = .06.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 19

Correlations of the Residual Scores from Baseline to Post-intervention for Primary and Secondary Variables for the Spouses in the Intervention Group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.27	-.22	.33	-.01
Personal Distress	.05	.04	-.39	.03
Mindfulness-Cur	.41*	-.49*	.40†	-.18
Mindfulness-Dec	.09	-.17	.11	.06
Mindfulness-Tot	.33	-.38†	.30	-.07
Values-R	.23	-.38†	.23	-.20
Values-H	-.09	-.47*	-.06	-.01

Note. N = 24. *p < 05. †p = .05-.07.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Some of the secondary outcome variables were also significantly correlated with pain severity. For the patients, improvement in positive empathy was related to decreases in pain severity (see Table 18). For spouses, greater improvements in empathy and the importance of health values were related to decreases in pain severity (see Table 19).

Finally, there were significant correlations between the secondary outcome variables with both positive and negative mood for the patients. For the patients, greater improvement in empathy was related to the increases in positive mood and decreases in negative mood (see Table 18). However, there were not any secondary outcome

variables that were related to changes in positive mood and negative mood for the spouses.

Control group. The correlations between residual change scores from baseline to post-intervention for primary and secondary variables are also presented for the control group because similar or different patterns of change over time may provide information as to whether changes occur regardless of the intervention. Decreases in personal distress and the importance of health values were related to improvements in marital satisfaction for the patients (see Table 20). For spouses, greater increases in empathy, mindfulness-decentering, mindfulness-curiosity, and total mindfulness were related to greater improvements in marital satisfaction (see Table 21).

Table 20

Correlations of the Residual Scores from Baseline to Post-intervention for Primary and Secondary Variables for the Patients in the Control Group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.40†	-.29	.48*	-.29
Personal Distress	-.52*	.21	-.52*	.49*
Mindfulness-Cur	-.07	.08	-.33	.23
Mindfulness-Dec	-.16	.40†	-.49*	.17
Mindfulness-Tot	-.11	.25	-.44*	.21
Values-R	.23	.46*	-.10	.01
Values-H	-.45*	.17	-.42*	.23

Note. N = 24. *p < 05. **p < .01. †p = .05-.06.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 21

Correlations of the Residual Scores from Baseline to Post-intervention for Primary and Secondary Variables for the Spouses in the Control Group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.50*	.25	.44*	-.12
Personal Distress	-.02	.41†	-.12	.29
Mindfulness-Cur	.71**	-.21	.40†	.21
Mindfulness-Dec	.44*	.07	.34	.00
Mindfulness-Tot	.68**	-.10	.42*	.13
Values-R	.11	.31	.09	-.02
Values-H	.17	.30	.27	-.18

Note. N = 23. *p < 05. **p < .01. †p = .05-.06.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

There was also a significant correlation between a secondary outcome variable and pain severity. For the patients, increases in the importance of relationship values were related to the increases in pain severity (see Table 20). For the spouses, no other changes in secondary outcome variables were associated with the changes in pain severity.

Finally, there were also significant correlations between the secondary outcome variables with both positive and negative mood for the patients. For the patients, increases in empathy and personal distress and decreases in mindfulness-decentering, total mindfulness, and the importance of health values were related to the

improvements in positive mood (see Table 20). Additionally for the patients, greater personal distress was related to greater negative mood. For the spouses, improvements in empathy and total mindfulness were related to the improvements in positive mood (see Table 21). However, there were no significant relationships between the changes in negative mood and changes in the secondary outcome variables for the spouses.

Comparisons between intervention and control groups. Fisher's r to z transformations were calculated to determine whether the magnitudes of these correlations were significantly different in the intervention versus control groups. For the patients, two correlations were significantly stronger in the control group compared to the intervention group: changes in positive mood and changes in mindfulness-decentering, $z = 2.47$, $p < .05$ and changes in positive mood and changes in total mindfulness. However, it is important to note that while these magnitudes were significantly stronger for the control group, all of these correlations between the changes in primary and secondary outcome variables were in the opposite directions than what was expected. For the spouses, the magnitude of the changes in the importance of health values and changes in pain severity was significantly greater for the intervention group, $z = -2.62$, $p < .01$.

In sum, there were few significant differences between corresponding correlations across the intervention and control groups. In addition, while there were significant correlations between changes in the secondary outcome variables and primary outcome variables among those in the control group, when the magnitudes of the correlations were stronger in the control group, this was always in the opposite direction than what was expected.

One-month follow-up. As with baseline to post-intervention, residual change scores for primary and secondary outcome variables were also calculated from baseline to the one-month follow-up. These change scores were correlated to determine whether changes in the secondary outcome variables were correlated with changes in the primary variables. These correlations were calculated separately for the intervention and control groups.

Intervention group. Greater improvements in personal distress and mindfulness-curiosity were related to increases in marital satisfaction for the patients (see Table 22). In contrast, greater improvement in empathy was significantly related to improvement in spouses' marital satisfaction (see Table 23).

Table 22

Correlations of the Residual Scores from Baseline to the One-month Follow-up for Primary and Secondary Variables for the Patients in the Intervention Group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.27	-.43†	.54*	-.41
Personal Distress	-.52**	.32	-.37	.55*
Mindfulness-Cur	.48*	-.15	.12	.25
Mindfulness-Dec	.32	-.21	.27	.24
Mindfulness-Tot	.45†	-.18	.20	.25
Values-R	.25	-.07	.15	-.30
Values-H	-.18	-.16	.09	-.77**

Note. N = 19. *p < 05. **p < .01. †p = .06-.07.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 23

Correlations of the Residual Scores from Baseline to the One-month Follow-up for Primary and Secondary Variables for the Spouses in the Intervention Group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.47*	.08	.48*	-.07
Personal Distress	-.38	-.18	-.47*	.50*
Mindfulness-Cur	.39	-.08	.48*	-.38
Mindfulness-Dec	.25	.05	.28	-.11
Mindfulness-Tot	.40	-.04	.46*	-.32
Values-R	.10	.04	.27	-.16
Values-H	-.20	-.58**	.28	-.16

Note. N = 19. *$p < 05$.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

While changes the secondary outcome variables were not significantly related to the changes in pain severity for patients, there was a significant correlation with the changes in pain severity for the spouses. Specifically, greater improvement in the importance of health values was related to decreases in pain severity (see Table 23).

Finally, there were significant correlations between the secondary outcome variables with both positive and negative mood. For the patients and spouses, greater improvement in empathy was related to increases in positive mood (see Tables 22 and 23). Additionally, for spouses, greater improvements in mindfulness-curiosity and total mindfulness, and personal distress were related to greater improvements in positive

mood. In terms of negative mood, for both patients and spouses, higher personal distress was related to increases in negative mood. For patients only, lower importance of health values was related to greater negative mood.

Control group. Similarly as baseline to post-intervention, the correlations between residual change scores from baseline to the one-month follow-up for primary and secondary variables are also presented for the control group. Changes in the secondary outcome variables were not significantly related to changes in marital satisfaction or changes in pain severity for either the patients or spouses.

While there were no significant correlations for the changes in secondary outcome variables and changes in marital satisfaction and pain severity, there were significant correlations with both positive and negative mood. The decreases in personal distress were related to increases in patients' positive mood and decreases in negative mood, $r(22) = -.49$, $p < .05$, and $r(22) = .66$, $p < .01$, respectively. Additionally, for spouses, decreases in personal distress, $r(22) = .62$, $p < .01$, and improvements in the importance of relationship, $r(22) = -.44$, $p < .05$, and health values, $r(22) = -.59$, $p < .01$, were related to decreases in negative mood. There were no significant correlations among spouses between the changes in secondary outcome variables and the changes in positive mood.

Comparisons between intervention and control groups. Fisher's r to z transformations were also calculated at the one-month follow-up to determine whether the magnitudes of the correlations between the changes in secondary variables and changes in primary variables were significantly different between the intervention and control groups. For the patients, the magnitude of the correlation between the changes

in negative mood and the importance of health values was stronger for the intervention group than control group, z = -3.31, p < .01. For the spouses, there were no significant differences in magnitudes of correlations of the changes in secondary and primary outcome variables between the intervention and control groups.

While there were significant correlations between changes in the secondary outcome variables and primary outcome variables among those in the control group, the magnitudes of the correlations between the changes in primary and secondary outcome variables were either similar or stronger for the intervention group.

Potential Confounds. One issue to consider is the amount of time spent with the participants during the interview and feedback portions. Similar amounts of time were spent with control and intervention couples during the interview portion of the study, $t(39)= 1.17$, $p = .25$. However, as previously mentioned, on average, the intervention group received 12 more minutes of attention during feedback than the control group, which was a significant difference (intervention $M = 17.13$, $SD = 4.71$; control $M = 5.04$, $SD = 1.40$), $t(45)= -11.81$, $p < .001$. Note that there was more variation in the intervention group, which makes sense given that feedback was tailored specifically to each couple, whereas the couples in the control group received the same educational feedback about The Gate Control Theory. It is difficult to provide tailored feedback in 5 minutes.

The amount of time spent in feedback was significantly related to several primary and secondary outcome variables at post-intervention. For the intervention group, feedback time was inversely related to negative mood for the patients, $r(24) = -.47$, $p = .02$, and personal distress for the patients, $r(24) = -.66$, $p < .001$, and the spouses, $r(24)$

= -.58, p = .003. In other words, greater time spent during the feedback session was associated with less negative mood for patients, and less personal distress for both patients and spouses. For the control group, feedback time was only significantly related to empathy for the patients, $r(23)$ = -.62, p = .002, suggesting that more time spent in education was related to less patient empathy. Note that feedback time was not significantly related to any other primary or secondary outcome variables for the intervention or control groups.

Although feedback time was not correlated with most of the primary and secondary variables at post-intervention, analyses were conducted to include time as a covariate because of the significant mean group difference. When feedback time was included as a covariate at post-intervention, some of the original findings were no longer significant. Specifically, pain for the patient, $F(1, 43) = 0.90$, p = .35, positive mood for the patient, $F(1, 43) = 0.39$, p = .54, and spouse, $F(1, 43) = 2.67$, p = .11, and negative mood for the spouse, $F(1, 43) = 2.18$, p = .15, were no longer significantly different between the intervention and control groups (see Tables 24 and 25).

Table 24

Post-Intervention Scores for the Primary Variables for Patients with Feedback Time as a Covariate

Variable	Intervention		Control			Partial Eta		FT
	Mean	(SD)	Mean	(SD)	F	Squared	F	PE^2
Marital Satisfaction	4.25	(1.36)	3.30	(1.36)	9.03**	.17	1.18	.03
Pain Severity	4.58	(2.59)	5.22	(3.27)	0.90†	.02	0.03	.00
Positive Mood	22.00	(8.08)	17.60	(8.50)	0.39†	.01	0.45	.02
Negative Mood	2.00	(2.87)	4.96	(7.88)	10.49**	.20	4.23*	.09

Note. N = 47. *p < 05. **p < .01. †no longer significant with the covariate included.
FT PE^2 = Feedback time partial eta squared.

Table 25

Post-Intervention Scores for the Primary Variables for Spouses with Feedback Time as a Covariate

Variable	Intervention		Control			Partial Eta		FT
	Mean	(SD)	Mean	(SD)	F	Squared	F	PE^2
Marital Satisfaction	4.21	(1.32)	3.39	(1.41)	10.65**	.20	1.96	.04
Pain Severity	4.29	(2.74)	5.61	(3.01)	5.48*	.11	0.79	.02
Positive Mood	26.17	(5.87)	17.43	(8.25)	2.67†	.06	0.48	.01
Negative Mood	1.79	(3.39)	2.78	(4.35)	2.18†	.05	0.02	.00

Note. N = 47. *$p < .05$. **$p < .01$. †no longer significant with the covariate included.
FT PE^2 = Feedback time partial eta squared.

However, among the primary outcome variables, marital satisfaction for the patient, $F(1, 43) = 9.03$, $p = .004$, and the spouse, $F(1, 43) = 10.65$, $p = .002$, were still significantly higher in the intervention than the control group, and pain severity for the spouse, $F(1, 43) = 5.48$, $p = .02$, and negative mood for the patient, $F(1, 43) = 10.49$, $p = .002$, were still significantly lower for the intervention group.

For the secondary outcome variables, there was no longer a significant difference between the patients in the intervention and control groups for personal distress, $F(1, 43) = 0.52$, $p = .47$. Positive empathy, $F(1, 43) = 10.67$, $p = .002$, mindfulness-curiosity, $F(1, 43) = 6.74$, $p = .01$, mindfulness-decentering, $F(1, 43) = 5.04$, $p = .03$, and total mindfulness, $F(1, 43) = 9.04$, $p = .004$, for the spouses all remained significantly higher for the intervention group than the control group (see Tables 26 and 27).

Table 26

Post-Intervention Scores for the Secondary Variables for Patients with Feedback Time as a Covariate

Variable	Intervention		Control			Partial Eta		FT
	Mean	(SD)	Mean	(SD)	F	Squared	F	PE^2
Empathy	33.94	(7.22)	32.90	(6.18)	0.23	.01	0.00	.00
Personal Distress	11.02	(5.97)	13.70	(9.84)	0.52†	.01	0.10	.00
Mindfulness-Cur	13.04	(6.78)	11.48	(5.52)	0.40	.01	0.00	.00
Mindfulness-Dec	13.76	(6.34)	13.52	(5.86)	0.65	.02	1.33	.03
Mindfulness-Tot	26.81	(12.29)	25.00	(10.54)	0.01	.00	0.39	.01
Values-R	4.50	(.59)	4.43	(.84)	0.24	.02	0.14	.01
Values-H	4.25	(.90)	4.09	(1.00)	1.50	.03	1.24	.03

Note. N = 47. *p < 05. †no longer significant with the covariate included.
FT PE^2 = Feedback time partial eta squared.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Table 27

Post-Intervention Scores for the Secondary Variables for Spouses with Feedback Time as a Covariate

Variable	Intervention		Control			Partial Eta		FT
	Mean	(SD)	Mean	(SD)	F	Squared	F	PE^2
Empathy	34.38	(8.11)	31.00	(8.24)	10.67**	.20	2.60	.06
Personal Distress	11.21	(3.65)	12.96	(8.20)	0.58	.01	2.74	.06
Mindfulness-Cur	12.63	(5.86)	8.75	(6.20)	6.74*	.14	2.61	.06
Mindfulness-Dec	13.58	(5.19)	12.34	(6.28)	5.04*	.11	2.05	.05
Mindfulness-Tot	26.21	(9.32)	21.08	(11.79)	9.04**	.17	4.01	.09
Values-R	4.58	(.58)	4.43	(.66)	0.15	.00	0.03	.00
Values-H	4.08	(.97)	4.04	(1.02)	1.77	.04	1.26	.03

Note. N = 47. *p < 05. **p < .01.
FT PE^2 = Feedback time partial eta squared.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

However, while feedback time reduced the number of significant findings when included as a covariate, feedback time itself was not a significant covariate in the vast majority of these analyses (see Tables 24-27). It was only significantly related to negative mood for the patient, $F(1, 43) = 4.23$, $p = .046$ (see Table 24). In addition, the effect sizes for feedback time (range = .00 to .09) suggest that feedback time is not an important variable in predicting the primary and secondary outcome variables. Finally, the intervention group, by design, had a longer period of time for feedback, which could also contribute to the loss of findings once feedback time is controlled for.

These analyses were repeated for the one-month follow-up data. For patients in the intervention group, feedback time was significantly related to marital satisfaction, $r(18) = .47$, $p = .049$, suggesting that more time spent in feedback was associated with greater marital satisfaction. Feedback time was significantly related to total mindfulness for spouses in the intervention group, $r(18) = .48$, $p = .04$. A greater amount of feedback time was associated with higher mindfulness for spouses in the intervention group. Feedback time was not significantly related to any other primary or secondary outcome variables for the intervention group at the one-month follow-up. For the control group, feedback time was only significantly related to empathy the importance of relationship values for the patients, $r(21) = -.54$, $p = .01$, suggesting that more time spent in education was related to lower importance of relationship values.

As with the post-intervention, feedback time was not correlated with most of the primary and secondary variables at the one-month follow-up. However, analyses were conducted to include time as a covariate. Prior to adding feedback time as a covariate, the only significant findings at the one-month follow-up were that the spouses in the

intervention group had greater marital satisfaction and mindfulness-decentering than spouses in the control group. When feedback time was included as a covariate, both marital satisfaction, $F(1,33) = 1.31$, $p = .26$, and mindfulness-decentering, $F(1,34) = 0.43$, $p = .52$, were no longer significant. However, similarly to the post-intervention analyses, feedback time itself was not a significant covariate for either marital satisfaction, $F(1,33) = 0.07$, $p = .80$, or mindfulness-decentering, $F(1,34) = 0.37$, $p = .55$. Additionally, the effect sizes for feedback time for both of these variables was .01, a very small effect.

In sum, the few significant correlations between feedback time with both primary and secondary outcome variables, and the sizes of the effect of feedback time, likely indicate that feedback time is consuming too much power. Therefore, the amount of time spent with couples during the feedback portion may not be meaningful in producing different outcomes between the control and intervention groups. This issue is discussed further in the Discussion section below.

CHAPTER 5

DISCUSSION

A large body of research has demonstrated that the quality of the marital relationship contributes to pain adjustment and well-being in patients with chronic pain (Cano et al., 2000; Cano et al., 2004; Gottman & Notarius, 2000; Keefe et al., 1992; Leonard et al., 2006). Therefore, improving the marital relationship may lead to improved pain severity and mood as well. Additionally, research suggests that the best way to affect individual change is by improving relationships. Baucom et al. (2009) suggests that patients function best, both mentally and physically, when they are involved in healthy relationships. Many spouses can assist their partner in making behavioral changes that can improve their pain (Baucom et al., in press). Even if the couple has relationship issues that are unrelated to pain, improving these issues can improve relationship functioning. This improved relationship could then provide the couple with the best environment in which they can address and treat pain (Baucom et al., in press). One way to improve the quality of the marital relationship is by using motivational based interviewing with couples (Cordova et al., 2001). The purpose of the current study was to develop and test an intervention that utilized motivational interviewing techniques while providing tailored feedback to couples who are affected by chronic pain. The current study examined whether the intervention resulted in changes in marital satisfaction, pain severity, and mood and explored potential reasons for why these changes may have occurred.

The motivational interviewing intervention in this study provided several benefits for couples facing chronic pain at the post-intervention assessment. Specifically, when

compared to couples in the control group, the intervention produced greater marital satisfaction, lower pain ratings, greater positive mood, and lower negative mood for both patients and spouses in the intervention group. In addition, there were benefits on some of the secondary outcome variables. The patients in the intervention group had lower personal distress than the controls following the intervention and the spouses in the intervention group had greater empathy and mindfulness. While there many significant effects at post-intervention, many of these did not remain significant at the one-month follow-up.

Primary Outcome Variables

As expected, both the patients and the spouses in the intervention group had better outcomes on all three of the primary variables -- marital satisfaction, pain severity, and mood -- than those in the control group following the intervention. For almost all of these variables, the group mean differences were attributable to the intervention group showing improvements on these variables from baseline to post-intervention. The one exception was for the spouses' pain ratings, which will be discussed further below. While it was hypothesized that these effects would remain at the one-month follow-up, the only effect that was maintained was that spouses in the intervention group had higher marital satisfaction than the spouses in the control group.

Marital Satisfaction

As predicted, marital satisfaction ratings were greater for both the patients and spouses in the intervention group than the control group following the intervention. The Marriage Checkup, which utilized a similar intervention, also found that using a motivational interviewing approach improved marital satisfaction among couples who

have relationship distress (Cordova et al., 2001). The current study suggests that this intervention can also improve marital satisfaction with couples facing chronic pain. It is possible that marital satisfaction was increased when the couples' strengths were discussed. Reminding the couples' what strengths they have may have fostered closeness between the partners that could have decreased over time while they faced other chronic issues, such as pain.

Pain

As with marital satisfaction, there were also findings for pain severity ratings. Specifically, after the intervention, patients in the intervention group reported lower pain ratings than the patients in the control group. The same was true for the spouses; the spouses in the intervention group rated their partner's pain significantly lower than the spouses in the control group. This finding supported the hypothesis that those in the intervention group would rate the patients' pain ratings as lower than those in the control group.

The intervention may have potentially affected pain ratings because the couples were offered strategies to help better manage pain. Couples may have begun to feel that they had more control over the pain than they originally thought. For example, patients were taught they can decrease their pain by reducing pain catastrophizing thoughts. Furthermore, their spouses were taught they can assist in decreasing their partners' pain by helping them to challenge these catastrophizing thoughts. Pain catastrophizing is common among those with chronic pain and is consistent over time (Keefe et al. 1989) and not only do pain patients catastrophize, but their spouses do as well (Cano et al., 2005). Patients and spouses often feel that they have little control over

the pain and this catastrophizing is related to pain severity (Leonard & Cano, 2006). It is possible that the intervention may have decreased pain catastrophizing among both patients and spouses, therefore reducing pain. However, the intervention did not measure whether pain catastrophizing decreased after the intervention.

Perhaps there was another reason pain decreased. One might argue that sitting for period of time without having any strenuous activity could produce lower pain ratings; however, the repeated measures analyses showed that while patients in the intervention group rated their pain significantly lower, the patients in the control group did not change their pain ratings from baseline to post-intervention. Research suggests that patients' perceptions of their activity level are not related to their pain severity (Huijnen et al., 2010), so it would be expected that the length of time that the couples are sitting would not have an impact on pain ratings.

Surprisingly, spouses in the control group rated their partners' pain at the post-intervention assessment as being significantly higher than at baseline as well as significantly higher than the intervention group at post-intervention. It is possible that this measure is not valid for the purposes of this study and that the spouses' changes in pain ratings are due to another influence. For example, perhaps the spouses took the pain more seriously after hearing about the Gate Control Theory so they could have been more willing to accept their partners' pain or to not downplay the pain.

Mood

Finally, positive mood was greater and negative mood was lower for both patients and spouses in the intervention group than the control group after the intervention. These findings were expected because previous research suggests that

including the spouses in the behavioral treatment of chronic pain has reduced psychological distress for both partners (Cano & Leonard, 2006; Moore & Chaney, 1985). Because the intervention encouraged couples to focus on their strengths, and gave them strategies for improving their pain and relationship in the future, the intervention could have created a sense of hope that their lives will improve and therefore, the couples may have developed a more positive outlook for their future.

One-Month Follow-Up

The only difference that was maintained at the one-month follow-up was that the spouses in the intervention group had greater marital satisfaction than the spouses in the control group. This was consistent with the findings in Cordova et al. (2001) which found that effects for marital satisfaction were maintained at a follow-up. However, the current study did not find lasting effects for marital satisfaction for the patients and there were also no other significant group differences at the one-month follow-up. Perhaps the difference between the Cordova et al. (2001) study and the current study existed because the patients in the current study were facing chronic pain, which is an additional source of chronic stress, whereas the couples in the Marriage Checkup study were not. While the couples in the Marriage Checkup study were couples with relationship distress, perhaps these issues were not as salient on a day to day basis as it is with chronic pain. Another reason could have been due to the brevity of the intervention itself. Because of the brevity of the intervention, it is possible that the effects were not found at the follow-up. Adding booster sessions to the intervention may assist with maintaining effects over a longer period of time (Gwaltney et al., 2011).

Secondary Outcome Variables

The current study also explored whether the intervention would produce benefits in empathy, personal distress, mindfulness, and the importance of health and relationship values. These variables were also conceptualized as the mechanisms through which the primary outcome variables would have changed. The direct effects of the secondary outcome variables will be discussed here and the "potential mechanism effects" will be discussed later.

Compared to the patients in the control group, patients in the intervention group reported lower personal distress at the post-intervention assessment. Additionally, spouses in the intervention group reported greater post-intervention empathy and mindfulness compared to spouses in the control group. There are several reasons that the intervention may have had a direct effect on empathy and mindfulness in spouses. Mindfulness is described as being aware to the present moment and what one is experiencing presently (Bishop et al., 2004; Wachs & Cordova, 2007). The intervention directly asked couples to focus on their thoughts and feelings in the present moment and to really listen to what their partner had to say. This may have made the spouses more aware of their own current state. Furthermore, through this process, the intervention may have helped the couples to promote empathic responding toward each other. For example, by having each partner discuss their views of their relationship and the pain, they may have felt heard and understood by their partner. Indeed, empathic understanding is often associated with empathic responses (Barnett et al., 1981).

It is interesting the group difference in mindfulness was evident for spouses but not for patients. When looking at repeated measures from baseline to post-intervention, there was a significant increase in all three of the mindfulness variables for patients in

the intervention group, whereas the patients in the control group did not significantly improve over time on mindfulness. Thus, while there were not post-intervention group differences with patient mindfulness, the patients in the intervention group did improve from baseline to post-intervention.

Surprisingly, there were no significant differences found for the importance of relationship and health values between the intervention and control groups for either patients or spouses. Since the intervention directly discussed pain and relationships, it was expected that it would make these values more salient to the couple. It is possible that the intervention may not have increased the importance of values for these couples; however, there are also some methodological possibilities to consider as explanations for why differences were not found. For example, the relationship and health values were each measured by a single question. In addition to the single question, the ranges of values for these items were restricted in this study as most participants reported that their health and relationships were of importance. This was not an unexpected finding since McCracken and Yang (2006) found that of 140 patients with chronic pain, the most valued domains were health and family. Perhaps the single question and restricted range did not allow for enough variability to find differences.

As with the primary variables, there were also few significant findings at the one-month follow-up for the secondary outcome variables. The only significant findings were that mindfulness-decentering was significantly higher for spouses in the intervention group compared to the control group and that there was a trend for total mindfulness for spouses as well. Again, this could be due to the brevity of the intervention.

Mechanisms of Change

One of the aims of the current study was to investigate potential reasons for why the intervention produced changes in marital satisfaction, pain severity, and mood.

Marital Satisfaction

For the patients in the intervention group, changes in the hypothesized mechanism variables were not related to changes in marital satisfaction. These null findings suggest that the changes in marital satisfaction were not due to these variables. Perhaps the intervention itself directly improved marital satisfaction or there could have been other variables that were not tested that were influencing the changes such as increases in intimacy (Cordova, Scott, et al., 2005).

For spouses in the intervention group, improvement in mindfulness-curiosity was associated with greater improvement in marital satisfaction. Mindfulness is positively related to marital satisfaction (Barnes et al., 2007; Wachs and Cordova, 2007) and has been found to increase marital satisfaction in a randomized intervention study (Carson et al., 2007). As previously discussed, the intervention may have fostered mindfulness when the partners were asked for their thoughts and feelings in the present moment regarding aspects of their relationship. By having the couples become aware of particular aspects of their relationships, it may have reminded them why they chose to be with their partner.

Pain

The secondary outcome variables may also explain why patients' pain ratings decreased after the intervention. Specifically, improvements in empathy were associated with reductions in pain severity. This is an interesting finding because there were no significant increases in empathy from baseline to post-intervention for patients.

While there were no changes in terms of empathy, it is possible that there was a subset of patients who did have increased empathy after the intervention, and those with increased empathy also had improved pain ratings. Perhaps when spousal empathy and validation were provided, patients' empathy increased and their pain decreased. According to the biopsychosocial model (Gatchel et al., 2007), psychological and social processes interact with the brain and influence health and illness. Perhaps through this method, the social process, increased empathy, is influencing pain. Johansen and Cano (2007) found a relationship between empathy and pain. In this study, when a negative empathic response was expressed in a conversation, specifically invalidation, greater pain severity was reported. Perhaps the opposite of this was true in the current study; that when validation was expressed, pain severity decreased.

For spouses in the intervention group, improvements in mindfulness-curiosity and a greater importance placed on health values were also related to lower pain ratings from baseline to post-intervention. In the pain field, mindfulness has been associated with decreases in pain, pain-distress, and disability (McCracken et al., 2007; McCracken & Thompson, 2008). Mindfulness increased for spouses in the intervention group from baseline to post-intervention, so it is possible that increased mindfulness lead to decreases in their ratings of their partners' pain. However, it is important to note that there were no significant decreases in the spouses' pain ratings from baseline to the post-intervention. Perhaps greater mindfulness increased the spouses' awareness of their partners' actual pain level and decreased catastrophizing or other cognitions that may have led to over-reporting of pain. There is also research to help explain the effect of health values. When patients felt they had success in living according to their

values, their disability decreased (McCracken & Yang, 2006). Additionally, the most important values for patients were family and health values (McCracken & Yang, 2006). Perhaps as the importance of health values were changing, this gave spouses hope that their partners' pain will decrease in the future. Thus, this hope could have been reflected in their current ratings of their partners' pain.

Mood

As with the other primary outcome variables, the ways in which both positive and negative mood improved were also examined. For the patients in the intervention group, improvements in empathy were related to the increases in positive mood. In addition, increases in empathy were also related to decreases in negative mood. While there were not significant improvements in empathy for patients from baseline to post-intervention, it is possible that there was a subgroup that did improve on empathy, which could have led to improvements in mood as well. Empathic responding affects perceptions of partners' relationship behaviors, such as good communication and warmth (Davis & Oathout, 1987), therefore, perhaps as empathic responding increased, it also increased these other positive behaviors, which in turn increased positive mood and decreased negative mood.

Furthermore, for spouses in the intervention group, greater improvements in mindfulness were related to greater improvements in positive mood. Research suggests a link between mindfulness and depression and multiple studies have shown that using a mindfulness-based approach can improve depression (Hofmann et al., 2010; Segal et al., 2002). Additionally, one study that used a mindfulness based intervention improved state-like positive emotions (Geschwind et al., 2011). It is possible that using

motivational interviewing techniques increased the awareness of pleasurable events within the couples' lives, which in turn elicited improvements in their present mood state (Geschwind et al., 2011).

Changes within the Control Group

Analyses were also conducted in the control group to explore changes over time. For both patients and spouses in the control group, improvements in empathy were related to improvements in positive mood and marital satisfaction. Additionally, decreases in personal distress were related to improvements in marital satisfaction, positive mood, and negative mood. There is research that suggests a link between empathy and personal distress with marital satisfaction. Cano et al. (2008) suggests a positive relationship between validation, a form of empathy, and marital satisfaction and a negative relationship between invalidation and marital satisfaction. Additionally, marital satisfaction has been found to improve as empathic responding improves (Boettcher, 1978). Therefore, perhaps both partners are improving their empathic responding by increasing validation and decreasing invalidation which affects marital satisfaction for both themselves and their partners. Another potential reason for the improvement in marital satisfaction could be due to an increase in intimacy among the couples. Cordova, Scott, et al., (2005) found that increases in intimacy were associated with increases in marital satisfaction. While intimacy was not directly measured in the current study, empathy improved for spouses and personal distress decreased for patients, which may have led to increased feelings of intimacy for both partners. Note that the magnitude of these correlations were not significantly different between the two groups.

However, there were some correlations between changes in primary and secondary outcome variables that were significantly stronger in the control group. Specifically, the following correlations were stronger for patients in the control group: 1) increases in mindfulness decentering and decreases in positive mood and 2) increases in total mindfulness and decreases in positive mood. It is interesting to note that these correlations were in the direction opposite to what was predicted. It is possible that the intervention was inhibiting these effects with the patients in the intervention group.

While the correlations between primary and secondary outcome variables support the idea that the secondary outcome variables could be the mechanisms of change, it is also possible that there is another explanation for why the changes in these variables are correlated. For example, all of these variables could be tapping a part of a larger construct, such as general positive affect, and when positive affect increases, the other variables could be changing along with it.

Limitations and Future Directions

This study had several strengths, including the randomization to the intervention or control conditions. However, there were also several limitations that are important to note. As already discussed, the brevity of the intervention may be one reason why there were no significant group differences at the one-month follow-up. There are several possibilities to consider for future research to attempt to maintain the benefits produced by the intervention. Additional sessions could be scheduled following the intervention in the current study to help teach the patients in greater detail how to carry out the initial strategies that were given to them. For example, one initial strategy that was often suggested to couples was using “I statements” to begin to communicate more

effectively. While the couples were taught how to use these statements and were given examples of how to use them, additional sessions could allow the couples to begin to practice using them while still having assistance. Furthermore, added sessions could also be included to teach couples empathy and mindfulness skills.

In addition, there were no attempts made in the current study to follow up with patients to determine whether or not any of the strategies suggested were helpful or if they were carried out after the intervention. An assessment such as this could have allowed for an investigation of which strategies were tested by the couples and which strategies could be effective in sustaining long term outcomes. Another study that used motivational interviewing techniques found that effects were maintained when booster sessions were implemented (Gwaltney et al., 2011).

Another limitation of this study was that the amount of time spent during the feedback portion was significantly different for the intervention and control groups. On average, about five minutes were spent with the couples in the control group during the feedback session and about 17 minutes were spent with the couples in the intervention group. While feedback time had a very small effect size on outcomes when it was included in analyses as a covariate, it did eliminate 5 of the 13 originally significant group differences on outcomes. Therefore, it is not clear whether the significant results are due to the increased time spent with the intervention group. Given the nature of the tailored feedback that was provided to couples, it would be very difficult to reduce feedback time to only five minutes for the intervention group. Five minutes is not sufficient time to engage the couples using the motivational interviewing strategies. Moreover, even when additional analyses were conducted controlling for feedback time,

most of the effects remained, suggesting that the targeted feedback was the primary reason for change. One possibility for future studies would be to match the time spent with the control and intervention groups to ensure that the results are due to the intervention itself and not the increased time spent with the couples in the intervention group. To do this, given the difficulty of decreasing the time spent with the intervention group, it would likely be easiest to expand the amount of time spent on education provided to control group.

Correlations were used to investigate whether the changes in the primary outcome variables were related to the changes in the secondary outcome variables. Thus, while the residualized change analyses suggest a causal pathway, a causal pathway cannot be concluded. There may be other explanations other than a causal pathway. For example, as previously mentioned, there could be an overarching construct that all of these variables are related to, such as positive affect. Future studies can directly manipulate the secondary outcome variables to determine if there are causal relationships. For example, experiments can be conducted that randomize couples to interventions that teach specific skills, such as mindfulness or empathy skills. These groups can be compared to a control group, to establish whether these skills improve outcomes in marital satisfaction, pain, and mood. Additionally, these variables could be measured multiple times over time to see if these secondary outcome variables are changing prior to the primary outcome variables.

Another limitation of this study is the sheer number of analyses that was conducted. Therefore, Type 1 error issues should be considered. The large number of correlations may be capitalizing on chance and therefore, there may be significant

correlations that are false positives. It is important to replicate this study to ensure these findings reflect reality and that they did not occur due to chance alone.

A final limitation is the attrition at the one-month follow-up. Six couples (17.5%) did not complete the one-month follow-up. This was similar to the 15% of people who did not complete the study at one month in the MC (Cordova et al., 2001). While there were few differences between couples that completed and did not complete the one-month follow-up, it is possible that these couples could have been different in other respects than those that completed the follow-up. Additionally, of the six couples that did not complete the one-month follow-up, five of these couples were randomly assigned to the intervention group. It is possible that there were a greater number of couples in the intervention group that did not follow-up for a couple of reasons. One possibility is that these couples did not follow through with the strategies that were offered to them during the intervention and did not want to complete the follow-up for this reason. Another possibility is that these couples felt that the intervention was too demanding due to the strategies offered and did not want to continue to participate. Finally, another aspect that may have affected the response rate at the one-month follow-up was whether the couples liked participating in this study or the couples in the intervention group may have felt that their relationship was judged inaccurately and were offended or angry. However, none of these were measured by the study and while there was no evidence of this observed from the participants, it is possible that if they did not like the information provided to them, they may not have felt it worthwhile to participate in the one-month follow-up.

Conclusion

In this study, several important benefits were obtained for couples facing chronic pain including greater marital satisfaction, less pain, increased positive mood, and decreased negative mood. This intervention was unique because it integrated several effective aspects of previous interventions such as including the spouse in the treatment, focusing on both pain and social variables, and utilizing motivational interviewing techniques.

It may be useful to consider whether an intervention like the one tested in the current study would be efficacious in other chronically ill populations, such as couples facing cancer, diabetes, or transplantation. These couples could also benefit from some of the same outcomes as the couples with chronic pain, such as improved mood and marital satisfaction, which are associated with other positive outcomes as well, including better medical compliance. For example, when patients have a negative mood, they are three times more likely to be noncompliant with medical treatment recommendations (DiMatteo et al., 2000). In addition, as previously discussed with the biopsychosocial model, if the spouses of these patients are included in the intervention, not only can the spouses benefit, but the spouses can affect the patients as well (Bookwala, 2005; Cano et al., 2000; Cano & Leonard, 2006; Flor et al., 1987; Flor et al., 1989; Gatchel et al., 2007; Leonard et al., 2006; Lousberg et al., 1991; McCracken, 2005; Stroud et al., 2006; Turk et al., 1992; Williamson et al., 1997). However, the intervention may need to be modified to account for other issues among various health populations, such as whether or not the illness is terminal, effects of treating the illness (i.e., chemotherapy, surgery), and how well the illness is managed.

At this time, continued research in this area needs to be conducted to determine whether this intervention would work with couples who have other chronic health issues. This study is a promising step to enhancing current treatments for couples facing chronic pain as well as other chronic illnesses. By including aspects of this intervention in future treatments, it is possible that existing treatments can become more effective.

ANCILLARY TABLES

Ancillary Table 1

Correlations of primary variables at post-intervention for the intervention group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Marital Satisfaction	---	-.14	.38*	-.35
Pain Severity	-.22	---	-.28	.31
Positive Mood	.33	-.27	---	-.39**
Negative Mood	-.33	.31	-.67***	---

Note. N = 48 (n = 24 patients; n = 24 spouses). *p = 07. **p = .06. ***p < .01. Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 2

Correlations of primary variables at post-intervention for the control group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Marital Satisfaction	---	-.19	.31	-.55**
Pain Severity	-.04	---	-.58**	.27
Positive Mood	.58**	-.16	---	-.57**
Negative Mood	-.22	.55**	-.20	---

Note. N = 46 (n = 23 patients; n = 23 spouses). ***p* < .01.
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 3

Correlations of primary variables at the follow-up for the intervention group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Marital Satisfaction	---	-.02	.53*	-.19
Pain Severity	-.01	---	-.43*	.45**
Positive Mood	.36	-.12	---	-.39
Negative Mood	-.22	-.13	-.58***	---

Note. N = 38 (n = 19 patients; n = 19 spouses). *p = 07. **p = .05. ***p < .01. Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 4

Correlations of primary variables at the follow-up for the control group

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Marital Satisfaction	---	-.02	.32	-.33
Pain Severity	.13	---	-.43*	.48*
Positive Mood	.02	.02	---	-.66**
Negative Mood	-.16	.19	-.26	---

Note. N = 44 (n = 22 patients; n = 22 spouses). *$p < .05$. **$p < .01$.
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 5

Correlations of secondary variables at post-intervention for the intervention group

Variable	Empathy	Personal Distress	Mind-Cur	Mind-Dec	Mind-Tot	Val-R	Val-H
Empathy	---	.19	.51*	.54**	.56**	.41*	.25
Personal Distress	-.44*	---	.34	.28	.33	.25	.26
Mindfulness-Cur	.19	.03	---	.75**	.94**	.31	.20
Mindfulness-Dec	.07	.06	.42*	---	.93**	.46*	.24
Mindfulness-Tot	.16	.05	.86**	.82**	---	.41*	.23
Values-R	.46*	-.35	.09	-.29	-.10	---	.49*
Values-H	.07	.07	.33	.02	.22	.37	---

Note. N = 48 (n = 24 patients; n = 24 spouses). *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 6

Correlations of secondary variables at post-intervention for the control group

Variable	Empathy	Personal Distress	Mind-Cur	Mind-Dec	Mind-Tot	Val-R	Val-H
Empathy	---	-.51	-.29	-.54**	-.45**	.32	.23
Personal Distress	.11	---	.14	.37	.28	-.22	-.08
Mindfulness-Cur	.42*	.09	---	.72**	.92**	.08	.34
Mindfulness-Dec	.44*	.26	.79**	---	.93**	.17	.08
Mindfulness-Tot	.45*	.18	.95**	.95**	---	.14	.22
Values-R	.48*	.10	.54**	.44*	.52*	---	.39
Values-H	.12	.10	.27	.35	.33	.37	---

Note. N = 46 (n = 23 patients; n = 23 spouses). *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 7

Correlations of secondary variables at the follow-up for the intervention group

Variable	Empathy	Personal Distress	Mind-Cur	Mind-Dec	Mind-Tot	Val-R	Val-H
Empathy	---	-.64**	.53*	.39	.51*	.44*	.15
Personal Distress	-.32	---	-.19	-.04	-.13	-.35	-.09
Mindfulness-Cur	.28	-.18	---	.75**	.95**	.26	-.04
Mindfulness-Dec	.15	-.29	.60**	---	.92**	.13	-.26
Mindfulness-Tot	.25	-.25	.94**	.84**	---	.22	-.15
Values-R	.42	-.19	.30	.11	.25	---	.15
Values-H	-.16	.02	.16	.02	.12	.45*	---

Note. N = 38 (n = 19 patients; n = 19 spouses). *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 8

Correlations of secondary variables at the follow-up for the control group

Variable	Empathy	Personal Distress	Mind-Cur	Mind-Dec	Mind-Tot	Val-R	Val-H
Empathy	---	.26	.45	-.06	.26	-.05	-.28
Personal Distress	.18	---	.34	.34	.40	.02	.19
Mindfulness-Cur	.69**	.12	---	.43*	.88**	.15	.31
Mindfulness-Dec	.35	.33	.45*	---	.81**	.10	.32
Mindfulness-Tot	.62**	.26	.86**	.84**	---	.14	.37
Values-R	.59**	-.21	.62**	.14	.46*	---	.33
Values-H	.29	-.01	.27	.03	.18	.67**	---

Note. N = 46 (n = 23 patients; n = 23 spouses). *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health
Patient correlations are above the diagonal and spouse correlations are below the diagonal.

Ancillary Table 9

Correlations of primary and secondary variables for the patients in the intervention group at post-intervention

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.31	-.08	.71**	-.37
Personal Distress	.10	.44*	-.01	.43*
Mindfulness-Cur	.07	.13	.46*	-.07
Mindfulness-Dec	.26	-.10	.44*	-.17
Mindfulness-Tot	.17	.02	.48*	-.13
Values-R	.27	.17	.01	.13
Values-H	-.02	-.08	-.11	.22

Note. N = 24. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 10

Correlations of primary and secondary variables for the spouses in the intervention group at post-intervention

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.29	-.16	.51*	-.37
Personal Distress	-.26	.41*	-.43*	.50*
Mindfulness-Cur	.03	-.19	.27	-.09
Mindfulness-Dec	-.06	.20	.16	-.07
Mindfulness-Tot	-.01	-.01	.25	-.10
Values-R	-.05	-.25	.33	.00
Values-H	-.42*	-.05	-.10	-.02

Note. N = 24. *p < 05.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 11

Correlations of primary and secondary variables for the patients in the control group at post-intervention

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.51*	.02	.42	-.44*
Personal Distress	-.52*	.28	-.65**	.92**
Mindfulness-Cur	-.11	-.06	-.14	.10
Mindfulness-Dec	-.20	.22	-.43*	.25
Mindfulness-Tot	-.17	.09	-.31	.20
Values-R	.28	-.04	.08	-.28
Values-H	-.09	.05	-.15	-.05

Note. N = 24. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 12

Correlations of primary and secondary variables for the spouses in the control group at post-intervention

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.62**	.11	.46*	-.15
Personal Distress	.03	.48*	.12	.45*
Mindfulness-Cur	.57**	.13	.49*	.01
Mindfulness-Dec	.63**	.17	.60**	.07
Mindfulness-Tot	.63**	.16	.58**	.05
Values-R	.49*	.18	.26	-.27
Values-H	.34	.08	.20	-.17

Note. N = 23. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 13

Correlations of primary and secondary variables for the patients in the intervention group at the follow-up

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.64**	-.11	.58**	-.41
Personal Distress	-.70**	.00	-.49*	.49*
Mindfulness-Cur	.36	.09	.45*	.12
Mindfulness-Dec	.21	-.37	.57*	.12
Mindfulness-Tot	.31	-.12	.53*	.14
Values-R	.47*	-.08	.16	-.11
Values-H	-.07	-.10	.06	-.52*

Note. N = 19. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 14

Correlations of primary and secondary variables for the spouses in the intervention group at the follow-up

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.52*	.11	.48*	-.23
Personal Distress	-.19	.14	-.44	.38
Mindfulness-Cur	.13	-.08	.44	-.42
Mindfulness-Dec	.22	.03	.40	-.32
Mindfulness-Tot	.18	-.04	.47*	-.42
Values-R	-.02	-.17	.49*	-.27
Values-H	-.46*	-.34	.38	-.14

Note. N = 19. *$p < 05$.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 15

Correlations of primary and secondary variables for the patients in the control group at the follow-up

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.48*	.19	.15	.11
Personal Distress	-.21	.54*	-.70**	.77**
Mindfulness-Cur	.15	-.12	-.24	.20
Mindfulness-Dec	-.05	.06	-.33	.34
Mindfulness-Tot	.07	-.05	-.33	.31
Values-R	.09	-.05	-.08	.04
Values-H	-.10	.27	-.34	.20

Note. N = 22. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

Ancillary Table 16

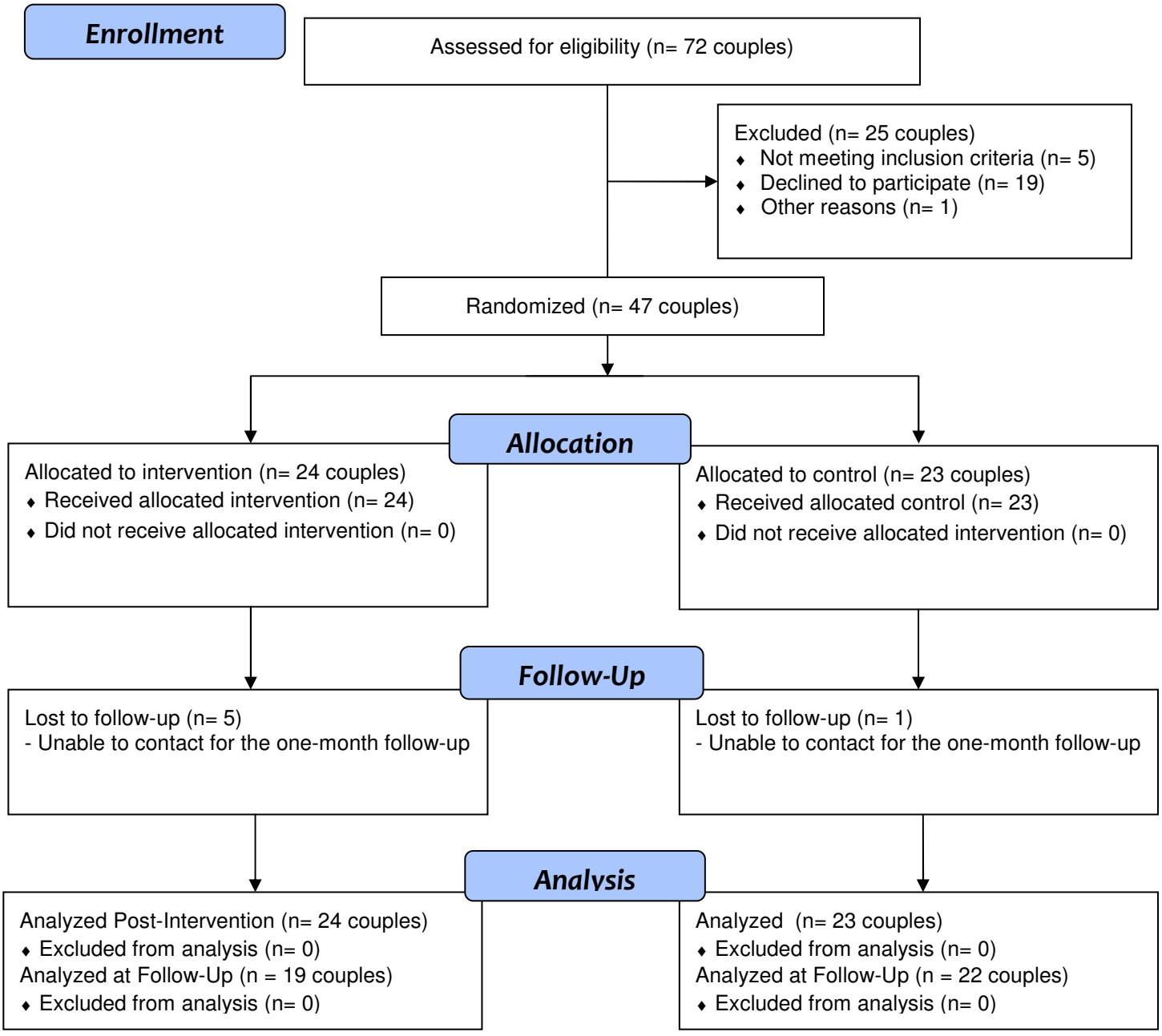
Correlations of primary and secondary variables for the spouses in the control group at the follow-up

	Marital Satisfaction	Pain Severity	Positive Mood	Negative Mood
Empathy	.54*	.20	.26	.14
Personal Distress	.01	.44*	.07	.68**
Mindfulness-Cur	.41	.42	.01	.10
Mindfulness-Dec	-.02	.24	.22	.36
Mindfulness-Tot	.22	.39	.13	.26
Values-R	.33	.18	.21	-.52*
Values-H	.03	.10	.18	-.49*

Note. N = 22. *p < 05. **p < .01.
Mindfulness-Cur = Mindfulness-curiosity, Mindfulness-Dec = Mindfulness-decentering, Mindfulness-Tot = Total mindfulness, Values-R = Importance of relationship, Values-H = Importance of health

APPENDIX A

CONSORT 2010 Flow Diagram



APPENDIX B

Feedback Form for Intervention Group

The Relationship Interview Study: Understanding Couples with Chronic Pain

Couple Name:

Date:

	Husband	Wife	Average
Marital Satisfaction			100
Depression			< 16
Perceived Partner Responsiveness			107
Empathy			32
Personal Distress			32
Focus on the Present			39
Pain Catastrophizing			22.25

SUMMARY OF SCORES

COMPARED TO OTHER COUPLES, YOU SCORED COMPARATIVELY WELL/OR HIGH IN:

Marital Satisfaction
Depression
Perceived Partner Responsiveness
Empathy
Personal Distress
Focus on the Present
Pain Catastrophizing

Strengths (SELECT 1-3 OF THE FOLLOWING)

1. Satisfied with your relationship
2. Ability to understand each other
3. Ability to listen to each other
4. Ability to focus on the present
5. Ability to articulate your needs and values

Reasons Why These are Strengths:

1. Being satisfied in your relationship has been shown to reduce the likelihood of divorce and depression. In addition, those who are satisfied in their relationship generally report lower levels of pain.
2. Feeling like your partner understands you can help increase the satisfaction you have within your relationship and decrease depression and pain. Additionally, feeling like your partner understands you can help increase you and your partner's personal and relationship well-being.
3. Being able to listen to each other may result in a higher likelihood of problem solving during disagreements rather than using ineffective communication. In addition, if you are able to listen to your partner, your partner may feel more understood, which could improve the satisfaction in your relationship as well as how you deal with pain and how it interferes with your life together.
4. Focusing on the present can lead to better problem solving on current issues, like pain. In addition, by focusing on the present, may provide you with more reflection and enjoyment during positive times.
5. Being able to articulate your needs and values to your partner will allow them to understand you better. This understanding can lead to improved communication and well-being as well as decreased depression and pain.

Areas for Potential Change (SELECT 1-3 OF THE FOLLOWING)

Every couple has areas in which they can improve upon. Here are some areas that you may want to consider working on:

1. Being satisfied within your relationship
2. Understanding your partner's view of things
3. Taking the time to listen to your partner
4. Focusing on present issues rather than past issues
5. Articulating your needs and values

Reasons For the Areas of Potential Change

1. If you are not satisfied in your relationship, you are at a higher risk for depression and divorce. Increasing the satisfaction you have in your relationship can reduce the risk of these.
2. If you are not able to try to understand your partner's views, this could lead to a decrease in satisfaction in your relationship and an increase in depression and pain. Feeling like your partner understands you can help increase you and your partner's personal and relationship well-being.
3. If you are not able to take the time to listen, your partner may feel like you do not want to listen to what they have to say. If you are able to listen to your partner, your partner may feel more understood, which could improve the satisfaction in your relationship as well as how you deal with pain and how it interferes with your life together.
4. Bringing up previous situations that are not relevant to a current one may increase anger or resentment and not allow for effective communication. Focusing on the present can lead to better problem solving on current issues like pain and may provide you with more reflection and enjoyment during positive times.
5. If your partner is not aware of your needs and values then your partner may not know what to address within your relationship. While you do not always have to agree on the same values, understanding your partner's views is important because it can allow your partner to understand you better. This understanding can lead to improved communication and well-being as well as decreased depression and pain.

Strategies

If you would like to consider working on areas for potential change in your relationship, here are some strategies that you can use to help you do so.

Menu of STRATEGIES (SELECT 2-4 OF THE FOLLOWING):

1. Marital Counseling. Many couples benefit from engaging in counseling for a variety of reasons. For example, counseling can help couples communicate more effectively, learn how to listen and communicate clearly, and improve relationship satisfaction and pain adjustment.
2. Sharing. Take 5-10 minutes a day to discuss how your day was. Taking the time to share the events of your day and truly listening to your partner's day can help to bring you closer together.
3. "Date Nights." Relationships need time to thrive so it is important to set aside specific time to spend together. Intimacy cannot be maintained without spending this time together. It is suggested that you schedule time to spend with just each other at least once per month.
4. Empathic Training. Try to really understand your partner's point of view. While you will not always agree with your partner, by listening to your partner and putting yourself in your partner's shoes, this can help you to understand your partner's views about pain and your relationship. You can even try taking each other's sides and communicating from the opposing point of view.
5. Behavior Exchange. Ask each other about a small task that you each could do for each other this week (e.g., say "I love you", a non-sexual massage, buy flowers, take out the trash). Make sure the size of the tasks are matched so that you both feel rewarded. Then do them and tell your partner how it felt to receive the gift.
6. Use "I" statements. Using "I" statements can help you to communicate effectively to your partner what your values, needs, and feelings are. Some examples of how to use "I" statements include:
    a. When you do X in situation Y, I feel Z.
        i. Examples:
            1. When you don't call to tell me you are running late (X) when we have a dinner appointment (Y), I feel worried and frustrated (Z).
            2. When you tell me that you love me (X) before we go to sleep (Y), I feel that you truly care about me.
            3. When you do my chores for me (X) when I am in pain (Y), I feel that you understand what I am going through.
    b. I would like X because Y.
        i. Examples:
            1. I would like to have more date nights (X) because I feel that it increases the romance in our relationship (Y).
            2. I would like you to watch the kids more (X) because it allows me to have some time to myself (Y).

3. I would like some help with the dishes (X) because I feel pain after standing for a long time (Y).

7. Relaxation training. You can try a variety of relaxation techniques including meditation, yoga, visualization, or deep breathing. Learning these techniques may help in reducing tension, pain, stress, and anger, as well as improve concentration and confidence in solving problems. Feel free to contact us if you'd like more information.
8. Cognitive reframing of catastrophic thoughts about pain. When your thoughts about pain take on a life of their own (e.g., "I'm never going to live my life while I have pain!", "My life has no meaning while I have pain!"), see if you can challenge that thought. Think of the positive things in your life and share your gratitude with your partner. Invite your partner to help you do this.
9. Be curious about your partner. Take the time to ask your partner questions about what he or she is thinking or feeling about different situations, including about the pain. Being curious about different aspects of your partner will help you learn more and understand your partner better, improving satisfaction and opening the lines of communication.
10. Staying in the present. During an argument, try to stick with the current issue at hand rather than bringing up events or issues in the past. During a shared pleasant experience, take the time to appreciate the event rather than rushing through it or being on "autopilot." Pay attention to what you see, hear, smell, feel, and taste in that moment. Ask your partner about what he or she is experiencing.

APPENDIX C

Feedback Form for Control Group

The Relationship Interview Study: Understanding Couples with Chronic Pain

Couple Name:

Date:

The Gate Control Theory of Pain

1. In the 1960's, scientists developed a new theory of pain, the "Gate Control Theory."

2. According to this theory, there is a gate located in the spinal cord right in the middle of the pain pathway. This gate can be open or closed. When the gate is closed it can stop pain messages from going up the pain pathway to the brain. When the gate is open, pain messages are allowed to go along the pain pathway right to the brain. (Refer to **Figure 1**)

3. Scientists have discovered that your brain closes the gate in the pain pathway by releasing natural pain killers that are called endorphins. These pain killers are just like morphine and are very powerful.

Thoughts and feelings in brain can close the gate.

1. Scientists have also discovered that there are nerves that go from areas of the brain in which thoughts and feelings occur to the gate in the pain pathway. (Refer to **Figure 2**).

2. Research studies suggest that activity in these centers of the brain can cause the gate in the pain pathway to be open or closed.

3. This is probably why many people notice that their thoughts and feelings can have a major effect on pain.

Figure 1

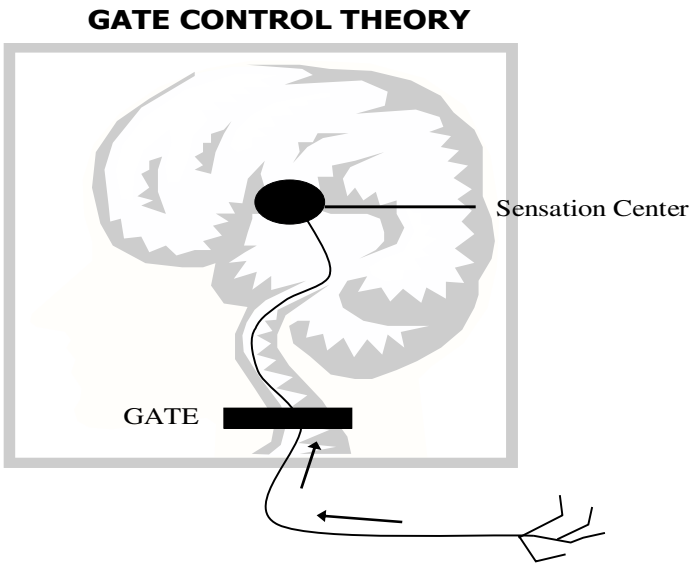
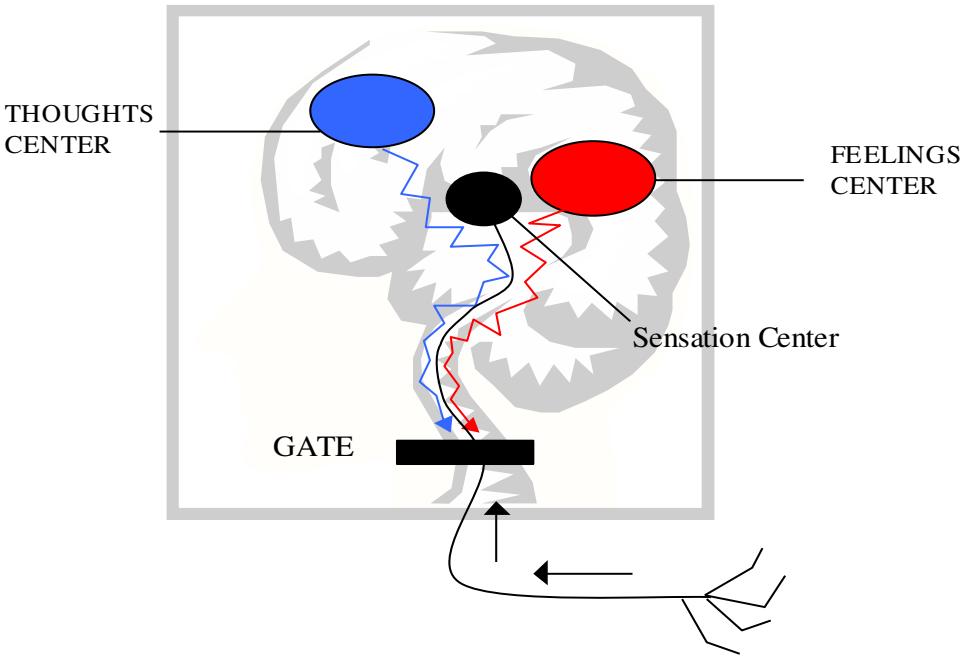


Figure 2



APPENDIX D

CES-D

Center for Epidemiologic Studies Depression Scale (CES-D) (Radloff, 1977)

The following is a list of the ways you might have felt or behaved. Please indicate how often you have felt this way during the past week.

Please circle the appropriate number for each question. *During the past week…*	**Rarely or none of the time (less than 1 day)**	**Some or a little of the time (1-2 days)**	**Occasionally or a moderate amount of time (3-4 days)**	**All of the time (5-7 days)**
1. I was bothered by things that usually don't bother me.	0	1	2	3
2. I did not feel like eating; my appetite was poor.	0	1	2	3
3. I felt that I could not shake off the blues even with help from my family or friends.	0	1	2	3
4. I felt that I was just as good as other people.	3	2	1	0
5. I had trouble keeping my mind on what I was doing.	0	1	2	3
6. I felt depressed.	0	1	2	3
7. I felt that everything I did was an effort.	0	1	2	3
8. I felt hopeful about the future.	3	2	1	0
9. I thought my life had been a failure.	0	1	2	3
10. I felt fearful.	0	1	2	3
11. My sleep was restless.	0	1	2	3
12. I was happy.	3	2	1	0
13. I talked less than usual.	0	1	2	3
14. I felt lonely.	0	1	2	3
15. People were unfriendly.	0	1	2	3

16. I enjoyed life.	3	2	1	0
17. I had crying spells.	0	1	2	3
18. I felt sad.	0	1	2	3
19. I felt that people dislike me.	0	1	2	3
20. I could not “get going.”	0	1	2	3

Sum Total: _____

APPENDIX E

The Oral History Interview

The Oral History Interview (Buehlman et al., 1992)

Question 1. Why don't we start from the beginning… Tell me how the two of you met and got together.

Do you remember the time you met for the first time? Tell me about it.

Was there anything about (spouse's name) that made him/her stand out.

What were your first impressions of each other?

Question 2. When you think back to the time you were dating, before you got married, what do you remember? What stands out?

How long did you know each other before you got married? What do you remember of this period? What were some of the highlights? Some of the tensions? What types of things did you do together?

Question 3. Looking back over the years, what moments stand out as the really good times in your marriage? What were the really happy times? (What is a good time like for this couple?)

Question 4. Looking back over the years, what moments stand out as the really hard times in your marriage? Why do you think you stayed together? How did you get through these difficult times?

Question 5. How would you say your marriage is different from when you first got married?

Pain Questions

Question 6. How do you think the pain has affected your marriage?

How has the pain affected the time you spend together? What you talk about? Who does the chores? Time spent with kids, family, friends? Hobbies or leisure time?

Question 7. How have you felt about those changes?

Question 8. Have you ever talked about these things with each other?

Question 9. Have there been any negative consequences/effects of the pain?

Question 10. How about any positive effects?

APPENDIX F

Adherence Template

Couple Number: Experimental or Control Group:

Explains the table (e.g., what the variables we tested mean)

1 – Does not explain any variables
2 – Explains some, but not all variables
3 – Explains all of the variables

Explains the couple's strengths
1 – Does not explain any strengths
2 – Explains 1-3 of the couples strengths

Explains why it's important to have these as strengths
1 – Does not explain any reasons
2 – Explains the reasons

Explains the couple's weaknesses (called areas for potential change)
1 – Does not explain any areas for potential change
2 – Explains 1-3 of the couples areas for potential change

Explains why it's important to improve upon areas for potential change
1 – Does not explain any reasons
2 – Explains the reasons

Suggests strategies for improving areas for potential change
1 – Suggests 0 or 1 strategy
2 – Suggests 2-4 strategies

Uses open-ended questions (open-ended asks for elaboration; close ended are typically one word answers – like yes or no)
1 – Uses no open-ended questions
2 – Uses more close-ended than open-ended questions
3 – Uses more open-ended than close-ended questions

Uses reflections (repeats back what they're saying; e.g., it's hard not to worry about the pain)
1 – Does not use any reflections
2 – Uses 1-2 reflections
3 – Uses more than 2 reflections

Uses empathy (affirm and support their thoughts/feelings; e.g., it's tough)
1 – Does not use any empathic statements
2 – Uses 1-2 empathic statements
3 – Uses more than 2 empathic statements

APPENDIX G

DAS

DYADIC ADJUSTMENT SCALE (DAS) (Spanier, 1976)

Most people have disagreements in their relationships. Please indicate below the approximate extent of agreement or disagreement between you and your partner for each item on the following list, by circling the appropriate number.

	Always Agree	Almost Always Agree	Occa-sionally Disagree	Fre-quently Disagree	Almost Always Disagree	Always Disagree
1. Handling Family Finances……	5	4	3	2	1	0
2. Matters of Recreation……....	5	4	3	2	1	0
3. Religious Matters…….	5	4	3	2	1	0
4. Demonstrations of Affection……	5	4	3	2	1	0
5. Friends……..	5	4	3	2	1	0
6. Sex Relations……	5	4	3	2	1	0
7. Conventionality (correct or proper behavior)...	5	4	3	2	1	0
8. Philosophy of Life…….	5	4	3	2	1	0
9. Ways of Dealing with Parents or In-Laws…...	5	4	3	2	1	0
10. Aims, Goals and Things Believed Important..	5	4	3	2	1	0
11. Amount of Time Spent Together……	5	4	3	2	1	0
12. Making Major Decisions……	5	4	3	2	1	0
13. Household Tasks……	5	4	3	2	1	0
14. Leisure Time Interests and Activities……	5	4	3	2	1	0
15. Career Decisions……	5	4	3	2	1	0

	All the Time	Most of the Time	More often than Not	Occa-sionally	Rarely	Never
16. How often do you discuss or have you considered divorce, separation or terminating your relationship?……..	0	1	2	3	4	5
17. How often do you or your mate leave the house after a fight?……	0	1	2	3	4	5
18. In general, how often do you think that things between you and your partner are going well?..	5	4	3	2	1	0
19. Do you confide in your mate?……	5	4	3	2	1	0
20. Do you ever regret that you married? (or lived together)……..	0	1	2	3	4	5
21. How often do you and your mate quarrel?……	0	1	2	3	4	5
22. How often do you and your mate "get on each other's nerves"?…….	0	1	2	3	4	5

	Every Day	Almost Every Day	Occa-sionally	Rarely	Never
23. Do you kiss your mate?……	4	3	2	1	0

	All of Them	Most of Them	Some of Them	Very few of Them	None of Them
24. Do you and your mate engage in outside interests together?……..	4	3	2	1	0

How often would you say the following events occur between you and your mate?

	Never	Less than Once a Month	Once or twice a Month	Once or twice a Week	Once a Day	More often
25. Have a stimulating exchange of ideas……	0	1	2	3	4	5
26. Laugh together……	0	1	2	3	4	5
27. Calmly discuss something……..	0	1	2	3	4	5
28. Work together on a project……..	0	1	2	3	4	5

These are some things about which couples sometimes agree and sometimes disagree. Indicate if either item below caused differences of opinions or were problems in your relationship during the past few weeks. (Circle Yes or NO)

	Yes	No
29. Being too tired for sex……..	0	1
30. Not showing love…….	0	1

31. Which of the following statements best describes how you feel about the future of your relationship? **(Check ONE)**

I want desperately for my relationship to succeed, and would go to almost any length to see that it does……	____5____
I want very much for my relationship t o succeed, and will do all I can to see that it does……	___4_____
I want very much for my relationship to succeed, and will do my fair share to see that it does……..	____3____
It would be nice for my relationship to succeed, but I can't do much more than I am doing now to help it succeed……	____2____
It would be nice if it succeeded, but I refuse to do any more than I am doing now to keep the relationship going……..	____1____
My relationship can never succeed, and there is no more that I can do to keep the relationship going……..	____0____

32. The numbers on the following line represent different degrees of happiness in your relationship. The middle point, "happy", represents the degree of happiness of most relationships. Please **CIRCLE** the number which best describes the degree of happiness, all things considered, of your relationship.

0	1	2	3	4	5	6
Extremely Unhappy	Fairly Unhappy	A Little Unhappy	Happy	Very Happy	Extremely Happy	Perfectly Happy

APPENDIX H

BPI

Brief Pain Inventory (Cleeland, 1989)

BRIEF PAIN INVENTORY

1. Please rate your pain by circling the one number that best describes your pain at its *worst* in the last week.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

2. Please rate your pain by circling the one number that best describes your pain at its *least* in the last week.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

3. Please rate your pain by circling the one number that best describes your pain on the *average*.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

4. Please rate your pain by circling the one number that tell how much pain you have *right now*.

0	1	2	3	4	5	6	7	8	9	10
No pain										Pain as bad as you can imagine

For the next set of questions, choose the one number that describes how, during the past week, pain has interfered with the following activities. Please use the 0 to 10 scale where a 0 means that "pain does not interfere with that activity" and a 10 means that "pain completely interferes."

Does not interfere										**Completely interferes**
0	**1**	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**

a) General Activity……..…0 1 2 3 4 5 6 7 8 9 10

b) Mood……...……....0 1 2 3 4 5 6 7 8 9 10

c) Mobility (ability to get around)…….……0 1 2 3 4 5 6 7 8 9 10

d) Normal Work (includes both work outside the home and housework)

…….……0 1 2 3 4 5 6 7 8 9 10

e) Relations With Other People……..……0 1 2 3 4 5 6 7 8 9 10

f) Sleep……0 1 2 3 4 5 6 7 8 9 10

g) Enjoyment Of Life……..……0 1 2 3 4 5 6 7 8 9 10

h) Self Care (taking care of your daily needs)…….....0 1 2 3 4 5 6 7 8 9 10

i) Recreational Activities……....0 1 2 3 4 5 6 7 8 9 10

j) Social Activities……..….0 1 2 3 4 5 6 7 8 9 10

k) Communication With Others……..……0 1 2 3 4 5 6 7 8 9 10

l) Learning New Information or Skills……...…….0 1 2 3 4 5 6 7 8 9 10

APPENDIX I

Mood

Mood (Cohen et al., 2003)

Please rate how accurately these adjectives describe how you are feeling RIGHT NOW.

	Not at all accurate	A little accurate	Moderately accurate	Very accurate	Extremely accurate
1. Lively	0	1	2	3	4
2. Full-of-pep	0	1	2	3	4
3. Energetic	0	1	2	3	4
4. Happy	0	1	2	3	4
5. Pleased	0	1	2	3	4
6. Cheerful	0	1	2	3	4
7. At ease	0	1	2	3	4
8. Calm	0	1	2	3	4
9. Relaxed	0	1	2	3	4
10. Sad	0	1	2	3	4
11. Depressed	0	1	2	3	4
12. Unhappy	0	1	2	3	4
13. On edge	0	1	2	3	4
14. Nervous	0	1	2	3	4
15. Tense	0	1	2	3	4
16. Hostile	0	1	2	3	4
17. Resentful	0	1	2	3	4
18. Angry	0	1	2	3	4

APPENDIX J

CPVI

Chronic Pain Values Inventory (CPVI) (McCracken & Yang, 2006)

Many people with chronic pain find that their pain and other symptoms are barriers to engaging in activities that are personally important to them. These people have "VALUES" but they are not living according to their values.

For example, you may want to be a loving partner, a warm and supportive parent, a helpful and reliable friend, a person who keeps physically fit and able, or a person who is always learning new skills, but you may find yourself in circumstances where you are not living that way.

For each of the areas listed below, consider how you most want to live your life. Then rate how IMPORTANT each domain is for you. This is NOT about how well you are doing in each area – it is about how important it is to you. Rate the importance you place in each domain using any number of the scale form 0 (not at all important) to 5 (very important). Each area need not be important to you – rate an area low if it is not important to you personally.

Consider each area according to your values, the important ways that you most want to live your life in each domain.

1. Family: Participation in your relationships with your parents, children, other close relatives, people you live with, or whoever is your "family."

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

2. Intimate relations: Being the kind of partner you want to be for your husband/wife or closest partner in life.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

3. Friends: Spending time with friends, doing what you need to maintain friendships, or providing help and support for others as a friend.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

4. Work: Engaging in whatever is your occupation, your job, volunteer work, community service, education, or your work around the home.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

5. Health: Keeping yourself fit, physically able, and healthy just as you would most want to do.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

6. Growth and learning: Learning new skills or gaining knowledge, or improving yourself as a person as you would most want.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

In this section, we want you to look at how much SUCCESS you have had in living according to your values. Many times when people have chronic pain they find it difficult to live their life as they want to live it.

For each of the areas of life listed below consider again how you most want to live your life. Then rate how SUCCESSFUL you have been living according to your values *during the past two weeks*. These questions are NOT asking how successful you want to be but how successful you have been. Rate your success using any number on the scale from 0 (not at all successful) to 5 (very successful).

Consider each area according to your values, the important ways that you most want to live your life in each domain.

7. Family: Participation in your relationships with your parents, children, other close relatives, people you live with, or whoever is your "family."

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

8. Intimate relations: Being the kind of partner you want to be for your husband/wife or closest partner in life.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

9. Friends: Spending time with friends, doing what you need to maintain friendships, or providing help and support for others as a friend.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

10. Work: Engaging in whatever is your occupation, your job, volunteer work, community service, education, or your work around the home.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

11. Health: Keeping yourself fit, physically able, and healthy just as you would most want to do.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

12. Growth and learning: Learning new skills or gaining knowledge, or improving yourself as a person as you would most want.

0	1	2	3	4	5
Not at all important	Slightly important	Somewhat important	Moderately important	Very important	Extremely important

APPENDIX K

Empathic Emotional Responses

Empathic Emotional Responses (Batson et al., 1997)

Using the scale below, estimate to what extent each item describes your feelings toward your partner at this moment by circling the appropriate number.

	Not at All						Extremely
Sympathetic	1	2	3	4	5	6	7
Softhearted	1	2	3	4	5	6	7
Warm	1	2	3	4	5	6	7
Compassionate	1	2	3	4	5	6	7
Tender	1	2	3	4	5	6	7
Moved	1	2	3	4	5	6	7
Alarmed	1	2	3	4	5	6	7
Grieved	1	2	3	4	5	6	7
Troubled	1	2	3	4	5	6	7
Distressed	1	2	3	4	5	6	7
Upset	1	2	3	4	5	6	7
Disturbed	1	2	3	4	5	6	7
Worried	1	2	3	4	5	6	7
Perturbed	1	2	3	4	5	6	7

APPENDIX L

TMS

Toronto Mindfulness Scale (TMS) (Bishop et al., 2006)

Instructions: Below is a list of things that people sometimes experience. Please read each statement. Next to each statement are five choices: "not at all," "a little," "moderately," "quite a bit," and "very much." Please indicate the extent to which you agree with each statement. In other words, how well does the statement describe *what you are experiencing, right now*?

	Not at all	A little	Moderately	Quite a bit	Very much
1. I experience myself as separate from my changing thoughts and feelings.	0	1	2	3	4
2. I am more concerned with being open to my experiences than controlling or changing them.	0	1	2	3	4
3. I am curious about what I might learn about myself by taking notice of how I react to certain thoughts, feelings or sensations.	0	1	2	3	4
4. I experience my thoughts more as events in my mind than as a necessarily accurate reflection of the way things 'really' are.	0	1	2	3	4
5. I am curious to see what my mind is up to from moment to moment.	0	1	2	3	4
6. I am curious about each of the thoughts and feelings I am having.	0	1	2	3	4
7. I am receptive to observing unpleasant thoughts and feelings without interfering with them.	0	1	2	3	4
8. I am more invested in just watching my experiences as they arise, than in figuring out what they could mean.	0	1	2	3	4
9. I approach each experience by trying to accept it, no matter whether it was pleasant or unpleasant.	0	1	2	3	4
10. I remain curious about the nature of each experience as it arises.	0	1	2	3	4
11. I am aware of my thoughts and feelings without overidentifying with them.	0	1	2	3	4

12. I am curious about my reactions to things.	0	1	2	3	4
13. I am curious about what I might learn about myself by just taking notice of what my attention gets drawn to.	0	1	2	3	4

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ABSTRACT

THE EFFECTS OF MOTIVATIONAL INTERVIEWING ON MARITAL AND PAIN ADJUSTMENT IN CHRONIC PAIN PATIENTS AND THEIR SPOUSES

by

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May 2012

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Major: Clinical Psychology

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Chronic pain is a costly health condition that is estimated to affect 150 million Americans. Numerous studies have shown that chronic pain affects a variety of aspects of life including mood, daily activities, and relationships. Not only does the individual with chronic pain suffer, spouses often do as well. The purpose of this study was to develop and test an intervention that utilized motivational interviewing techniques while providing tailored feedback to couples who are affected by chronic pain. This study examined which changes arose following the intervention and explored potential reasons for why these changes occurred.

Participants consisted of 47 couples in which at least one member had a chronic pain condition. Each couple completed questionnaires, participated in an interview about the history of their relationship and pain, and engaged in an interaction about coping with pain. Then the couples were randomly assigned to either the intervention group or control group. The couples in the intervention group received oral and written feedback, utilizing motivational interviewing techniques, regarding strengths and

weaknesses of their relationship and pain coping. The couples in the control group received oral and written educational feedback about the Gate Control Theory.

The motivational interviewing intervention in this study provided several benefits for couples facing chronic pain at the post-intervention assessment. Specifically, the intervention produced greater marital satisfaction, lower pain ratings, greater positive mood, and lower negative mood for both patients and spouses in the intervention group compared to those in the control group. In addition, there were benefits on some of the secondary outcome variables. The patients in the intervention group had lower personal distress than the controls following the intervention and the spouses had greater empathy and mindfulness. However, many of these findings did not remain significant at the one-month follow-up. This study also found that some of the changes in secondary variables were associated with changes in the primary variables, suggesting that these could be mechanisms of change within the intervention.

This study is a promising step to enhancing current treatments for couples facing chronic pain as well as other chronic illnesses. By including aspects of this intervention in future treatments, it is possible that existing treatments can become more effective.

AUTOBIOGRAPHICAL STATEMENT

Lisa Renee Miller received a Bachelor of Science degree in 2002 from Baldwin-Wallace College in Berea, Ohio where she majored in Psychology and Business. She is obtaining her Ph.D. in the Clinical Psychology Program at Wayne State University, specializing in Health Psychology. She received a Master of Arts degree in 2008 from Wayne State University. Her primary interests are how physical conditions, especially chronic illnesses, influence mental health. She enjoys traveling, cooking, and spending time with friends and family.