NIH Public Access
Author Manuscript
Pain. Author manuscript; available in PMC 2014 January 01.

Published in final edited form as:
Pain. 2013 January ; 154(1): 147–153. doi:10.1016/j.pain.2012.10.004.

Relationship Status and Quality Moderate Daily Pain-Related Changes in Physical Disability, Affect, and Cognitions in Women with Chronic Pain

Shannon Stark Taylor, M.A., **Mary C. Davis, Ph.D.**, and **Alex J. Zautra, Ph.D.**
Department of Psychology, Arizona State University

Abstract

The objectives of this study were to examine whether 1) daily pain-related changes in physical functioning differed between happily partnered, unhappily partnered, and unpartnered female chronic pain patients, and 2) affect and pain cognitions mediated the partner status effect on pain-related changes in physical functioning. 251 women with chronic pain due to osteoarthritis and/or fibromyalgia completed 30 daily electronic diaries assessing pain, affect, pain-related cognitions, and physical functioning. Patients living with a romantic partner also completed a modified version of the Locke-Wallace Marital Adjustment Scale [19] to assess relationship satisfaction. Multilevel modeling revealed that patients in satisfying unions showed more adaptive daily pain-related changes in physical functioning, pain coping difficulty, and catastrophizing compared to those in unsatisfying unions and those who were unpartnered. Both partnered groups also showed more adaptive pain-related changes in positive affect compared to the unpartnered group. The impact of relationship status on pain-related changes in physical functioning was partly mediated by the pain cognitions catastrophizing and coping difficulty. These results indicate that happily partnered pain patients show less pain-related physical disability and more adaptive affective and cognitive responses to daily pain changes than do unhappily partnered and unpartnered patients. Living in a happy union may bolster the capacity of patients to sustain a sense of pain coping efficacy during pain episodes, which in turn, minimizes pain-related physical activity limitations.

Keywords

Chronic pain; spousal relations; pain coping; daily process methodology

1. Introduction

Being partnered may benefit individuals with chronic pain, a health problem often accompanied by substantial disability, depression, and anxiety [27]. Partnered patients report slower declines in functional disability over time [33] and lower levels of depressive symptoms [3,21] than unpartnered patients. The advantages of being partnered may be

Corresponding author: Mary C. Davis, Dept of Psychology, Box 871104, Arizona State University, Tempe, AZ 85287-1104; phone: 480-727-8227; fax: 480-965-8544.

Conflict of Interest Statement
The authors have no conflict of interest.

limited to those in happy unions, however. For example, among pain patients, those in nondistressed marriages report lower distress and pain compared those in distressed marriages [30, but see 5]. Prevailing models posit that adaptation is partly determined by affective and cognitive responses to pain, which are influenced by social context [13,17,28] and linked to functional health [8]. Thus, one possible mechanism whereby spouses influence patients' functioning is by facilitating adaptive and constraining maladaptive responses to daily pain exacerbations, consistent with existing models [20,23]. The current study examined whether and how partner status together with relationship satisfaction moderate daily pain responses in a sample of female chronic pain patients.

Diary methods capture the covariation between pain, emotions, and cognitions by assessing individuals repeatedly in daily life, and thus can portray pain-response relations as they unfold. Within patients over time, daily pain increases not only are associated with subsequent increases in activity limitations [e.g., 14], but also accompanied by increases in negative [1,36] and decreases in positive affect [11,12,36]. Regarding cognitive responses, catastrophizing and pain coping difficulty both predict adaption to chronic pain. Catastrophizing is characterized by exaggerated negative evaluations of the pain experience, whereas coping difficulty describes the perception that one's resources are taxed in managing pain. Day-to-day increases in catastrophizing and pain coping difficulty are linked to increases in pain [e.g., 13,18].

Whether having a partner predicts patients' pain-related physical, emotional, and cognitive responses is an important but unanswered question. Moreover, there are reasons to expect that any benefits of having a partner may be limited to patients in satisfying unions. The few daily process data available suggest that among partnered patients, increases in daily satisfaction with spouse support are related to smaller pain-related increases in negative affect and catastrophizing [13]. Sometimes, however, a supportive spouse may promote disability by reinforcing patient responses to pain that are detrimental in the long run. Perceived spouse support is correlated with increased disability in pain patients [10,32]. Likewise, observer ratings of spouses' solicitous responses to patients' non-verbal pain behaviors predict increases in patients' physical disability [31].

The current study examined 1) the role of partnership status and relationship satisfaction in the associations between daily changes in pain and disability, and 2) potential affective and cognitive mediators of the effect of partnership group on the pain-disability link. Happily partnered patients were expected to show smaller pain-related increases in disability and more adaptive affective and cognitive responses relative to their counterparts who were either partnered and distressed or unpartnered. The moderating effects of relationship status on pain-disability relations were expected to be mediated in part by daily fluctuations in pain catastrophizing, coping difficulty, and affect (see Figure 1).

2. Methods

2.1 Participants

Participants were recruited in the Phoenix metropolitan area from physicians' offices, advertisements, senior citizen groups, and mailings to members of the Arthritis Foundation to participate in a longitudinal investigation of adaptation to chronic pain. Inclusionary criteria included: 1) a pain rating of above 20 on a 0–100 scale, and 2) physician-confirmed osteoarthritis (OA) and/or fibromyalgia (FM) diagnosis. Exclusionary criteria included: 1) a diagnosed autoimmune disorder, and 2) involvement in pain-related litigation, and 3) completion of fewer than 6 days of diaries.

The final sample was comprised of 251 women who ranged in age from 37 to 72 years (M = 57.33, SD = 8.39) and carried a diagnosis of pain due to OA (n=103), FM (n=48), or both (n=100). The majority of the sample was Caucasian (90%), and had completed some college (43.8%) or post graduate education (23.1%). The sample reported an average household income that fell between $30,000 and $39,999. Of the 251 participants, 138 were living with a spouse, 7 were living with a romantic partner, and 106 were not currently living with a spouse or partner. Of those not currently living with a spouse or partner, 11 were never married, 30 were widowed, 63 were divorced, and 2 were separated.

2.2 Procedure

All procedures were approved by the Institutional Review Board at Arizona State University. Participants were first screened for study eligibility by phone. Those who were eligible provided permission for staff to contact their physicians to confirm pain diagnoses. Once enrolled, participants then received a home visit by a trained research staff member, which involved: 1) assessment of participants' tender points and range of motion, 2) completion of an initial questionnaire that included questions about the participants' demographics and quality of partner relations, and 3) training regarding use of a laptop computer to complete daily diaries. As part of their participation, individuals also attended a laboratory session to assess emotion-modulated startle responses and stress reactivity and completed follow-up questionnaires regarding functional and mental health. Data for the current study were drawn from the initial questionnaire and daily diary portion of the larger project.

Participants were asked to fill out diaries for 30 days each evening 30 minutes prior to retiring. Diaries assessed the participants' physical symptoms, functional health, pain cognitions and coping efforts, interpersonal events, and affects for that day. Date-checking software on the computer prevented diary entry on any day other than the current day. Participants were compensated up to $3 for each day of diaries completed for the diary component of the project. Thirty-eight participants completed more than 30 diaries; only up to the first 37 diaries (i.e., up to one week of diaries beyond the 30-day window) completed by these participants were included in analyses. Six participants completed fewer than 7 days of diaries and their data were excluded from analyses. After these participants and diary days were excluded, the average number of completed diaries was 29 of 30 (range 7–37).

2.3 Measures

2.3.1 Relationship Status and Adjustment—Participants indicated whether they were married, living with a romantic partner, never married, widowed, divorced, or separated, and answers were coded to reflect whether participants were currently partnered (i.e., married or living with a romantic partner) or not partnered (i.e., never married, widowed, divorced, or separated). Relationship adjustment was assessed with the first nine items of the Marital Adjustment Scale [25]. Participants rated current relationship on a 7-point continuum, anchored by "extremely unhappy" on one end "extremely happy" on the other, and "happy" at the center point. Participants also rated the extent to which they agreed with their partner in the following seven domains: finances, recreation, demonstration of affection, friends, sexual relations, conventionality, life philosophy, and in-law relations. Ratings for each item were anchored on a 5-point Likert scale ranging from 1="always agree" to 5="always disagree." All item responses were weighted in accordance with the scoring template in Wallace and Locke [19], yielding scores that could range from 0 to 88 (M = 55.16, SD = 18.07; Mdn = 57). Cronbach's alpha for this scale in the current sample was .87. High and low relationship satisfaction groups were created based on a median split of the modified Locke-Wallace score to create a categorical variable with three groups where 0 =

unpartnered (UnP; n = 106), 1 = partnered/low satisfaction (LowSat; n = 74), and 2 = partnered/high satisfaction (HighSat; n = 71). The median of the modified Locke-Wallace score of 57 in this sample corresponds with a full Locke-Wallace score of 102, comparable to the widely-used cutoff value of 100 to distinguish satisfied versus dissatisfied couples [e.g., 5].

2.3.2 Satisfaction with Spouse Responding—Participants were asked to rate their satisfaction with how their spouses responded to their most recent significant pain episode on a 5-point Likert scale ranging from 1 (very dissatisfied) to 5 (very satisfied). This item is similar to one employed by Holtzman and Delongis [13] assessing satisfaction with spouse responses in chronic pain patients.

2.3.3 Pain—Daily pain was assessed in the diaries via an item asking participants to rate their pain on a 101-point scale [16]. The item was phrased as follows: “Please choose a number between 0 and 100 that best describes the average level of pain you have experienced today due to your Fibromyalgia or Osteoarthritis. A zero (0) would mean no pain and a one hundred (100) would mean pain as bad as it can be.” The day-to-day test-retest reliability was $r = .65$.

2.3.4 Positive and Negative Affect—Daily positive and negative affect using the Positive and Negative Affect Schedule [PANAS; 35]. Participants rated 20 adjectives describing positive affective states (10 items) and negative affect (10 items) on a 5-point scale ranging from 1 (very slightly or not at all) to 5 (extremely). Daily scores were computed by averaging each participant’s ratings for positive and negative affect within a day. Within-person reliability was .88 for positive affect and .78 for negative affect.

2.3.5 Pain Catastrophizing—Daily pain catastrophizing was assessed with two questions from the Catastrophizing scale of the Coping Strategies Questionnaire [19]. Participants were asked to rate their agreement with the following two statements: “Today, I worried about whether my pain would ever end” and “Today, I felt my pain was so bad I couldn’t stand it anymore.” Statements were rated on a 5-point scale from 1 (strongly disagree) to 5 (strongly agree). Daily scores were computed by averaging the two ratings for each day. The within-person correlation for these items was $r = .90$.

2.3.6 Pain Coping Difficulty—Daily diaries assessed the participants’ perception that pain was difficult to manage using a question from a pain coping efficacy scale developed by Zautra and Wrabetz [37]. The participants were asked to think of the time that day when their pain was the worst and to rate how difficult it was to cope with that pain on a scale from 1 (not at all) to 5 (extremely). The day-to-day test-retest reliability of this item was $r = .45$.

2.3.7 Physical Disability—Daily physical disability was measured with the four items of the Role Physical subscale from the SF-36 [34], with the time frame modified to refer to the current day. The items assessed whether participants’ ability to function in important roles that day was limited due to physical problems, for example “accomplished less than you would like” or “were limited in the kind of work or other activities” due to physical health, with ratings of 0=No, 1=Yes- Slightly, and 2=Yes-Very Much. Item scores were averaged within each day to generate a total daily score. The within-person reliability for the Role Physical subscale was .74 in the current sample.

2.4 Data Reduction and Analytic Strategy

Average levels of pain, physical functioning, affect, and pain cognitions across diary days were subtracted from each daily score within person, yielding a deviation score for each variable of interest. These deviation scores, also termed person-centered scores, index day-to-day within-person change relative to an individual's average level on the variable of interest. Deviation scores will be referred to by the Greek letter Δ in the text that follows.

Repeated daily measurements in this study resulted in a hierarchical nested data structure with up to 37 measurements per variable for each participant. Multilevel modeling was conducted to account for the variation both within (Level 1) and between participants (Level 2), allowing examination of Level 1 questions, (e.g., When patients report higher levels of pain, do they also report declines in physical functioning?); Level 2 questions (e.g., Do UnP, LowSat, and HighSat groups differ on overall physical functioning?); and Level 1 X Level 2 interactions (e.g., Do groups differ in the relation between changes in pain and physical functioning?). All analyses to address main study questions were conducted using SAS PROC MIXED [24].

First, we determined whether there were differences in demographics or mean levels of daily diary variables aggregated within person across 30 days between the UnP, LowSat, and HighSat groups with analyses of variance (ANOVA) and χ^2 comparisons. We also examined intercorrelations between person-centered diary variables. Next, for the main analyses, we tested whether daily changes in pain differentially related to changes in daily physical disability based on partnership group (i.e., UnP, LowSat, HighSat). The multilevel model predicting functional health included the following predictors: partnership group (0 = UnP, 1 = LowSat, 2 = HighSat), Δ pain, and their interaction. The group dummy variables were coded such that both UnP and LowSat were each contrasted with the HighSat group in the models. We then repeated analyses with partnership groups recoded to allow us to examine differences between UnP and LowSat groups. Pain diagnosis (OA vs. FM) was also included as a covariate, to control for overall levels of higher disability and maladaptive pain coping in FM relative to OA patients in this sample, consistent with findings reported in similar samples [9]. Significant Δ pain X partnership group interactions were expected, such that increases in pain would relate to more substantial declines in functional health in UnP and LowSat groups compared to the HighSat group. The equation for this model is as follows:

$$\text{Today's Physical Disability} = \beta_0 + \beta_1\,\text{Group UH(UnP vs HighSat)} + \beta_2\,\text{Group LH (LowSat vs HighSat)} + \beta_3\,\Delta\text{Pain} + \beta 4\,\Delta\text{Pain} \times \text{Group UH} + \beta_5\,\Delta\text{Pain} \times \text{Group LH} + \beta_6\,\text{Diagnosis} + r$$

β_0 yields an estimate of the intercept for disability, and $\beta_{1–2}$ provide the main effect estimates of the three partnership groups, and β_3 for the deviations in pain. Slopes $\beta_{4–5}$ test for differences between partnership groups in the association between daily deviations in pain and disability, and β_6 controls for pain diagnosis. The *r* stands for the within-person residual.

Finally, we probed whether changes in affective or cognitive factors could account for the relation between the partnership group x Δ pain interaction and the dependent variable, disability, by conducting product-of-coefficients analyses [22]. To that end, we examined whether: 1) the Group x Δ Pain interaction predicted the proposed mediator (i.e., coefficient *a)*, and 2) the mediator predicted the outcome with the independent variable in the model (i.e., coefficient *b*), following the same format as the formula presented above. We then calculated the product of the coefficients (*a* * *b*), and used PRODCLIN [26] to estimate asymmetric 95% confidence limits for the mediated effects.

For all multilevel analyses, intercepts were allowed to vary randomly, and all models included a first-order autoregressive variance-covariance matrix to account for the tendency of scores on variables to be highly correlated from one day to the next. The Aiken and West [2] procedure was used to examine significant interaction effects, plotting the simple slopes for the associations between changes in pain and dependent variables for each partnership group.

3. Results

3.1 Sample Demographics and Daily Diary Measures, and Intercorrelations

Demographic and aggregated scores for diary measures based on partnership groups are depicted in Table 1. Comparisons of partnership groups on demographic characteristics revealed that the UnP group was older on average than the HighSat group and had a lower income than both the LowSat and HighSat groups ($ps < .0008$). There were no differences between groups in ethnic composition, education level, employment status, or pain diagnosis. As expected, the HighSat group reported greater satisfaction with their spouses' response to their pain than did the LowSat group ($p < .0001$), but across the days of diaries, there were no significant differences between the UnP, LowSat, and HighSat groups in average pain, physical disability, positive affect, negative affect, pain catastrophizing, or pain coping difficulty.

Evaluation of intercorrelations among person-centered diary variables revealed that they were all significantly related (r values 0.08 – 0.43, all ps $< .05$). As expected, daily increases in pain and disability were associated with greater negative affect, catastrophizing, and pain coping difficulty, and lower positive affect.

3.2 Relations between Daily Changes in Pain and Physical Functioning based on Partnership Groups

The primary analysis addressed whether patients in a satisfying union show smaller pain-related increases in physical disability compared to patients who were less satisfied in their unions or unpartnered, controlling for pain diagnosis. Results of this analysis are depicted in Table 2 and show that on days when they reported higher than their average levels of pain, all participants experienced increased physical disability (Δ pain $\beta = 0.34$, $p < .0001$). As predicted, there were differences between partnership groups in the strength of the association between fluctuations in pain and same-day disability, reflected in significant Δ pain X partnership group interactions.[1] Figure 2 shows that the relation between increases in pain and increases in physical disability was less pronounced in the HighSat group compared to both the LowSat and UnP groups, which did not differ from one another. Thus, being in a well-adjusted relationship appears to have a modest buffering effect on pain-related increases in disability compared to being in a less happy relationship or unpartnered.

3.3 Mediation of the Buffering Effect of Partnership Group on Pain-disability Relation

We examined potential affective and cognitive mediators that might account for the buffering effect of a happy union on the pain—disability association. First, did the Δ pain X partnership group interactions predict the mediators in separate models, controlling for pain diagnosis? Findings, depicted in Table 2, revealed main effects for increases in pain, indicating that increases in pain predicted declines in positive affect and increases in negative affect, catastrophizing, and pain coping difficulty for all participants. Importantly, pain-related changes in positive affect, catastrophizing, and pain coping difficulty each

[1]We tested the pain diagnosis X Δ pain interaction as a predictor of disability, and found no interaction effect. Thus, the relation between daily changes in pain and disability are similar across pain groups.

varied based on relationship group. The pattern of findings for pain-related changes in catastrophizing and pain coping difficulty were similar to those that emerged for physical disability, with the HighSat group faring better than both the LowSat and the UnP groups. The LowSat and UnP groups did not differ from one another. For positive affect, pain-related declines were more marked in the UnP group compared with the HighSat group ($p < .01$) and the LowSat group ($p < .06$), which did not differ from each other. No differences between partnership groups were apparent in negative affective responses to increased pain. Thus, participants in happy unions generally responded to changes in pain with more adaptive pain cognitions than did their counterparts who were either in less happy unions or unpartnered.

Next, we examined whether the potential mediators (i.e., positive affect, catastrophizing, and pain coping difficulty) predicting physical disability accounted with the Δ pain X partnership group term in the model. Results of these analyses are depicted in Table 3. Each of the three mediators was significantly related to changes in physical disability, beyond the contributions of Δ pain, partnership group, and Δ pain X partnership group interaction terms.

Finally, because the Δ Pain → Disability associations were similar for LowSat and UnP groups, these groups were combined into a single group (LowUp) and contrasted with the HighSat group for the product-of-coefficients analyses. In analyses including a single mediator, the Δ Pain X Group interaction-→ Disability relation was significantly mediated by pain coping difficulty (indirect effect = .04343, 95% CIs = 0 .02656 – .06142), catastrophizing (indirect effect = .01546, 95% CIs = .00567 – .02653), and positive affect (indirect effect = .02305, 95% CIs = .00263–.04390). When pain coping difficulty, catastrophizing, and positive affect were included together in the model, significant mediation was still evident for pain coping difficulty (indirect effect = .0364, 95% CIs = 0 . 0220 – .0522), and catastrophizing (indirect effect = .0049, 95% CIs = .00054 – .0110), but not positive affect (indirect effect = .0218, 95% CIs = 0 – .0417). Together, these findings suggest that pain cognitions in particular serve as mediators of the difference between relationship groups in the link between increases in pain and disability.

4. Discussion

Living with a spouse or partner, especially if the union is a satisfying one, is related to better functional health among individuals in chronic pain [30], but the mechanisms whereby such relationships yield benefits have not been fully elaborated. Findings from the current study provide clues about how patients in satisfying spousal relationships are able to fare better over the long term compared to their less satisfied or unpartnered counterparts. On days of high pain, happily partnered patients were less likely to experience increased physical disability, catastrophize about the pain, or feel the pain was difficult to manage compared to women in less happy unions and unpartnered women. How were happily partnered women better able to sustain their physical functioning during an increase in pain? We examined whether affect and/or cognitions served as mediators of this partnership status difference, and found that it was the capacity of happily partnered women to experience less catastrophizing and difficulty coping with an increase in pain that contributed to their increased ability to limit their pain-related physical disability relative to unhappily partnered or unpartnered women. These findings highlight the relative importance of pain-related cognitions reflecting coping efficacy for preserving today's physical functioning during increases in pain.

It is plausible that it is not sharing a happy union, but rather attributes of women who manage to have happy unions, that can account for their capacity to manage changes in pain

day to day. For example, happily partnered women may possess more traits associated with resilience and/or fewer traits associated with vulnerability to adversity than unhappily partnered or unpartnered women. Arguing against this explanation, however, is the equivalence of groups in mean levels of pain, disability, positive affect, negative affect, catastrophizing, and pain coping difficulty across diary days. Thus, it appears that that it is the social environment that patients perceive rather than attributes of the patients themselves that are providing women in happy partnerships with resources to be resilient in managing their changes in pain.

The current findings complement those reported by Delongis and Holtzman [13] in their daily process study of partnered rheumatoid arthritis patients. They asked how spousal relations relate to within-person pain coping and found that patient reports of higher than usual satisfaction with spouses' support in the morning buffered the relation between morning increases in pain and evening increases in negative affect and catastrophizing. Thus, patients were able to limit the negative emotional and cognitive consequences of pain when they felt satisfied with their spouses' support. The current study did not assess ongoing patient satisfaction with spouse support, but did determine how they generally regard their spouses' behavior. Happily partnered women reported being more satisfied overall with how their spouses responded to their most recent increase in pain than did unhappily partnered women. Taken together, the findings suggest that the daily benefits that patients experience in happy unions are due to patients' perceptions that their spouse's support is highly responsive to their needs, bolstering the patients' capacity to use adaptive coping strategies and preserving their positive affect and physical functioning during increases in pain.

How can the current findings help to inform intervention efforts targeting chronic pain? One possibility is broadening treatment focus beyond the individual. Because individuals are embedded within social networks, a promising treatment approach includes training key social network members to be responsive to the patient. Over the past 15 years, some intervention approaches for chronic pain have involved spouses in the treatment, in an attempt to teach spouses how to elicit and positively reinforce patient's efforts to cope with pain [20]. Although improving relationship satisfaction typically is not the purpose of the interventions that include spouses, such an approach may yield benefits to patients via enhanced marital adjustment. For example, patients who reported increased marital satisfaction following a spouse-assisted coping skills intervention had less physical disability and showed less pain behavior relative to those who did not report increased marital adjustment [20]. Thus, teaching spouses how to assist patients' own coping efforts may, in fact, provide training in how to be a responsive, satisfying partner, or at least bolster the patients' perception that the spouse is responsive. A complementary approach could include building a couple's socioemotional regulation skills by teaching partners to respond empathically to one another when dealing with pain and other stressors [13,29]. For instance, when spouses responded with supportive, caring gestures to their partners during days of increased family stress, relationship tension declined on the following day. An intriguing possibility is that bolstering the capacity for relationship-focused coping during stress may promote optimal physical, psychological, and social functioning in couples and families managing chronic pain. Efforts such as these may yield benefits by building emotional intimacy in these relationships, providing an ongoing context for more empathic partner communication and more adaptive patient responses to partner support [4,6,15]. The accumulating evidence suggests that maximizing the beneficial impacts of available social resources relationship quality may be an important avenue to effective coping and sustained quality of life in pain patients.

The current study has some important limitations. First, because the data are correlational, we cannot make causal statements regarding the relations between partnership status and

pain-related increases in disability. Second, the participants in this study were all women and primarily Caucasian and middle-aged, so that the generalizability of these findings to younger, more ethnically diverse, and/or male chronic pain patients remains to be determined. Third, although our focus is on the value of happy partnerships for adaptation in chronic pain, in reality we assessed only the patients' global perceptions of their relationships. A more comprehensive approach would assess relational vulnerability and resilience factors (e.g., daily spousal strain and satisfaction) not only of pain patients but also of partners to more fully capture the interpersonal processes within couples that promote or hinder daily well-being of both spouses. Finally, all assessments were based on self-reports. Inclusion of objective measures (e.g., physiological indices) would provide a more comprehensive framework with which to understand the impacts of social context of patient functioning. This study also had some notable strengths. The sample was large and comprised of patients with two of common chronic pain conditions, increasing the likelihood that the findings have relevance from a broad swath of patients with chronic pain. Moreover, reports of pain, affect, and functional health were collected daily, reducing recall bias and yielding reliable estimates of the day-to-day covariation between pain, affect, and functional health.

In conclusion, pain-related shifts in disability may be minimized by being embedded in a satisfying spousal relationship that shapes a patient's coping responses to pain toward strategies that are more adaptive. Although relationship status had effects that were quite modest in magnitude, those effects should be considered within a broader understanding of the multifactorial nature of pain-related disability. To uncover its true significance, a small effect must be evaluated in the context of its real world impact [7]. In this case, small benefits in disability over a lifetime of managing chronic pain may indeed have a substantial impact on quality of life for pain patients. These findings highlight the potential utility of interventions that move beyond a focus on the individual patient and target the patient's social milieu and her perception of it. Additional research elaborating the interpersonal processes whereby satisfying spousal relations facilitate resilience in patients is critical to inform the development of such treatments.

Acknowledgments

This project was supported by NIH grant R01AR046034.

References

1. Affleck G, Tennen H, Urrows S, Higgins P. Neuroticism and the pain-mood relation in rheumatoid arthritis: Insights from a prospective daily study. J Consult Clin Psychol. 1992; 60:119–26. [PubMed: 1556274]
2. Aiken, LS.; West, SG. Testing and intrepreting interactions. Thousand Oaks, CA: Sage; 1991. Multiple regression.
3. Averill PM, Novy DM, Nelson DV, Berry LA. Correlates of depression in chronic pain patients: A comprehensive examination. Pain. 1996; 65:93–100. [PubMed: 8826495]
4. Cano A, Barterian JA, Heller JB. Empathic and nonempathic interaction in chronic pain couples. Clin J Pain. 2008; 24:678–84. [PubMed: 18806532]
5. Cano A, Gillis M, Heinz W, Geisser M, Foran H. Marital functioning, chronic pain, and psychological distress. Pain. 2004; 107:99–106. [PubMed: 14715395]
6. Cano A, Williams AC. Social interaction in pain: Reinforcing pain behaviors or building intimacy? Pain. 2010; 149:9–11. [PubMed: 19892466]
7. Cohen, J. Statistical power analysis for the behavioral sciences. 2. Hillsdale, New Jersey: Lawrence Erlbaum Associates, Inc; 1987.

8. Crombez G, Eccleston C, Van Hamme G, De Vlieger P. Attempting to solve the problem of pain: A questionnaire study in acute and chronic pain patients. Pain. 2008; 137:556–63. [PubMed: 18063310]
9. Davis MC, Zautra AJ, Reich JW. Vulnerability to Stress Among Women in Chronic Pain From Fibromyalgia and Osteoarthritis. Ann Beh Med. 2001; 23:215–26.
10. Flor H, Kerns RD, Turk DC. The role of spouse reinforcement, perceived pain, and activity levels of chronic pain patients. J Psychosom Res. 1987; 31:251–9. [PubMed: 3585827]
11. Gil KM, Carson JW, Porter LS, Scipio C, Bediako SM, Orringer E. Daily mood and stress predict pain, health care use, and work activity in african american adults with sickle-cell disease. Health Psychol. 2004; 23:267–74. [PubMed: 15099167]
12. Hamilton NA, Catley D, Karlson C. Sleep and the affective response to stress and pain. Health Psychol. 2007; 26:288–95. [PubMed: 17500615]
13. Holtzman S, DeLongis A. One day at a time: The impact of daily satisfaction with spouse responses on pain, negative affect and catastrophizing among individuals with rheumatoid arthritis. Pain. 2007; 131:202–13. [PubMed: 17517474]
14. Hutchings A, Calloway M, Choy E, Hooper M, Hunter DJ, Jordan JM, Zhang Y, Baser O, Long S, Palmer L. The Longitudinal Examination of Arthritis Pain (LEAP) study: Relationships between weekly fluctuations in patient-rated joint pain and other health outcomes. J Rheumatol. 2007; 34:2291–300. [PubMed: 17937461]
15. Issner JB, Cano A, Leonard MT, Williams AM. How do I empathize with you? Let me count the ways: Relations between facets of pain-related empathy. J Pain. 2012; 13:167–75. [PubMed: 22225968]
16. Jensen MP, Karoly P, Braver S. The measurement of clinical pain intensity: A comparison of six methods. Pain. 1986; 27:117–26. [PubMed: 3785962]
17. Jensen MP, Turner JA, Romano JM, Karoly P. Coping with chronic pain: a critical review of the literature. Pain. 1991; 47:249–83. [PubMed: 1784498]
18. Keefe FJ, Affleck G, Lefebvre JC, Starr K, Caldwell DS, Tennen H. Pain coping strategies and coping efficacy in rheumatoid arthritis: a daily process analysis. Pain. 1997; 69:35–42. [PubMed: 9060010]
19. Keefe FJ, Brown GK, Wallston KA, Caldwell DS. Coping with rheumatoid arthritis pain: Catastrophizing as a maladaptive strategy. Pain. 1989; 37:51–6. [PubMed: 2726278]
20. Keefe FJ, Caldwell DS, Baucom D, Salley A, Robinson E, Timmons K, Beaupre P, Weisberg J, Helms M. Spouse-assisted coping skills training in the management of osteoarthritic knee pain. Arthritis Care Res. 1996; 9:279–91. [PubMed: 8997917]
21. Kraaimaat FW, van Dam-Baggen CMJ, Bijlsma JWJ. Depression, anxiety and social support in rheumatoid arthritic women without and with a spouse. Psychol Health. 1995; 10:387–96.
22. Krull JL, MacKinnon DP. Multilevel Modeling of Individual and Group Level Mediated Effects. Multivariate Behavioral Research. 2001; 36:249–77.
23. Leonard MT, Cano A, Johansen AB. Chronic pain in a couples context: A review and integration of theoretical models and empirical evidence. J Pain. 2006; 7:377–90. [PubMed: 16750794]
24. Littell, RC.; Milliken, GA.; Stroup, WW.; Wolfinger, RD. SAS system for mixed models. Cary, NC: SAS Institute; 1996.
25. Locke HJ, Wallace KM. Short marital-adjustment and prediction tests - Their reliability and validity. Marriage Fam Living. 1959; 21:251–5.
26. MacKinnon DP, Fritz MS, Williams J, Lockwood CM. Distribution of the product confidence limits for the indirect effect: Program PRODCLIN. Beh Res Meth. 2007; 39:384–9.
27. McWilliams LA, Goodwin RD, Cox BJ. Depression and anxiety associated with three pain conditions: Results from a nationally representative sample. Pain. 2004; 111:77–83. [PubMed: 15327811]
28. Novy DM, Nelson DV, Francis DJ, Turk DC. Perspectives of chronic pain: An evaluative comparison of restrictive and comprehensive models. Psychol Bull. 1995; 118:238–47. [PubMed: 7568572]
29. O'Brien TB, DeLongis A, Pomaki G, Puterman E, Zwicker A. Couples coping with stress: The role of empathic responding. Eur Psychol. 2009; 14:18–28.

30. Reese JB, Somers TJ, Keefe FJ, Mosley-Williams A, Lumley MA. Pain and functioning of rheumatoid arthritis patients based on marital status: Is a distressed marriage preferable to no marriage? J Pain. 2010; 11:958–64. [PubMed: 20418185]

31. Romano JM, Turner JA, Jensen MP, Friedman LS, Bulcroft RA, Hops H, Wright SF. Chronic pain patient-spouse behavioral interactions predict patient disability. Pain. 1995; 63:353–60. [PubMed: 8719536]

32. Stroud MW, Turner JA, Jensen MP, Cardenas DD. Partner responses to pain behaviors are associated with depression and activity interference among persons with chronic pain and spinal cord injury. J Pain. 2006; 7:91–9. [PubMed: 16459274]

33. Ward MM, Leigh JP. Marital status and the progression of functional disability in patients with rheumatoid arthritis. Arthritis Rheum. 1993; 36:581–8. [PubMed: 8489537]

34. Ware JE, Sherbourne CD. The MOS 36-item short-form health survey (SF-36): I. Conceptual framework and item selection. Med Care. 1992; 30:473–83. [PubMed: 1593914]

35. Watson D, Clark LA, Tellegen A. Development and validation of brief measures of positive and negative affect: The PANAS scales. J Pers Soc Psychol. 1988; 54:1063–70. [PubMed: 3397865]

36. Zautra AJ, Johnson LM, Davis MC. Positive affect as a source of resilience for women in chronic pain. J Cons Clin Psychol. 2005; 73:212–20.

37. Zautra AJ, Wrabetz AB. Coping success and its relationship to psychological distress for older adults. J Pers Soc Psychol. 1991; 61:801–10. [PubMed: 1753334]

Summary

Pain patients in a satisfying spousal relationship are better able to cope with daily pain flares, thereby limiting their pain-related physical disability compared to patients who were either in less satisfying relationships or unpartnered.

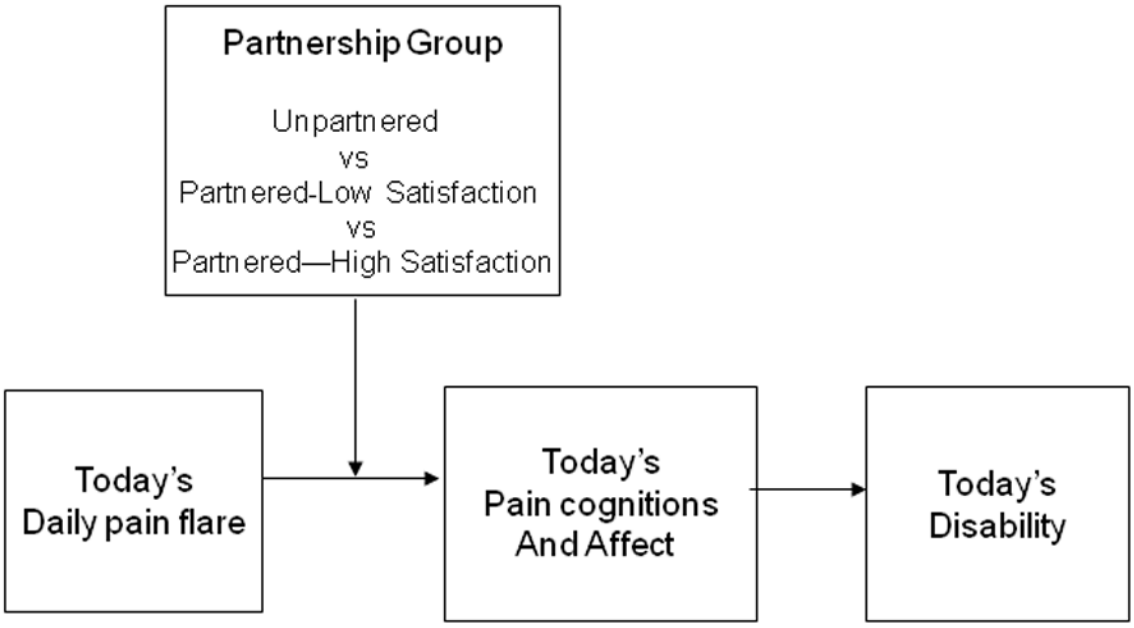

Figure 1.
Model Depicting Relations Between Partnership Group and Changes in Daily Pain, Affect, and Pain Cognitions, and Physical Disability

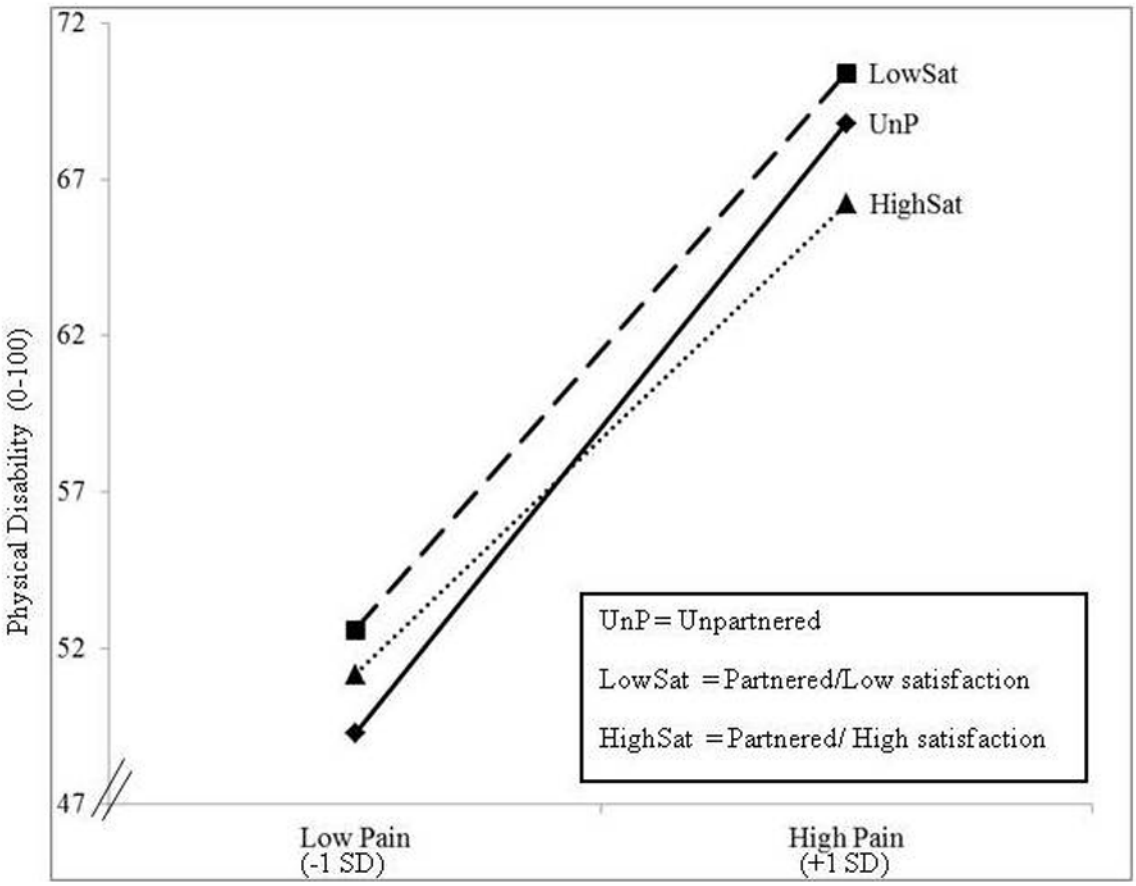

Figure 2.
Within-person Relation between Changes in Daily Pain and Physical Disability based on Partnership Status Groups

Table 1

Sample Characteristics and Mean Levels of Key Study Variables Across Diary Days based on Partnership Status Groups

	Unpartnered ***n*** **= 106**	**Partnered, low adjustment** ***n*** **= 74**	**Partnered, high adjustment** ***n*** **= 71**	
	***M (SD)*/%**	***M (SD)*/%**	***M (SD)*/%**	***F* or (χ^2)**
Variable				
Age (years)	59.08 (8.14)[a]	57.1 (7.84)[ab]	55.24 (9.04)[b]	4.49**
Caucasian (%)	86.9	90.5	93.0	(0.29)
Post high school Ed (%)	85.8	82.4	78.6	(1.53)
Employed (%)	54.5	55.4	57.1	(0.12)
Income	$19–25K[a]	$40–50K[b]	$40–50K[b]	55.00***
FMS Diagnosis (%)	57.0	60.8	63.4	(0.76)
Marital adjustment (0–88)	n/a	41.39 (13.10)	69.51 (9.16)	222.68***
Satisfaction with spouse response (1–5)	n/a	2.15 (1.29)	3.27 (0.99)	33.81***
Average pain (0–100)	53.83 (17.16)	54.35 (16.74)	55.41 (17.80)	0.18
Disability (0–100)	61.80 (29.37)	61.45 (29.77)	60.20 (31.03)	0.06
Positive affect (1–5)	2.52 (0.79)	2.35 (0.71)	2.49 (0.87)	1.04
Negative affect (1–5)	1.35 (0.35)	1.40 (0.40)	1.38 (0.43)	0.49
Catastrophizing (1–5)	2.15 (0.87)	2.27 (0.78)	2.15 (0.86)	0.54
Pain coping difficulty (1–5)	2.74 (0.83)	2.71 (0.68)	2.71 (0.84)	0.04

Note: Values with different superscripts are significantly different at $p < .05$.

* $p < .05$,

** $p < .01$,

*** $p < .001$

Table 2

Multi-level regression analyses: Relations of pain intensity, Partnership Group, and Pain X Partnership Group Interactions Predicting Daily Physical Disability, Positive and Negative Affect, Pain Catastrophizing, and Pain Coping Difficulty

	Dependent Variable				
	Disability	**Negative affect**	**Positive affect**	**Pain catastrophizing**	**Pain coping difficulty**
Predictors	***b* (SE)**	***b* (SE)**	***b* (SE)**	***b* (SE)**	***b* (SE)**
Between-subject					
Diagnosis: OA vs FM	18.78 (3.77)***	0.12 (0.05)**	−0.44 (0.10)***	0.41 (0.10)***	0.40 (0.10)***
Partnership group: UnP vs HighSat	2.70 (4.51)	−0.03 (0.06)	0.02 (0.12)	0.03 (0.12)	0.05 (0.12)
Partnership group: LowSat vs HighSat	2.60 (4.88)	0.02 (0.06)	−0.15 (0.13)	0.13 (0.14)	0.02 (0.13)
Within-subject					
ΔPain	0.34 (0.04)***	0.003 (0.0005)***	−0.01 (0.0007)***	0.01 (0.0008)***	0.02 (0.0009)***
ΔPain x Partnership group: UnP vs HighSat	0.14 (0.06)**	.00049 (0.0006)	−0.003 (0.0009)**	0.003 (0.001)**	0.005 (0.001)***
ΔPain x Partnership group: LowSat vs HighSat	0.15 (0.06)**	0.0005 (0.0007)	−0.0008 (0.001)	0.003 (0.001)**	0.006 (0.001)***

Note: OA = osteoarthritis; FM = fibromyalgia; UnP = unpartnered, HighSat = partnered/high satisfaction, LowSat = partnered/low satisfaction.

Between-subject *dfs* range from 245–250, within-subject *dfs* range from 5549–7063.

* p < .05;

** p < .01;

*** p < .001

Table 3

Models Testing Affective and Cognitive Mediators in the Relations between the Pain X Partnership Status Interaction and Physical Disability

Dependent Variable: Physical Disability	**Potential Mediators**			
	Positive affect only	**Catastrophizing only**	**Pain Coping Difficulty only**	**All Mediators**
Predictors	***b* (SE)**	***b* (SE)**	***b* (SE)**	***b* (SE)**
Between-subject				
Diagnosis: OA vs FM	19.56 (3.83)***	19.12 (3.79)***	15.54 (3.43)***	16.80 (4.07)***
Partnership group: UnP vs HighSat	3.09 (4.58)	2.86 (4.53)	3.03 (4.09)	3.49 (4.22)
Partnership group: LowSat vs HighSat	2.88 (4.95)	2.78 (4.91)	2.67 (4.42)	3.01 (4.56)
Within-subject				
ΔPain	0.29 (0.04)***	0.28 (0.04)***	0.20 (0.05)***	0.15 (0.04)**
ΔPositive Affect	−12.06 (0.70)***	-	-	−11.44 (0.70)***
ΔCatastrophizing	-	5.21 (0.68)***	-	1.71 (0.70)*
ΔPain Coping Difficulty	-	-	7.68 (0.55)***	6.37 (0.57)***
ΔPain x Partnership group: UnP vs HighSat	0.12 (0.05)*	0.13 (0.05)*	0.10 (0.06)	0.08 (0.05)
ΔPain x Partnership group: LowSat vs HighSat	0.13 (0.06)*	0.14 (0.06)*	0.10 (0.06)	0.09 (0.05)

Note: OA=osteoarthritis; FM = fibromyalgia; UnP = unpartnered, HighSat = partnered,/high satisfaction, LowSat = partnered/low satisfaction.

Between-subject *dfs* range from 243–245. Within-subject *dfs* range from 5424–5542.

*p < .05;

**p < .01;

***p < .001