

The Role of Social Support in Coping with Daily Pain among Patients with Rheumatoid Arthritis

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Abstract

Using a daily process methodology, the current study examined the role of social support in coping and pain severity among patients with rheumatoid arthritis (RA). Seventy-three adults with RA completed a structured record twice daily for one week on pain severity, pain coping, satisfaction with support and disappointment in support. Findings suggested that support influenced pain indirectly, by encouraging the use of specific coping strategies, as well as impacting coping effectiveness. Satisfaction with support was associated with adaptive and maladaptive coping, while disappointment was associated with maladaptive coping. Findings highlight the importance of close others in promoting adaptive coping strategies.

Keywords

chronic pain, coping, social support

OVER THE past 25 years, research has demonstrated beneficial effects of social support on the psychological and physical well-being of individuals suffering from chronic illnesses such as cancer (Helgeson & Cohen, 1996), coronary heart disease (Uchino, Cacioppo, & Kiecolt-Glaser, 1996) and diabetes (Cheng & Boey, 2000). The potentially therapeutic role of social support has also been of interest to researchers studying individuals with chronic pain. Although biomedical factors seem to instigate the initial report of pain among these patients, over time psychosocial factors may play a significant role in the disease course of various chronic pain conditions (Turk & Melzack, 2001).

The majority of studies that have examined social support in the context of chronic pain have focused on its relationship with depression, with findings generally indicating that individuals higher in support suffer from less depression and negative mood (e.g. Brown, Wallston, & Nicassio, 1989; Doeglas, Suurmeijer, Krol, Sanderman, van Rijswijk, & van Leeuwen, 1994). However, relatively few studies have investigated the relationship between social support and health outcomes, such as pain severity. To date, no consensus has been reached on either the magnitude or direction of the relationship between these variables, due in part to the heterogeneity in research design and type of statistical analyses used in prior research. A number of studies have demonstrated an association between higher levels of social support and lower levels of chronic pain (Feldman, Downey, & Schaffer-Neitz, 1999; Jamison & Virts, 1990; Weinberger, Hiner, & Tierney, 1986). For instance, Feldman and colleagues conducted a study on individuals diagnosed with complex regional pain syndrome in which participants completed a daily structured record on mood, pain and perceived support for 28 consecutive days. They found that perceptions of social support were predictive of decreases in pain on the following day. After completing the daily records, participants responded to an open-ended questionnaire regarding what others had said or done that was especially helpful to them in coping with their condition. Participants reported that helpful exchanges typically involved the encouragement of active coping and the discouragement of helplessness and catastrophizing. Patients

also noted as beneficial others' acknowledgement of the hardships they had faced, and reinforcement for past and present coping efforts. In a study by Jamison and Virts (1990), patients with chronic pain reported their perceptions of family support prior to entering an outpatient pain program. One year following the completion of the program, patients who initially reported having supportive families reported significantly less pain intensity, less reliance on medication and greater activity levels. However, other studies have failed to find a significant relation between social support and pain severity (e.g. Lauer & Johnson, 1997).

Social support and rheumatoid arthritis

Rheumatoid arthritis (RA) is an incurable autoimmune disease that affects approximately 1 percent of the western population (Evers, Kraaimaat, Geenen, & Bijlsma, 1998). It is associated with a variety of distressing and debilitating symptoms including chronic pain, stiffness and inflammation of the joints, fatigue and frequent mood changes (Smith & Wallston, 1992). Among these symptoms, pain of variable duration and intensity is the most significant and problematic symptom for patients with RA (Young, 1992). As a result of their disease and related distress, RA sufferers typically experience a wide range of daily stressors such as difficulties performing household chores, impaired ability to work or hold a job, difficulties engaging in leisure or social activities and interpersonal tensions resulting from added burdens for friends and family members (Stenstrom, Lindell, Swanberg, Nordemar, & Harms-Ringdahl, 1992). Due to the lack of a cure, RA treatment focuses on the alleviation of symptoms and an attempt to maintain functional status (Evers et al., 1998).

As in other chronic pain conditions, disease factors only modestly predict future disability in RA (van der Heide, Jacobs, Haanen, & Bijlsma, 1995; Wolfe & Cathey, 1991). As a result, there is growing interest in and awareness of the influence of psychosocial factors on the disease progression of RA (Young, 1992). Some research in this area has demonstrated that social support has beneficial effects on levels of pain and disability among patients with RA (e.g.

Savelkoul, Post, de Witte, & van den Borne, 2000; Waltz, Kriegel, & van't Pad Bosch, 1998). In a study that examined patients with rheumatic diseases, including both RA and osteoarthritis, satisfaction with supportive exchanges was associated with lower levels of pain frequency and intensity (Savelkoul et al., 2000). A recent longitudinal study by Waltz and colleagues (1998) found similar results. Among a sample of patients diagnosed with RA, a baseline measure of emotional support was found to predict pain levels upon follow-up one year later.

Again, however, a relationship between support and pain has not always been found. In a study by Affleck and colleagues, individuals with RA completed a daily questionnaire for 75 consecutive days on levels of stress, mood, pain and support (Affleck, Tennen, Urrows, & Higgins, 1994). Findings indicated that support was not able to buffer the negative effects of daily stress on next day pain. Furthermore, some studies have found higher levels of instrumental support to be associated with a *greater* degree of functional impairment among patients with RA (Doeglas, Suurmeijer, Krol, Sanderman, van Rijswijk, & van Leeuwen, 1992; Taal, Rasker, Seydel, & Wiegman, 1993).

Dissatisfaction with support

The vast majority of research investigating social support among patients with chronic pain has focused on the benefits of social relationships, failing to consider the possibility of negative effects. Lack of research in this area is surprising given that previous studies have indicated that negative aspects of social relationships may be as potent, if not more potent, in predicting well-being (e.g. Pagel, Erdly, & Becker, 1987; Rook, 1984; Rook & Pietromonaco, 1987; Schuster, Kessler, & Aseltine, 1990; Walen & Lachman, 2000).

Although attempts to provide support are usually well intentioned, it is not the case that such attempts will always be *perceived* as helpful by the recipient. A small number of studies have demonstrated that dissatisfaction with support may have a negative impact on the psychological well-being of patients with RA (Griffin, Friend, Kaell, & Bennett, 2001; Manne & Zautra, 1989; Revenson, Schiaffino, Majerovitz,

& Gibofsky, 1991; Riemsma, Taal, Wiegman, Rasker, Bruyn, & van Paassen, 2000). Even fewer studies have examined the potentially harmful effects of negative social exchanges on physical well-being among patients with chronic pain. One such study was conducted by Griffin and colleagues, who demonstrated that among patients who tend to cope by venting their emotions, perceived punishing responses from close others was associated with poorer disease status over time.

Support as coping assistance

Despite the number of studies that have found a link between support and well-being, little is known about the mechanism through which support influences health. One possibility is that support is effective in enhancing well-being because it acts as coping assistance (O'Brien & DeLongis, 1997; Thoits, 1986). When faced with a stressful situation, social support may help individuals alter the meaning of the situation, the individual's emotional or behavioral response to the situation, and/or the situation itself. Evidence for this model has been found among studies of both healthy community samples (e.g. Holohan & Moos, 1987; McColl, Lei, & Skinner, 1995; Valentiner, Holahan, & Moos, 1994) and chronically ill populations (e.g. Ell, Mantell, Hamovitch, & Nishimoto, 1989; Holohan, Moos, Holohan, & Brennan, 1995; Kvam & Lyons, 1991). For example, in a longitudinal study of patients with cardiac disease, higher levels of social support at baseline were associated with fewer depressive symptoms one year later both directly, and indirectly, through encouraging higher levels of positive reappraisal and problem solving (approach coping; Holohan et al., 1995). However, other studies have failed to find an influence of support on ways of coping (e.g. Frazier, Tix, Klein, & Arikian, 2000; Mikail, DuBreuil, & D'Eon, 1993; Savelkoul et al., 2000).

A model in which social relationships serve as a coping resource is useful in addressing the mechanism through which both positive *and* negative social interactions impact well-being. For example, in a study of women diagnosed with RA, women who perceived their spouses as supportive engaged in higher levels of cognitive restructuring and information seeking, ways of

coping associated with higher psychological functioning in that sample (Manne & Zautra, 1989). Meanwhile, critical remarks by patients' spouses were associated with higher levels of wishful thinking, a way of coping associated with lower levels of psychological functioning.

Coping and chronic pain

Studies that have examined the relationship between social support and coping have rarely examined, within the same study, the effect of coping on well-being (Schreurs & de Ridder, 1997). Therefore, if findings support the idea that social support influences ways of coping, it is difficult to conclude whether the coping strategies that are encouraged by support providers are ones that lead to positive or negative health outcomes for the patient.

The present study attempted to clarify the role of support in facilitating four ways of coping that have been found to be associated with adjustment to either RA specifically, or, more generally, with chronic pain in previous research. Specifically, the effects of cognitive reframing, stoic distancing, emotional expression and problem solving were examined.

Cognitive reframing, attempts to perceive one's current situation more positively, has generally been found to be associated with positive outcomes among patients with RA (for a review, see Manne & Zautra, 1992). For example, cognitive reframing has been found to be associated with decreases in both depression and functional impairment (Felton & Revenson, 1984; Manne & Zautra, 1989; Parker, McRae, Smarr, Beck, Frank, Anderson, & Walker, 1988).

Stoic distancing refers to attempts to avoid acknowledging, dwelling upon or expressing the extent of pain and its associated distress. Suppressing thoughts and conversations about health problems was associated with increased functional impairment in a study of patients with RA (Parker et al., 1988). Ignoring pain and diverting attention away from pain among patients with chronic pain have been associated with both decreases in physical disability (Turner, 1991) and increases in disability at lower levels of pain severity (Jensen & Karoly, 1991). In a study of patients with osteoarthritis (OA), stoic distancing was associated with

increased activity level, but unrelated to pain severity (Regan, Lorig, & Thoresen, 1988).

Findings from studies of *emotional expression* and chronic pain have been somewhat mixed as well. Emotional expression refers to efforts to express pain-related distress. In a study by Affleck and colleagues (Affleck, Tennen, Keefe, Lefebvre, Kashikar-Zuck, Starr, & Caldwell, 1999), emotional support seeking predicted higher next day pain among patients with RA, however, venting emotions was unrelated to pain severity. In this same study, emotional support seeking was associated with lower pain levels the following day among patients with OA. In a study by Turner, Clancy and Vitaliano (1987), support seeking was correlated with lower levels of pain. However, Kelley and colleagues found no significant associations between emotional expression and pain (Kelley, Lumley, & Leisen, 1997). The discrepancy between this latter finding and that of other researchers may be due to differences in contextual factors between studies. That is, participants in this study expressed their emotions by speaking into a microphone rather than to another person.

Problem solving involves attempts to directly impact the source of the problem. Active coping strategies such as problem solving have generally been associated with positive health outcomes (Jensen, Turner, Romano, & Karoly, 1991). However, this relationship has not always been found. Research has also shown that problem solving may not be an effective strategy for patients dealing with a stressor over which they have little or no control over, such as RA pain (Aldrich, Eccleston, & Crombez, 2000; Folkman, Lazarus, Gruen, & DeLongis, 1986).

Methodological issues

Calls in the stress and coping literature have been made for the use of daily process methods involving intensive day-to-day monitoring in order to view support and coping processes close to their real-time occurrence (Tennen, Affleck, Armeli, & Carney, 2000). Multiple time-points are often necessary to create an appropriate test of the stability and magnitude of the relation between variables (Epstein, 1983). One method that has been used to examine the temporal patterning of support and

coping processes is the structured daily record approach. Using this design, the validity and reliability of self-report data can be increased by decreasing recall error of various events and experiences. When subjects are asked to report on various daily events and experiences close to their real-time occurrence, data are less likely to reflect respondents' personal theories of stability and change (Pearson, Ross, & Dawes, 1992). A further advantage of this methodology is that it allows a better mapping of methods onto conceptual models of social support and coping as processes (Gottlieb & Wagner, 1991; Lazarus & DeLongis, 1983; Rutter, 1987).

The current study

Although research has demonstrated associations between both social support and coping with well-being among patients with chronic illness, these lines of research have developed relatively independent of one another. A number of investigators (O'Brien & DeLongis, 1997; Schreurs & de Ridder, 1997) have suggested that in order to gain a better understanding of how patients cope with illness and the influence of the social context in which coping occurs, researchers should examine the combined effects of support and coping on well-being. The current study utilized a structured daily record method to examine the relations among social support, coping and pain severity among patients with RA over time. Levels of social support, ways of coping and pain severity have been demonstrated to vary across time and context within individuals (e.g. Affleck et al., 1994; Grennan & Jayson, 1989; Tennen et al., 2000; Wethington & Kessler, 1991). Therefore daily process methodology provides an appropriate framework in which to take an idiographic-nomothetic approach to examining these variables (Keefe, Affleck, Lefebvre, Starr, Caldwell, & Tennen, 1997; Tennen & Affleck, 1996).

The current study examined relations among social support, coping and pain among RA patients. First, we examined the relation of satisfaction with social support and disappointment in social support with subsequent levels of pain severity, independent of the effects of coping. Based on previous research (e.g. Feldman et al., 1999), we expected that satisfaction with

support would be associated with decreases in pain severity across the course of a day. Although we know of no previous research that has examined the influence of dissatisfaction with support on pain severity, research has found dissatisfaction with support to be associated with both poor mood and disease status among RA patients (e.g. Griffin et al., 2001; Revenson et al., 1991). Therefore, it was expected that disappointment in support would be associated with higher levels of pain severity over the course of a day.

Second, we investigated ways in which satisfaction with support and disappointment in support were related to coping with pain. According to Carpenter and Scott (1992), social support may encourage both the use of specific coping strategies and the effectiveness with which coping strategies are employed. Therefore, we examined whether support and coping interact to predict subsequent pain levels. In other words, are perceptions of support related to increases or decreases in the *effectiveness* of various ways of coping? Finally, we asked whether satisfaction and disappointment with support are associated with the *use* of coping strategies. Based on past research (e.g. Manne & Zautra, 1989), it was expected that satisfaction with support would be associated with higher levels of adaptive coping and disappointment in support would be associated with higher levels of maladaptive coping.

Method

Sample

The final sample consisted of 73 patients with RA. Respondents were recruited via the British Columbia Rheumatoid Arthritis Registry and the Provincial Department of Vital Statistics. To be eligible, individuals were required to meet the following criteria: (1) diagnosed with RA as defined by the American Rheumatism Association criteria (Arnett, Edworthy, Bloch, McShane, Fries, Cooper, Healey, Kaplan, Liang, Luthra, Medsger, Mitchell, Neustadt, Pinals, Schaller, Sharp, Wilder, & Hunder, 1988); (2) non-hospitalized and had utilized outpatient services during the previous three years; (3) did not meet criteria for major comorbidity (e.g. life-threatening illness, major heart disease, stroke complications); (4) had

clearance from their primary physician; (5) lived within the Greater Vancouver Region; and (6) spoke English.

Respondents were predominantly female (77%) and married (68%), ranging from 24 to 81 years old ($M = 56.2$, $SD = 13.12$).¹ The majority of respondents had completed at least a high school education (96%). A total of 37 percent were working at the time of the study, while the remainder were either retired (38%), on sick leave (15%), unemployed (7%) or laid off (1%). The mean number of years since diagnosis was 10.91 ($SD = 9.87$), ranging from 1 to 41 years. Respondents reported frequency of morning stiffness on a scale from 0 (never) to 5 (all of the time). Respondents indicated an average stiffness frequency of 2.03 ($SD = 1.55$). On a measure assessing the degree to which individuals experienced difficulties completing 8 daily activities on a scale ranging from 0 (no difficulty) to 3 (unable to do), respondents reported a mean level of functional disability of .78 ($SD = .55$).

Attrition

Of the 230 eligible respondents initially identified by the researchers, 200 gave consent via mail to be reached by telephone. One hundred and forty-nine individuals agreed via telephone to participate in the current study and were mailed study materials. In total, 114 completed study material packages were returned. We were able to interview 25 of the respondents who did not return the study materials in order to establish reasons for their withdrawal. Reasons for withdrawal included unexpected illness (RA-related or other types of illness), leaving town or reluctance to complete study materials twice daily. Of the 114 respondents who completed and returned the study materials, 14 completed less than 50 percent of the 14 time points within the structured record and were dropped from the analyses due to insufficient data. An additional 23 respondents indicated they had absolutely no RA-related pain to cope with during the course of the study and three respondents indicated they had done nothing over the course of the study to cope with their RA pain. Given the focus of the current analyses and the requirement for within subject variability in order for participants to be included in the analyses, these

individuals were also excluded. Lastly, one respondent was an outlier on a predictor variable, and was therefore dropped from the analyses. Analyses indicated that dropped respondents were not significantly different from the final sample in educational status, years since diagnosis of RA, or age (i.e. $p > .10$ for all tests). However, the final sample reported more frequent morning stiffness, $t(92) = -3.12$, $p < .01$, and greater difficulties in daily living activities, $t(93) = -3.67$, $p < .001$, in comparison to those dropped from the current analyses. Given that several respondents were dropped due to absence of RA-related pain, these findings suggest that dropped respondents were also experiencing lower levels of overall disease activity.

Procedure

Respondents completed an initial background questionnaire, followed by a structured daily record twice daily for one week. Daily record keeping was limited to one week in order to minimize the burden placed on the sample. We relied upon paper rather than electronic diaries because the latter would have been inappropriate given the lack of comfort with electronic/computer technology evidenced in pilot testing, particularly by our older participants. Respondents were asked to complete the records around lunchtime, and again before going to bed each day. Linking diary entries to naturally occurring daily events such as mealtime (lunchtime) and bedtime served as a memory prompt, or signal, to the participants to complete their diary entry. The precise timing of the diary entry was not critical to the research questions being addressed in the present study. Our experience is that this greater flexibility serves to increase the ease, and therefore the reliability, of completing the diary. At each of the 14 time points, respondents reported levels of satisfaction with support, disappointment in support, coping and pain since the last record entry. Obtaining measures twice daily provided the opportunity to examine whether patients' morning coping attempts and supportive exchanges were able to impact their pain levels later that day. Respondents were encouraged to seal the records after completing each time point using stickers provided by the researchers.

In this way, the period of cued recall was limited to no more than half a day.

Measures

In order to address the hypotheses in the current study, information was drawn from data collected as part of a larger study investigating stress, coping and support among patients with RA. Only those measures that were examined in the current study are addressed here.

Background questionnaire

Respondents provided demographic and medical status information including age, sex, education level, marital status, work status, year of RA diagnosis, morning stiffness frequency and functional disability. Functional disability was operationalized as difficulties performing eight daily activities (e.g. dressing oneself, getting in and out of bed, walking). These items were drawn from the Modified Stanford Health Assessment Questionnaire (Pincus, Summey, Soraci, Wallston, & Hummon, 1983), used frequently in the assessment of functional disability among patients with rheumatic diseases.

Daily record measures

The following measures were completed twice daily as part of the structured daily record:²

Pain severity Respondents indicated severity of RA pain on a 10 cm visual analogue scale (VAS) with possible scores ranging from 0 (no pain) to 100 (severe pain; Huskisson, 1974). The VAS has demonstrated good validity in previous research, displaying positive associations with other self-report measures of pain intensity (e.g. Paice & Cohen, 1997) and observed pain behaviors (e.g. Gramling & Elliot, 1992). Participants reported an average level of pain severity of 40.16 (SD = 22.97) in the morning and 40.02 (SD = 22.91) in the evening.

Satisfaction with support This measure was designed to assess satisfaction with three major dimensions of social support (emotional, informational and instrumental), that have been found to be related to health outcomes in previous research (Coyne & DeLongis, 1986). Respondents were asked to indicate 'Who was helpful to you in dealing with your arthritis pain

this morning (or afternoon)—either by talking with you, comforting you, listening to you, giving you advice or giving you practical assistance?' Respondents indicated sources of support which they found helpful using a checklist which included: (a) no one; (b) spouse; (c) brother or sister; (d) child(ren); (e) parent; (f) parent-in-law; (g) other relative; (h) friend; (i) neighbor; (j) someone at work; or (k) someone else (who?). The number of sources of support was summed to create a total score for morning and evening satisfaction with support. Due to the skewed nature of the data (96% of the total scores on this variable were either 1 or 0), satisfaction with support was treated as a dichotomous variable that was coded as '1' (satisfied with at least one person's support) or '-1' (not satisfied with support from any source).³ Seventy-one percent of respondents reported satisfaction with support on a least one morning of the study. Seventy percent of respondents reported satisfaction with support on at least one evening.

Disappointment in support Respondents were also asked to indicate 'Who disappointed you in helping you deal with your arthritis pain this morning (or afternoon)?' Respondents indicated sources of disappointment using the same checklist of individuals described earlier. The number of sources of disappointment in support was summed to yield a total score for morning and evening disappointment in support. Given that none of the participants reported a total disappointment score of greater than 1, disappointment in support was also treated as a dichotomous variable that was coded as '1' (disappointment in support) or '-1' (no disappointment in support). While 15 percent of respondents reported being disappointed in the support they received on at least one morning, 18 percent reported disappointment on at least one evening. The relatively low level of disappointment reported by participants in the current study is consistent with previous findings that negative interpersonal events occur infrequently compared to positive interpersonal events (Rook & Pietromonaco, 1987).

Coping strategies Participants completed a brief Ways of Coping inventory that was based on the longer Revised Ways of Coping

(WOC-R; Folkman et al., 1986). The WOC-R was adapted here specifically for use with a chronic pain population. In addition to the scales tapped with the WOC-R (planful-problem solving, confrontation, stoic distancing, self-control, escape-avoidance, accepting responsibility, positive reappraisal and seeking social support), the brief WOC used in the current study also assessed downward social comparison. This latter form of coping has been found to be an important component of coping with pain and illness in previous studies (e.g. Affleck, Tennen, Pfeiffer, & Fifield, 1988; Affleck, Tennen, Pfeiffer, Fifield, & Rowe, 1987; Wood, Taylor, & Lichtman, 1985).

Respondents indicated the degree to which they had utilized each of 18 coping strategies specifically to cope with RA pain on a 3-point scale labeled 0 (not at all), 1 (some) and 2 (a lot).

Factor analysis revealed four primary coping factors (for a detailed review of the factor analysis procedures and results conducted on the present sample, see Newth & DeLongis, 2004). These four ways of coping are now reviewed.

Cognitive reframing represents efforts to perceive one's current situation positively. Items reflect both positive reappraisal and downward social comparison. Therefore, this scale includes both downward social comparison strategies that enable the individual to see themselves as better off than others (e.g. 'Realized how, in some ways, I'm more fortunate than others') and coping efforts geared toward focusing on positive elements within one's current situation (e.g. 'Changed or grew as a person in a good way'). The average levels of morning and evening cognitive reframing reported by respondents were .42 (SD = .48) and .39 (SD = .48), respectively.

Stoic distancing represents attempts to avoid acknowledging, dwelling upon or expressing the extent of the pain and its associated distress. This scale includes elements of stoic distancing both oneself and others from the pain or pain-related distress as a means of coping (e.g. 'Went on as if nothing had happened' or 'Tried to keep my pain to myself'). The average levels of morning and evening stoic distancing reported were .72 (SD = .52) and .69 (SD = .52).

Emotional expression represents efforts to express the pain-related distress within an

interpersonal context. This scale includes items reflecting both the expression of pain-related emotions (e.g. 'Expressed anger') as well as efforts to obtain social support for such feelings (e.g. 'Accepted sympathy and understanding from someone'). Respondents reported average levels of morning and evening emotional expression of .27 (SD = .37) and .26 (SD = .34), respectively.

Problem solving represents increased efforts to engage oneself cognitively and behaviorally in order to directly impact the source of stress as a means of coping. Items on this scale reflect effortful and attentive attempts to develop and execute a course of action that will directly impact the pain and its effects (e.g. 'I knew what I had to do so increased my efforts to make things work'). The average levels of morning and evening problem solving reported were .53 (SD = .57) and .51 (SD = .57).

Results

Pearson product moment correlations were calculated among daily record variables and demographic and medical status variables. Values for daily record variables were aggregated across time points for each individual. Evening pain severity was not significantly associated with gender, age, marital status or years since diagnosis (i.e. $p > .10$ for all tests). However, it was significantly associated with higher morning stiffness frequency, $r(73) = .44$, $p < .001$, and functional disability, $r(73) = .47$, $p < .001$. Satisfaction with support, but not disappointment in support, was significantly associated with higher functional disability, $r(73) = .41$, $p < .001$. Cognitive reframing and emotional expression were significantly associated with greater levels of functional disability, $r(73) = .24$, $p < .05$ and $r(73) = .30$, $p < .01$, respectively. Emotional expression was also significantly associated with greater frequency of morning stiffness, $r(73) = .26$, $p < .05$. Finally, stoic distancing and problem solving were significantly negatively related to age, $r(73) = -.42$, $p < .001$ and $r(73) = -.23$, $p < .05$, respectively.

Correlations were then calculated among aggregated daily record variables (see Table 1). At the bivariate level, evening pain severity was found to be significantly associated with higher

Table 1. Intercorrelations among morning and evening pain severity, morning satisfaction with support, morning disappointment in support and morning coping ($n = 73$)

	1	2	3	4	5	6	7	8
1. AM Cognitive reframing	–	.28*	.49***	.53***	.26*	.13	.27*	.17
2. AM Stoic distancing		–	.25*	.45***	.19	.17	.11	.08
3. AM Emotional expression			–	.45***	.48***	.34**	.37***	.29*
4. AM Problem solving				–	.34**	.41***	.30**	.37***
5. AM Satisfaction with support					–	.35**	.29*	.30**
6. AM Disappointment in support						–	.15	.22†
7. AM Pain severity							–	.87***
8. PM Pain severity								–

* $p < .05$, ** $p < .01$, *** $p < .001$

† $p < .10$

morning pain severity, satisfaction with support and somewhat, but not significantly, associated with higher disappointment in support. Two of the four coping strategies were significantly related to evening pain severity (see Newth & DeLongis, 2004). Specifically, morning use of emotional expression and problem solving were both significantly associated with greater evening pain severity. Satisfaction with support and disappointment in support were also found to be significantly associated with coping. Satisfaction with support was significantly associated with greater use of cognitive reframing, emotional expression and problem solving. Meanwhile, disappointment in support was significantly associated with greater use of emotional expression and problem solving.

Hierarchical linear modeling

Hierarchical linear modeling (HLM), a multi-level modeling technique uniquely suited for the analysis of repeated measures (diary) data, was used to examine relations among support, coping and pain severity over time. Within-person variation is modeled at Level 1 and between-person variation is modeled at Level 2, allowing for the simultaneous examination of the two sources of variation. In the Level 1 specification of within-person variation, separate regression slopes and intercepts are estimated for each person. In the Level 2 specification of between-person variation, the Level 1 regression parameters are used to estimate average parameter estimates across all

subjects as well as the amount of variation around this average. Variables that have differing values within a person are added at Level 1 (e.g. support, coping, pain), and variables that have a common value within a person are added at Level 2 (e.g. functional disability). We used a random-intercept model in which the intercept is specified as random and the slopes are specified as fixed. With the exception of perceived support and disappointment in support, all daily record study variables were standardized. In addition, each predictor variable was centered around the mean of each individual's average score during the study.⁴

Lagged effects of morning coping and morning support with evening pain severity

Before specifying models testing the relations among morning support, coping and evening pain severity, the independent effects of demographic and medical status variables on each person's average daily pain levels (i.e. pain intercepts) were tested. The model for each patient can be expressed as:

$$\text{Level 1: } Y_{ij}(\text{PM Pain}) = \beta_{0j} + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{11}(\text{YSD}) + \gamma_{12}(\text{MSF}) + \gamma_{13}(\text{FD}) + \gamma_{14}(\text{G}) + \gamma_{15}(\text{Age}) + u_{0j}$$

At Level 1, evening pain severity on any given day ($Y_{ij}(\text{PM Pain})$) is a function of one's average evening pain across all days (β_{0j}) and that day's deviation from the average (e_{ij}). At

Level 2, the Level 1 intercept (β_0) for any person (i) is a function of the average intercept (mean pain) across persons (γ_{00}), years since diagnosis (YSD), general morning stiffness frequency (MSF), general functional disability (FD), gender (G), age (Age), their respective regression coefficients ($\gamma_{11}, \gamma_{12}, \gamma_{13}, \gamma_{14}, \gamma_{15}$) and a random component (u_{0j}). Stiffness frequency and functional disability were found to be significantly positively related to evening pain severity. Consistent with recommended multi-level model specification, the insignificant effects were dropped and stiffness frequency and functional disability were retained as control variables in subsequent analyses predicting evening pain severity (Kreft & de Leeuw, 1998; Snijders & Bosker, 1999).

Do morning satisfaction with support, disappointment in support and coping have independent effects on evening pain severity?^{5,6} We specified a model predicting evening pain severity that included morning levels of satisfaction with support (SS), disappointment in support (DS) and coping (cognitive reframing (CR), stoic distancing (SD), emotional expression (EE) and problem solving (PS)), controlling for stiffness frequency, functional disability and morning pain (to capture residualized change in pain from morning to evening). The final model for this analysis can be expressed as:

$$\text{Level 1: } Y_{ij}(\text{PM Pain}) = \beta_{0j} + \beta_{1j}(\text{AM Pain}) + \beta_{2j}(\text{AM SS}) + \beta_{3j}(\text{AM DS}) + \beta_{4j}(\text{AM CR}) + \beta_{5j}(\text{AM SD}) + \beta_{6j}(\text{AM EE}) + \beta_{7j}(\text{AM PS}) + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + \gamma_{01}(\text{MSF}) + \gamma_{02}(\text{FD}) + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

$$\beta_{7j} = \gamma_{70}$$

Results indicated that morning use of cognitive reframing significantly predicted lower levels of evening pain severity, $\beta = -.16, t(414) = -2.39, p < .05$, while morning use of problem solving

significantly predicted higher levels of evening pain severity, $\beta = .19, t(414) = 3.46, p < .001$ (see Newth & DeLongis, 2004). Morning use of stoic distancing and emotional expression were not significantly related to evening pain severity, $\beta = .01, t(414) = .19, p > .50$ and $\beta = .02, t(414) = .42, p > .50$, respectively. In addition, morning satisfaction with support, and disappointment in support were not significantly associated with evening pain severity, $\beta = .00, t(414) = -.05, p > .50$ and $\beta = -.02, t(414) = -.20, p > .50$, respectively.

Does morning satisfaction with support interact with morning coping to predict evening pain severity? Models were specified to determine whether satisfaction with support interacted with coping to predict subsequent pain severity. Although potential interactions between disappointment in support and coping in predicting subsequent pain severity were also of interest in the current study, low endorsement of disappointment in support did not permit its examination within an interaction term. That is, comparing the effects of coping when patients reported disappointment in support versus no disappointment in support would have resulted in a greatly imbalanced n for the two groups.

The interaction between satisfaction with support and coping was tested in four separate models. Each model was specified to include morning support, morning coping (cognitive reframing, stoic distancing, emotional expression and problem solving), and an interaction term between support and one of the four coping styles, controlling for stiffness frequency, functional disability and morning pain. Given that disappointment in support was non-significant in the previous model, it was excluded from all subsequent analyses predicting evening pain severity. This model can be expressed the same as earlier, with the subtraction of the disappointment term and addition of an interaction term in each of the four models. For example, in the model testing the interaction between satisfaction with support and cognitive reframing, the model would also contain an interaction term [$\beta_{8j}(\text{SS} \times \text{CR})$] at Level 1.

Of the four coping \times support interaction terms examined, stoic distancing was found to interact significantly with satisfaction with

support to predict evening pain severity, $\beta = -.08$, $t(417) = -2.46$, $p < .01$. This interaction is illustrated in Fig. 1, in which the relationship between morning stoic distancing and evening pain severity is displayed as a function of whether or not respondents reported satisfaction with support that morning. On mornings when respondents reported satisfaction with support, increased use of stoic distancing was associated with lower levels of pain severity in the evening. However, when stoic distancing was used in a context in which helpful support was not perceived, this way of coping was actually associated with higher levels of pain severity across the day.

Concurrent relations among morning support and morning coping

Do satisfaction with support and disappointment in support influence evening pain severity through indirect effects on coping? Models predicting morning measures of each the four coping strategies were specified. Preliminary analyses were conducted for each of the four models in order to determine the need to control for the presence of significant relationships between Level 2 variables (i.e. demographics and medical status) and ways of coping. Significant Level 2 predictors were retained in the models and all others were

dropped. Morning satisfaction and disappointment with support were entered as predictor variables. Given that patients were expected to engage in greater levels of coping when they were in more pain, morning pain severity was entered as a control variable. The extent to which participants engaged in the three remaining coping strategies was also controlled for in the model. A sample model (i.e. predicting cognitive reframing) for this set of analyses can be expressed as:

$$\text{Level 1: } Y_{ij}(\text{AM CR}) = \beta_{0j} + \beta_{1j}(\text{AM Pain}) + \beta_{2j}(\text{AM SS}) + \beta_{3j}(\text{AM DS}) + \beta_{4j}(\text{AM SD}) + \beta_{5j}(\text{AM EE}) + \beta_{6j}(\text{AM PS}) + e_{ij}$$

$$\text{Level 2: } \beta_{0j} = \gamma_{00} + u_{0j}$$

$$\beta_{1j} = \gamma_{10}$$

$$\beta_{2j} = \gamma_{20}$$

$$\beta_{3j} = \gamma_{30}$$

$$\beta_{4j} = \gamma_{40}$$

$$\beta_{5j} = \gamma_{50}$$

$$\beta_{6j} = \gamma_{60}$$

Results for the four models predicting coping use are presented in Table 2. Findings indicated that on mornings when respondents reported satisfaction with support, they reported engaging in significantly higher levels of cognitive reframing, $\beta = .10$, $t(418) = 2.39$, $p < .05$,

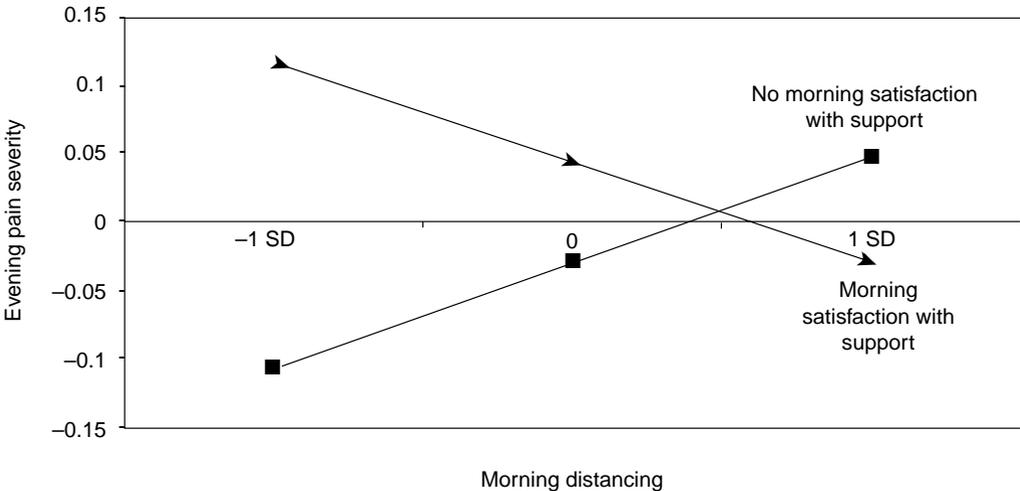


Figure 1. Evening pain severity as a function of morning stoic distancing and support.

Table 2. Hierarchical linear model (HLM) analyses: relations of satisfaction and disappointment in support to coping, controlling for AM pain severity

Effect	Cognitive reframing		Stoic distancing		Emotional expression		Problem solving	
	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>	β	<i>t</i>
Stiffness frequency	– ^a	–	.13*	2.27	.12**	3.00	.11*	2.21
Age	–	–	–.03***	–4.18	–	–	–.02*	–2.06
Pain severity	–.08†	–1.73	.14**	2.78	.03	.37	.06	1.07
Cognitive reframing	–	–	.33***	5.65	.25	2.28	.28**	5.90
Stoic distancing	.26***	4.38	–	–	.02	.33	.20**	3.64
Emotional expression	.12*	2.16	.01	.16	–	–	.00	.06
Problem solving	.27***	5.20	.25***	4.35	.01	.19	–	–
Satisfaction with support	.10*	2.39	–.03	–.77	.34***	3.28	.07*	2.12
Disappointment in support	–.11	–1.35	.05	.63	.23*	2.00	.14*	2.34

* $p < .05$, ** $p < .01$, *** $p < .001$

† $p < .10$

Note: ^aWith respect to age and stiffness frequency variables, dashed line indicates variable was dropped based on preliminary analyses demonstrating non-significant relationship

emotional expression, $\beta = .34$, $t(417) = 6.28$, $p < .001$ and problem solving, $\beta = .07$, $t(416) = 2.12$, $p < .05$. On mornings when respondents reported being disappointed in support, they also reported using significantly higher levels of emotional expression, and problem solving, $\beta = .23$, $t(417) = 2.00$, $p < .05$ and $\beta = .14$, $t(416) = 2.34$, $p < .05$, respectively. Thus, although morning satisfaction and disappointment with support did not have direct effects on evening pain severity, these variables appeared to exert indirect effects on pain severity through associations with ways of coping.⁷

Discussion

Using a daily process methodology, the present study examined the role of satisfaction and disappointment with support in coping and pain severity among patients with RA. Consistent with expectations, support appeared to influence pain severity both through encouraging the use of specific coping strategies, as well as by impacting the effectiveness with which these coping strategies were employed. These findings provide support for models conceptualizing social support as a coping resource (O'Brien & DeLongis, 1997; Thoits, 1986).

Satisfaction with social support and ways of coping

Patients' reports of greater satisfaction with support were associated with higher reported use of cognitive reframing. This finding is consistent with previous research (Dunkel-Schetter et al., 1987; Manne & Zautra, 1989). Further, it provides evidence for Thoits' model in which social support works to reduce distress by helping individuals reinterpret their situation in less upsetting ways. Given that cognitive reframing in the morning predicted decreases in evening pain severity, this finding is also consistent with studies demonstrating that positive aspects of support are associated with adaptive ways of coping (see Schreurs & de Ridder, 1997, for a review).

When patients in our study reported satisfaction with support, they tended to report using higher levels of emotional expression. This is consistent with previous research (e.g. Dunkel-Schetter et al., 1987), and may indicate that an important component of feeling satisfied with one's support is feeling that one may freely express one's emotions. However, whether such expression is subsequently associated with positive or negative outcomes, may depend upon a number of factors. These may include the manner in which the emotions are expressed to others, the quality and tone of the emotions expressed and the reaction of

others to the expression (O'Brien & DeLongis, 1997).

Finally, when patients reported satisfaction with support, they tended to indicate using higher levels of problem solving. Satisfaction with support in the morning was associated with higher levels of problem solving in the evening, even after controlling for prior levels of problem solving. This finding is consistent with previous studies that have found social support to be related to active ways of coping such as problem solving (Schreurs & de Ridder, 1997). One possible interpretation of this finding is that supportive others may directly encourage the RA patient to cope via active problem solving. Historically in western culture there has been an assumption, even among scholars (e.g. Freud, 1959 [1926]; Haan, 1993), that active problem-focused coping is preferable to more emotion-focused ways of coping (i.e. 'defense mechanisms' or 'illusions'). Given this, it seems likely that involved others may feel that the best way to provide support to patients is by encouraging problem-focused coping.

However, active problem solving was found to be a maladaptive way of coping with pain, perhaps because such coping is associated with overexertion among pain patients. If friends and family are encouraging patients to try to directly impact their pain, they may inadvertently be pushing patients too hard, leading them to overexert themselves. Even if efforts to influence pain directly do not result in overexertion, the increased attention towards the pain that occurs in the meantime may be responsible for increases in pain ratings (McCracken, 1997; Newth & DeLongis, 2004).

Overall, our findings suggest that when respondents feel supported, they use a greater variety of coping strategies, perhaps reflecting a greater effort put forth to cope with pain. This may be because support providers are encouraging patients' efforts to cope, which may serve to both increase satisfaction with support and to increase coping efforts. However, our findings suggest that these increased coping efforts are not always well placed. That is, the coping efforts of patients in our study were not always tied to better pain outcomes. This highlights the need for psychoeducational approaches that help patients and their families to best direct their efforts toward more effective modes of

copied with pain. These findings suggest that including support providers in clinical interventions may increase their effectiveness (see Johnson, 2002).

Disappointment in social support and ways of coping

Just as satisfaction with support was associated with increased use of emotional expression in coping with RA pain, so was dissatisfaction with support. This latter finding is consistent with that of Griffin and colleagues (2001) who found a relationship between perceived punishing responses of support providers and a greater use of venting negative emotions. It seems that when patients become disappointed in their support, efforts to engage in adaptive ways of coping may become derailed. The focus of coping may instead turn to the expression of distress related to both their pain and disappointment in support. In addition, at times when patients reported being disappointed in the support they received, they tended to use higher levels of the one form of coping we found to be associated with poorer pain outcomes: problem solving. This finding is consistent with research and theory suggesting that negative social interactions are associated with maladaptive ways of coping (see Schreurs and de Ridder, 1997, for a review).

Our findings indicate a positive relation between emotional expression and both satisfaction and dissatisfaction with support. Given this, one interpretation involves the assumption that when people express their emotions others are likely to react. Depending upon what emotions are expressed and how they are expressed, the reaction from others could be *either* positive or negative. This would account for the association of this strategy with higher ratings of both satisfaction and dissatisfaction with support.

The focus of the present study was on the role support plays in both coping and pain outcomes. However, it is likely that support and coping are two dynamic processes that are *mutually* influential over time (O'Brien & DeLongis, 1997; Thoits, 1986). Overall, findings were consistent with a model in which satisfaction with social support influences coping. With respect to disappointment in support, however, the direction of relationship seemed to be reversed at

times. That is, findings were consistent with a model in which disappointment in support was an outcome, rather than a determinant, of some forms of coping. Although morning disappointment in support did not predict evening coping, morning coping via stoic distancing did predict evening disappointment. This finding suggests that if patients try to keep others from knowing how much pain they are in, they may not provide sufficient cues to others in their social environment concerning the types of help they might need. A consequence of this appears to be subsequent disappointment in support. This finding is consistent with existing literature indicating that when individuals engage in avoidant coping such as stoic distancing, they are more susceptible to decreases in social resources (Dunkel-Schetter et al., 1987; O'Brien & DeLongis, 1997).

Support and coping effectiveness

On mornings when patients felt supported by their networks, the use of stoic distancing was associated with lower levels of evening pain severity. However, when patients reported using stoic distancing in the absence of support, stoic distancing was associated with higher levels of evening pain severity. In other words, stoic distancing appeared to be effective only when patients felt they were supported by their social networks. This may reflect situations in which support providers help patients distance themselves from their pain by distracting them and perhaps engaging them in alternative activities, rather than engaging them in a discussion about their pain. However, when patients are dissatisfied with support provided, perhaps support providers are drawing attention to the patient's pain by asking them about their pain or providing them with sympathy or pity. In essence, support providers may be interfering with patients' efforts to distance themselves from their pain. Previous findings have indicated that misunderstood needs of arthritis patients may lead to poorer illness adjustment (e.g. Melamed & Brenner, 1989). Our findings suggest that if patients' needs are misunderstood, support providers may not be able to successfully support patients' coping efforts.

Our finding that the use of stoic distancing was only effective when supported by members

of one's social environment suggests a possible explanation for contradictory findings on the benefits of coping via illusion and other denial-like strategies (e.g. Colvin & Block, 1994; Taylor & Brown, 1988). Contradictory findings regarding the benefit versus harm of illusions may be due in part to a failure to consider the social context in which they occur. In other words, illusions may be beneficial to the extent that they are supported by one's social network. If the patient tries to distance themselves from the negative, but realistic, aspects of his or her situation, and others in their social network do not support these efforts, but rather continue to talk about the (perhaps realistically) negative aspects of the situation, then our findings indicate that the patient's coping efforts are not likely to be successful.

Direct effects of support and disappointment in support on pain severity

In contrast to previous research that has demonstrated direct effects of support among patients with chronic pain (e.g. Evers et al., 1998; Feldman et al., 1999), we did not find a significant direct relationship between satisfaction with support and pain severity over time. Our finding that support was associated with adaptive *and* maladaptive ways of coping may help shed light on this result. That is, no significant direct relationship between morning support and evening pain severity may have emerged in the present study because support providers were encouraging both adaptive and maladaptive ways of coping with pain.

Similarly, disappointment in support in the morning did not predict increases in pain severity in the evening. Although 'negative' support has been shown in previous research to exert direct (harmful) effects on psychological well-being (e.g. Revenson et al., 1991; Riemsma et al., 2000), little is known about its relation to physical well-being. Our findings suggest that negative interpersonal exchanges may impact physical well-being indirectly, rather than directly, through ways of coping.

Conclusions

The current study provides support for interpersonal models of coping. In particular, our

findings suggest that coping does not occur in a social vacuum and that interpersonal factors are important contextual factors in understanding coping and its effects. Findings from the current study indicate that social support and coping are inextricably linked. Satisfaction with support was associated with reports of higher use of cognitive reframing, emotional expression and problem solving. In addition, social support was a predictor of the effectiveness with which patients were able to employ the use of stoic distancing to cope with their pain. Finally, our finding that disappointment in support is related to ways of coping with pain among patients with RA suggests the need for further research on the effects of dissatisfaction with support among patients with chronic pain. Previous research has shown that individuals may become dissatisfied with the support they receive when it is judged to be excessive or unwanted, inconsistent with their needs or coming from the 'wrong' support provider (Lanza, Cameron, & Revenson, 1995). Findings from the current study may also be incorporated into cognitive-behavioral pain management programs that involve patients and members of their support networks. Further research is needed to clarify whether interventions that address communication of patient needs for support, as well as ways in which support networks encourage and respond to patients' adaptive and maladaptive ways of coping lead to improvements in patient levels of pain and disability over time.

Notes

1. The higher percentage of women in the current study is consistent with the greater prevalence of RA among women (i.e. the overall ratio is 3:1; Anderson, Bradley, Young, McDaniel, & Wise, 1985).
2. In addition to measures listed here, daily records also required participants to report on ways in which their arthritis symptoms restricted them in doing anything that they normally do (e.g. miss work, cut down on chores, etc.). Preliminary analyses revealed that this variable did not add substantially to our understanding of the relations among social support, coping and pain severity. As a result, this variable was excluded from the analyses presented in the current article.
3. Dummy coding was used for all dichotomous study variables, as recommended by Pedhazur (1982) to

ease interpretation. With this type of effect coding, a positive beta coefficient indicates that the effects of the independent variable are stronger for '1', and a negative beta coefficient indicates that the effects are stronger for '-1'.

4. This type of centering allows one to examine the effects of individual changes in coping and support during the period of observation (Raudenbush, Brennan, & Barnett, 1995). For example, one can answer the question, what is the impact on evening pain severity when an individual uses more cognitive reframing than they do on average? Further, by using deviation scores, each person becomes his or her own control, thereby diminishing possible confounds (Aldwin, 1994; Vitaliano, Maiuro, Russo, & Becker, 1987).
5. Preliminary analyses investigated whether evening support and coping variables exert lagged effects on morning pain severity. No evidence for evening to morning lagged effects was found (i.e. $p > .10$ for all tests).
6. Preliminary analyses controlled for day of week and weekday/weekend effects on fluctuations in pain severity and coping. No evidence for these effects was found (i.e. $p > .10$ for all tests). Therefore, these variables were dropped from all future analyses.
7. To further explore the direction of relationships among support and coping variables, a secondary set of analyses was conducted. First, morning satisfaction with support and disappointment in support were modeled to predict evening ways of coping, controlling for morning ways of coping, and morning pain. Findings indicated that morning support predicted a greater level of evening problem solving, $\beta = .08$, $t(417) = 2.12$, $p < .05$. Morning disappointment in support did not significantly predict the use of evening coping strategies (i.e. $p > .10$ for all tests). Second, morning coping variables were modeled to predict evening satisfaction with support and evening disappointment in support, controlling for morning satisfaction with support, morning disappointment in support and morning pain. Morning use of coping strategies did not significantly predict satisfaction with support in the evening (i.e. $p > .10$). However, morning use of stoic distancing was found to be associated with higher levels of disappointment in support in the evening, $\beta = 1.02$, $t(423) = 2.45$, $p < .05$.

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