Daily Interpersonal Events in Pain Patients:

Applying Action Theory to Chronic Illness

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Abstract

Action theory proposes that individuals actively shape and then respond to their environments, highlighting the role of stable person characteristics in the development and maintenance of life's interpersonal difficulties. In this study, we adopted the action perspective in our examination of the daily lives of chronic pain patients with rheumatoid arthritis. Our evaluation of patients' daily diary reports indicated that individuals played a more prominent role in shaping their positive versus their negative social worlds. The contribution of symptoms of ill health and demographic characteristics, as well as personality attributes were also examined as stable factors that predicted exposure to and appraisal of events. In addition to between-person measures, day to day variations in illness symptoms also played a key role in predicting their social experinces. Together, these findings suggest that stable person characteristics and within-person fluctuations in ill health are each tied to daily interpersonal experiences for those in chronic pain. More broadly, they point to the value of capturing the experiences of individuals intensively over time, an approach that can help to elaborate the contributions of both stable factors and circumstance in shaping our social contexts.

Keywords

action theory; rheumatoid arthritis; chronic pain; interpersonal events

Action theory asserts that individuals play a substantial role in shaping their social contexts (Brandtstadter, 1998; Lerner, 1983). Through our own behavior, we each garner reactions from those around us, and these reactions in turn influence our functioning and quality of life. To some extent, then, action theory suggests that we are masters of our own universe, generating the conditions in which we live, albeit often unwittingly. This perspective is woven throughout the literature, largely focusing on how individuals create stressful interpersonal environments that precipitate and/or maintain their poor functioning (e.g., Bolger & Zuckerman, 1995; Suls & Martin, 2005). Within the realm of mental health, Joiner and colleagues (1995; 1999), for example, have reported that individuals with a propensity to seek reassurance from others report more stressful interpersonal events, which in turn contribute prospectively to elevations in their levels of depressive symptoms. In a similar vein, Hammen (1991) has found evidence consistent with her "stress generation" model of depression. Compared to those who are not depressed, depressed individuals experience a higher rate of self-generated life events, promoting future depression (e.g., Hammen, 1991; Nelson, Hammen, Daley, Burge, & Davila,

2001). Here again, stable personality attributes are called on as important contributors to the stress generation cycle (Nelson et al., 2001).

In the domain of physical health, action theory has some currency as well. Health psychologists have long recognized the importance of social environment, including social isolation and conflict, as a key predictor of disease risk and adaptation (e.g.,Taylor & Repetti, 1997), The recognition has fueled interest in understanding individual differences as determinants of health and illness through their impact on exposure and reactions to social stressors (Smith & Spiro, 2002). A case in point is the "stress engendering" personality attribute of hostility, reflecting a propensity toward cynicism, anger, and mistrust (Barefoot & Lipkus, 1994). Hostile individuals are exposed to more interpersonal conflict (Smith et al., 1988), and then respond to these social stressors with greater anger and physiological arousal than their nonhostile counterparts (Suls & Wan, 1998). Elevated physiological arousal to stress is a risk for the development of coronary heart disease (Krantz & Manuck, 1984).

While focusing on the volitional nature of human action, action theory does recognize the constraints imposed by social forces. Cultural, historical, and physical factors that lie out of our control limit the possibilities available to us (Brandtstadter, 1998); for example, social background factors such as age, gender, and socioeconomic status undoubtedly structure our social contexts. Among the constraints most relevant to health psychology is the health status of an individual. The burdens imposed by physical symptoms and disability from chronic illness can be enormous, potentially shrinking an individual's social network and limiting opportunities for interpersonal contact over the long term. The chronic limitations of the illness on the social milieu are further complicated by day-to-day fluctuations in symptoms and physical functioning. Although ongoing illness has an impact on social exchanges, we know relatively little about how the contributions of stable and fluctuating features of the illness compare with those of other aspects of the individual, including background demographic and personality factors.

In our work, we have explored the associations between symptoms, interpersonal environment, and adaptation in the context of chronic pain, a highly prevalent chronic health problem among adults (Rustoen, Wahl, Hanestad, Lerdal, Stevens, & Miaskowski, 2005). Here we draw on data from a sample of individuals with rheumatoid arthritis (RA), an autoimmune disease characterized by chronic inflammation, joint swelling and tenderness, pain, morning stiffness, fatigue, and disability. RA symptoms and markers of disease activity often co-occur with psychosocial stressors, particularly those of an acute and interpersonal nature (e.g.,Affleck et al., 1997; Arango & Cano, 1998; Zautra et al., 1994). The process by which RA patients' stable and varying illness symptoms, as well as personality and demographic characteristics, contribute to the experience of and responses to interpersonal events cannot be captured in a single assessment. These core issues require attention in both the nomothetic world of between-subject analysis and the idiographic world of within-subject inquiry. Thus, methods that capture the time course of both illness symptoms and events by assessing individuals repeatedly in their daily lives gives us the opportunity to more fully portray these relations as they unfold.

It is worth noting that by emphasizing the ways in which individuals create and then respond to a negative social world, we have sometimes failed to consider with equal enthusiasm the role individuals play in creating a positive social milieu. To what extent is a positive interpersonal environment attributable to stable individual versus situational factors? This question is one with important ramifications for long term health and adaptation. Accruing evidence points to positive social ties as an important predictor of optimal functioning and high quality of life over the lifespan. Perhaps not surprising, positive emotion is related to higher psychological health and well-being (e.g., Affleck & Tennen, 1996). Recent data point to the

impact of positive affect on physical health outcomes as well (e.g., Moskowitz et al., 2003; Ostir, Ottenbacher, & Markides, 2004).

In this study, we adopted the action perspective in our examination of the social events and illness symptoms occurring in lives of RA patients using daily diary reports. Through multilevel modeling, we first asked to what extent differences between individuals versus circumstances that occur on a given day accounted for the fluctuations not only in daily negative but also positive events and appraisals. We next asked the extent to which key personality attributes and demographic factors, as well as illness features, predicted the frequency and appraisal of these events. This approach follows on the central role of role of personality suggested in the action perspective, while also paying heed to the potential limits imposed by social forces reflected in demographic variables and by illness symptoms. Although we could have selected a host of other personality features, none have been studied as thoroughly in relation to interpersonal events as have neuroticism and extraversion (e.g., Canli, 2004), and we include them here. Likewise, the list of potential demographic factors is extensive; we elected to focus on those we deemed most directly relevant to health, including age, gender, and markers of socioeconomic status (Adler, Marmot, McEwen, & Stewart, 1999; Iribarren et al., 2005). Finally, central to our evaluation was whether stable and fluctuating aspects of the disease itself (i.e., daily pain/tenderness, fatigue, disability) accounted for the daily interpersonal experiences of patients.

Method

Participants

Participants were 184 men (n=52) and women (n=132) between the ages of 21 and 86 (M = 54.9, SD = 13.74), with a physician-confirmed diagnosis of rheumatoid arthritis (RA). The sample was comprised primarily of Caucasians (90 %), most of whom were married or living with a romantic partner (64%). Approximately 44% of the participants reported that they had graduated from college, and 35% indicated that they were currently employed. The average annual household income of participants fell between $30,000 and $39,999.

Procedure

All participants returned an informed consent form and a release of information form by mail permitting their physicians to confirm the diagnosis of RA. Upon receipt of these forms, research staff verified RA diagnosis with participants' physicians, and sent participants an initial questionnaire that contained items to assess demographic data and personality traits, including neuroticism and extraversion. When they returned the initial questionnaires, again by mail, participants were sent a set of 30 daily diaries and 30 stamped envelopes addressed to the research team. They were then contacted by a member of the research staff by phone and provided with detailed instructions regarding completion and mailing of the diaries. Participants were asked to complete a diary each night approximately 30 minutes prior to going to bed, and to place the completed diary in the mail the next day. (They were asked to mail diaries completed on Saturday and Sunday evenings on the following Monday.) After completing and mailing diaries for several days, participants were contacted by phone by a research team member, asked if they had any questions regarding the diaries, and encouraged to continue completing the diaries every evening for the remainder of the 30-day period. Participants were paid up to $90 for returning the initial questionnaire and daily diaries.

Measures

Daily interpersonal events—The daily diaries included measures of positive and negative interpersonal events drawn from the Inventory of Small Life Events (ISLE) for older adults (Zautra, Guarnaccia, & Dohrenwend, 1986; Zautra, Schultz & Reich, 2000), to assess daily

positive experiences and daily exposure to stressors. Participants provided frequency counts of the occurrence of 44 events in all (26 positive, such as "played a sport, game, or cards with friends," and 18 negative, such as "criticized by friend/acquaintance") gathered from the four domains of the ISLE: (1) friends and acquaintances; (2) spouse or live-in partner; (3) family members; and (4) co-workers. To examine these scores at the between- and within-person levels independently, we transformed the daily positive event and negative event scores into mean scores and person-centered daily change scores, constructed by subtracting each person's mean from her/his daily scores across all daily observations. This method of forming change or deviation scores was used for all within-person variables in this study.

To estimate responsiveness to events, we also assessed appraisals of stress and positive benefit from the daily events. That is, for the stressors and positive events within each of the four interpersonal domains, we asked participants to rate on 1-4 scales (from 1=*not at all* to 4=*extremely*) the overall level of stressfulness for the stressors and overall level of enjoyment for the positive events. These methods link enjoyment and perceived stress to everyday events within each domain, and provide ratings of daily stress and enjoyment that are focused on individuals' responses to actual events.

Daily pain/tenderness and fatigue—Daily pain and fatigue were assessed in the diaries with the standard instruction for a numerical rating scale (Jensen, Karoly, & Braver, 1988; Zautra et al., 2001), "What number between 0 and 100 describes your average level of arthritis pain (or fatigue) today? A zero (0) would mean 'no pain (or fatigue)' and a one hundred (100) would mean 'pain (or fatigue) as bad as it can be.' An additional item asked participants to rate on a 1-4 scale (from 1=*none* to 4=*severe*) "How much inflammation and tenderness did you have in your joints today?" Because the ratings of mean daily pain and mean joint tenderness/inflammation were highly correlated (r = .80), they were combined in a composite variable called "pain/tenderness" by computing the average of each day's ratings after they had been converted to z scores.

Functional disability—Difficulty carrying out routine tasks was assessed in the daily diaries with 10 items drawn from the Health Assessment Questionnaire (HAQ; Ramey, Raynauld, & Fries, 1992). For each item, participants indicated whether the behavior was attempted that day, and for behaviors that were attempted, rated their level of limitation on a 3-point scale (from 1 = *Not at all limited* to 3 = *Limited a lot*)." Sample items included "Lifting or carrying groceries," "Bending, kneeling, or stooping," and "Bathing or dressing yourself." A mean score for each participant for each day was calculated by taking the mean of every item that was attempted that day, and these daily means then were used to compute an overall mean daily HAQ scores for each participant across the 30 days of diaries. In this sample, the coefficient alpha for the mean scores on the 10 HAQ items, averaged over time, was .96.

Neuroticism and Extraversion—Neuroticism and extraversion were assessed in the initial questionnaire via the 12 neuroticism items and the 12 extraversion items drawn from the NEO Five Factor Inventory (NEO-FFI: Costa and McCrae, 1992; Scandell, 2000). Participants rated their agreement with each statement on a 5-point scale (with 1 = *Strongly disagree*, 3 = *Neutral*, and 5 = *Strongly agree*). Examples of items for neuroticism include "I often feel tense and jittery" and "I often get angry at the way people treat me," and for extraversion include "I laugh easily" and "I really enjoy talking to people." Cronbach's alpha was .82 for neuroticism and .78 for extraversion in the present study.

Analytic Approach

The principal analyses for this study derive from a class of statistical procedures called multilevel modeling (Affleck, Zautra, Tennen, & Armeli, 1999). These procedures partition

the two sources of variance in our person-day data set - differences <u>between</u> persons in their average levels of the daily variables and differences <u>within</u> persons in their daily reports over time. In the vernacular of multilevel modeling, "level 1" units refer to the discrete daily reports of pain/tenderness and fatigue measured once a day; the "level 2" units are persons, who are described in this study by their demographic characteristics, personality traits, and average levels of daily pain/tenderness, fatigue, and disability. Our multilevel analyses examine both the within-person relations between level 1 variables over time and the effects of level 2 variables on level 1 intercepts (which are equivalent to each person's mean score on the daily variables). The SAS Proc Mixed procedure furnished parameters in the form of unstandardized maximum likelihood estimates (SAS Institute, 1996). In these analyses, level 1 predictors were person-centered, and intercepts and within-person slopes were allowed to vary randomly; this enabled us to generalize the findings to the population of persons from which the sample was drawn, to the population of observations from which their daily reports were sampled, and to the population of within-person relations which these samples are intended to represent (Affleck et al., 1999). Because autocorrelated residuals are a common consequence of equally spaced (daily) observations, and can bias standard errors and significance levels, these analyses also fit the error terms to an AR(1) model.

Results

Descriptive Findings

The 184 participants in this study reported data in 5284, or 95.7%, of the 5520 diaries they were asked to complete. We began by examining the means, standard deviations, and intercorrelations among the independent variables, presented in Table 1. Noteworthy significant correlations reveal that (a) higher levels of daily pain/tenderness were associated with higher neuroticism and lower income, (b) higher levels of daily fatigue were associated with higher neuroticism and lower extraversion, and (c) higher levels of daily disability (mean HAQ scores) were associated with higher neuroticism, older age, lower education, and lower income.

We next examined participants' reports of daily interpersonal events, our dependent measure. On the average day, the average participant experienced 1.12 (sd = 1.71) negative events and 5.00 (sd = 3.08) positive events. Participants reported having one or more events with coworkers on 1352 (25.6%) of the 5284 days they chronicled; with friends on 3339 (63.2%) days; with family members on 3693 (69.9%) days, and with spouse/partners on 3616 (68.4%). It was on these days that participants went on to rate the stressfulness and enjoyment of that day's interactions with the individual or individuals belonging to each relationship domain. On such days, mean stressfulness ratings (on 1-4 point scales) for coworkers was 1.62 (sd = .81); for friends was 1.29 (sd = .63); for family members was 1.40 (sd = .71); and for spouses was 1.44 (sd = .73). The corresponding mean enjoyment ratings for coworkers was 2.87 (sd = .97); for friends was 3.36 (sd = .83); for family members was 3.36 (sd = .82); and for spouses was 3.28 (sd = .86). On balance, then, participants tended to report that they experienced more positive than negative events, and were more responsive to those positive events, reflected in their levels of enjoyment, than they were to negative events, reflected in their levels of stressfulness.

To begin to determine the extent to which stable attributes of individuals and/or of their environments predict their interpersonal experiences, we first examined how much of the variability in each of the daily measures of events and relationship appraisals is due to differences between one individual and another (between-person variance) versus differences between one day and another (within-person variance). These findings, presented in Table 2, suggest that the differences between persons figure more prominently not only in the experience of positive versus negative daily events (explaining 48% versus 31% of the variance

in positive and negative events, respectively), but also in the daily perception of relationship enjoyment as opposed to relationship stress emanating from these events within each interpersonal domain. For each comparison, differences between people factored more strongly in the perception of relationship enjoyment than they did in the perception of relationship stress. Conversely, within-person variability played a greater part in the distribution of both negative daily events and negative daily relationship appraisals.

Predicting Daily Negative and Positive Events

We next examined between- and within-person predictors that might account for exposure to positive and negative daily events. The findings of a multivariate, multilevel, random effects regression analysis of the probabilities of experiencing positive and negative daily events on a given day are presented in Table 3. These models included several categories of "level 2" and/or "level 1" predictors. Among "level 2" or between-person predictors we considered disease-related, demographic, and personality variables. Disease-related predictors included (a) one's average daily pain/tenderness, mean daily fatigue, and mean disability scores and (b) the current day's deviation of pain/tenderness and fatigue from one's average levels. Demographic predictors included gender, age, education, and income. Personality predictors included neuroticism and extraversion. Furthermore, the model predicting each day's negative events was adjusted for each individual's mean number of positive daily events and the current day's deviation of positive events from the mean. Similarly, the prediction of daily positive events similarly controlled for mean numbers of, and the current day's, negative events. These analyses, then, identify which between-person and within-person variables account for the daily experience of negative and positive events.

Several between person variables reliably predicted event frequency. Individuals who reported higher average daily positive events also reported more daily negative events, suggesting that they tended to be interpersonally engaged. For negative events, two demographic and disease-related factors also proved to be significant predictors. Daily negative events were more commonly reported by younger participants and those who experienced higher average levels of daily fatigue. For positive events, demographic factors also figured as prominent predictors, as did personality. The probability of experiencing positive events on a given day was higher for women, for those with higher incomes, and for the more extraverted. In addition, within-person changes in disease-related symptoms predicted both positive and negative event frequency. Negative events were <u>more</u> likely and positive events <u>less</u> likely to occur on days when participants reported higher than normal fatigue.

These analyses were taken a step further by determining the ability of these categories of variables to reduce the between-person variance and within-person variance components in events indicated in Table 2. To account for between-person variance, we adopted a stepwise entry procedure. Step 1 included the more proximal predictors, i.e., disease-related variables; step 2 examined the additive effect of personality traits; and step 3 included the effect of gender, age, education, and income. Together these variables explained 14.1% of the between-person variability in negative events. Disease-related variables explained 3.3% of the between-person variability in negative events; an additional 4.3% was explained by personality differences; and an additional 6.5% was explained by demographic variables. These same variables were able to explain 9.2% of the between-person differences in positive events. Disease-related variables predicted none of this variance; personality explained 3.3% of the variance; and demographic variables explained yet another 5.9% of the variance. Our ability to explain the within-person variation in negative and positive events was necessarily restricted to the daily ratings of pain/tenderness and fatigue. These ratings explained 1.0% of the within-person variability in negative events and 3.4% of the within-person variability in positive events.

Together, the findings suggest that chronic symptoms of disease and personality attributes play a role in determining one's exposure to events, but that demographic factors should not be overlooked as important contributors to an individual's interpersonal milieu. Also noteworthy is that chronic disease symptoms were predictive of between-person variation in negative but not positive events, whereas personality attributes were predictive of between-person variation in positive but not negative events. Fluctuations in disease symptoms also contributed to exposure to daily events, accounting for modest amounts of within-person variance, particularly for positive events.

Predicting Daily Appraisals of Events

To predict individuals' ratings of the events they experienced in each of the interpersonal domains assessed, we followed a general multilevel model similar to the one described above, with the following adjustments. In addition to incorporating the disease-related, personality, and demographic predictors that appeared in the models predicting positive and negative events, we added the corresponding mean and daily positive (or negative) events occurring in that domain. Each model predicting relationship stress in a given domain also adjusted for the mean and daily ratings of relationship enjoyment in that domain, and vice versa. Findings for these analyses are presented in Tables 4 through 7.

Daily Relationship Stress—Not surprisingly, in each of the domains - with friends, coworkers, family members, and spouses -- daily ratings of greater relationship stressfulness most often occurred when the participant experienced more negative events with these individuals, both on average and on the day in question. Substantial amounts of between-person variance in relationship stress were attributable to between-person differences in the 30-day average of frequencies of the occurrence of domain-specific negative events. Proportions of variance accounted for by between-person differences in events ranged from 24.6% for friends, 41.2% for family members, 46.1% for spouses, to 57.2% for coworkers. Same-day domain-specific events predicted 15.6% of the within-person differences in friendship stress; 27.9% of family stress; 37.7% of spousal stress; and 21.0% of coworker stress.

After accounting for the occurrence of negative events, demographic and personality variables were not predictive of stress ratings in any interpersonal domain, and between-person symptoms and disability played only a small role. Those who were more disabled reported more stressful interactions with co-workers, and those who were more fatigued in general reported more stressful interactions with family members. A more consistent predictor of stress ratings across domains was the within-person daily fluctuations in symptoms, particularly pain and tenderness. When individuals had greater pain/tenderness on a given day, they also tended to rate that day's encounters with spouses, friends, and co-workers as more stressful. On days with increased levels of fatigue, ratings of stress with friends also tended to be higher. Beyond the variability accounted for by the occurrence of negative events themselves, then, ratings of stress within each domain most consistently varied with daily changes in disease-related symptoms.

Daily Relationship Enjoyment—Paralleling the findings for relationship stress, the most important predictors of relationship enjoyment were the positive events occurring in each relationship domain. They accounted for less variance in enjoyment ratings, however, than negative events did in predicting interpersonal stress ratings. With the exception of the coworker domain, individuals who had higher average levels of positive events in that domain were more likely to report enjoyment of relationships in that domain on a given day. And in all domains, relationship enjoyment was even greater when more positive events in that domain were experienced on that day. The amounts of between-person variance in relationship enjoyment that could be attributed to domain-specific positive events were 3.4% for coworkers,

9.6% for friends, 11.6% for family, and 36.9% for spouses. Domain-specific positive events were able to explain 10.0% of the within-person differences in daily enjoyment of relationships with family members; 11.3% for coworkers; 13.5% for friends; and 37.7% for spouses.

After accounting for the occurrence of positive events, demographic, personality, and disease-related variables predicted variance in enjoyment ratings. Most consistent across domains was the role of extraversion, with more extraverted individuals reporting greater daily enjoyment of their relationships with co-workers and friends. Additional between-person predictors of enjoyment emerged in the family domain: Those who were less disabled and less educated tended to report greater enjoyment with family members on a given day. Although between-person differences in disease-related symptoms did not predict enjoyment in any interpersonal domain, within-person fluctuations in daily symptoms did account for enjoyment of spouse and family relationships. On days when individuals experienced less fatigue and pain/tenderness, they reported greater enjoyment with their spouses. Likewise, on days when they were less fatigued, they reported more enjoyment of friends.

Discussion

The action perspective proposes that life events and responses to those events do not happen arbitrarily to us, but rather that we have a hand in shaping our own lives. In the current study, we examined how action theory might aid our understanding of the day-to-day interpersonal environment of individuals with a prevalent and disabling health condition, chronic pain. Through the use of diary methods with pain patients, we capitalized on a unique opportunity to explore the relations of factors that vary between- and within-person to the experiences of daily events. Together, the findings suggest that for those with chronic pain from RA, the occurrence and appraisals of daily events vary substantially between individuals, consistent with the action perspective. It is important to note that stable aspects of individuals and/or their lives appeared to be play a stronger role in generating both positive interpersonal experiences and reactions to those experiences, whereas fluctuations in situational factors figured more prominently in the generation of and responses to negative experiences. It should come as no surprise that individuals may play a more active role in shaping the positive than the negative social conditions in which they live. However, the emphasis on the negative in many applications of action theory has led to some neglect of these fundamental aspects of human experiences. We and others have found that these positive social dimensions are especially important in preserving physical health, especially for those coping with chronic illness (e.g., Moskowitz, 2003; Zautra, Johnson, & Davis, 2005).

In applying the action perspective to chronic pain, we considered how the illness experience itself might shape patients' social context by examining key differences between individuals in their illness symptoms and functioning. We asked to what extent the experience of intractable pain, fatigue, and disability accounted for variability in the occurrence of and responses to interpersonal events. Indeed, enduring aspects of RA related to exposure to negative events, and predicted the stressful appraisal of negative social ties in several interpersonal domains. In contrast, stable features of the illness played no role in either exposure or appraisal of positive social events.

Based on the action theory, we expected that personality factors would prove to be important predictors of interpersonal experiences, even when taking into account features of the illness. Among the most striking findings of the current study was that although personality contributed to the reports of events and their appraisal, these effects were entirely limited to extraversion. In line with existing evidence gleaned from the life events literature (e.g., Headey & Wearing, 1989; Magnus, Diener, Fujita, & Pavot, 1993), extraverted individuals reported more frequent positive events, and tended to report enjoying those events across relationship domains more

than did those who were less extraverted. Neuroticism here proved to be insignificant in the prediction of patients' social milieu. This finding contrasts with previous work in non-pain samples, where neuroticism related to the experience of more frequent negative events and to greater distress in the face of these events (e.g., Bolger & Zuckerman, 1995; Davila, Bradbury, Cohan, & Tochluk, 1997). Because the overlap between neuroticism and illness features was modest but significant (rs = .15 to .30), inclusion of illness variables in the models might have diminished the contribution of neuroticism to negative interpersonal experiences. Whether the role of neuroticism in shaping social events diminishes in the context of chronic pain, however, also remains an open question.

Relatively less attention has been directed at discerning cultural and structural factors that may constrain individuals' interpersonal worlds. Here we explored such constraints by considering several basic demographic factors, and found that they accounted for variance in both positive and negative events, although different demographic factors appeared to be important for each. The most prominent demographic predictor of negative events was age: older individuals tended to report fewer negative social interactions than their younger counterparts. These findings are compatible with the "socioemotional selectivity" theory of functioning (e.g., Carstensen, Pasupathi, Mayr, & Nesselroade, 2000), which posits that as they age, adults become more adept at regulating their exposure to negative social ties. Even in the face of managing a chronic pain condition, then, the benefits of age with regard to interpersonal conflict appear to accrue.

For positive events, on the other hand, gender and income proved important: men and poorer individuals were exposed to less frequent positive social exchanges. Much of the research examining how social environments vary by gender and especially by socioeconomic status has focused on stressful events (e.g., Davis, Matthews, & Twamley, 1999; Baum, Garofalo, & Yali, 1999; Gallo & Matthews, 2003) or on broad measures of social support (Ranchor, Bouma, & Sanderman, 1996). Yet the current findings suggest that group differences in positive events themselves may be a fruitful avenue to explore further. Interestingly, the effect of income was evident even though our inventory was comprised of events that did not require access to material resources. Thus, the less frequent exposure to positive events among those with lower income was unlikely directly due to a lack of affluence. We suspect that the effects of low social status were indirect, through more insidious influences on the availability of discretionary time and energy. Chronic financial strain may also deplete the "reserve capacity" of individuals, decreasing their intrapsychic resources such as a perceived sense of control, and leaving them poorly positioned to encounter the experience of daily positive exchanges (Gallo & Matthews, 2003). Also demographic background factors generally related only to occurrence and not to ratings of events, suggesting that the influence of cultural and social factors on interpersonal environments may occur via exposure to events more than subjective appraisals of interpersonal relationships. orthy that the between person factors we examined to explain variability in events (i.e., chronic features of the disease, personality, and demographic factors) explained only 9 to 14% of the between-person variance in interpersonal events. Clearly, many stable aspects of the individuals and their situations were not captured in our selection of variables. Future work that includes more detailed reports of symptoms and disability as well as inclusion of additional personality attributes (e.g., sociotropy and autonomy; Hammen et al., 2001), and demographic factors (e.g., race and ethnicity) should provide a fuller assessment of important personal, physical, and cultural forces that shape patients' social environments.

In focusing on contributions of between person factors to the social environment, we should not lose sight of the fact that differences between persons accounted for less than half of the variance in reports of both occurrence and appraisal of positive and negative daily events. Thus, situational factors are key contributors to the daily social worlds of pain patients. Here we

targeted the possible contribution of day-to-day changes in patients' most common illness symptoms, pain/tenderness and fatigue, and found that increases in fatigue in particular predicted less frequent positive and more frequent negative social exchanges. Fluctuations in symptoms also consistently related to daily appraisals of events, beyond the effects of the occurrence of events themselves, mean levels of symptoms, demographic factors, and personality. Increased pain and fatigue were associated with perceptions of greater stressfulness of negative events and less enjoyment of positive events for RA patients. These findings indicate that in addition to "chronic" symptoms, daily variations in symptoms in a chronic pain condition, and likely other chronic illnesses, are important determinants of patients' daily social environments.

For clinical health psychologists, an important question centers on how this application of the action perspective informs interventions that foster maximal quality of life for the chronically ill. What targets can we reasonably expect to change and by what means? Given that positive social engagements promote resilience in the face of difficulty, directing efforts toward increasing exposure to and enjoyment of pleasant social interactions seems promising. Along this line, current cognitive-behavioral approaches to treatment of chronic pain typically include a module that focuses on scheduling pleasant events (Turk & Gatchel, 2005). Moreover, evolving interventions apply mindfulness meditation training to enhance individuals' capacity to notice and savor such positive experiences (Kabat-Zinn, 1994; Kabat-Zinn, Lipworth, & Burney, 1985). Although not attempting to alter personality per se, in essence, these interventions may help individuals behave in a more extraverted way, with the potential for accruing some of the benefits of having an extraverted personality.

Also relevant is the clear importance of fatigue as a symptom among those with chronic pain, a symptom that may be largely out of patients' control. Although similar to feelings of "tiredness," illness-related fatigue often is not readily alleviated by rest (Hawley & Wolfe, 1997). Patients themselves report that fatigue is among the most troubling of their symptoms, and rate it as one of the key factors leading to a decrease in their quality of life (Swain, 2000). The current findings highlight that the decrease in quality of life associated with fatigue includes not only exacerbation of negative but also constraints on positive daily social exchanges. Yet clinicians routinely consider fatigue a relatively minor symptom associated with a presenting complaint and ignore it. At the very least, our data suggest that attending to clinical strategies that facilitate social engagement despite the experience of fatigue may prove to be valuable in promoting well-being among individuals in chronic pain. Because fatigue is a common complaint of nearly every major chronic illness (e.g., Evans, 1999; Swain, 2000), similar clinical strategies may be relevant for other chronic conditions as well.

In our application of the action perspective, we focused on factors that may constrain daily social lives in a chronic illness population, particularly symptoms. A key point highlighted in these data is the value of methods that capture both person- and situation-level contributions to exposure to interpersonal stressors and positive exchanges and their appraisals. Ripe for exploration is the extent to which between-person factors interact with daily fluctuations in the illness experience to shape patients' social context in pain and other chronic illnesses. Such an approach would provide clinically-meaningful clues regarding processes by which those with chronic conditions both create and are subject to their social milieu. .

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Table 1

Means, Standard Deviations, and Intercorrelations among Independent Variables

	M	SD	(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
(1) Gender [a]	.72	.45								
(2) Age	54.89	13.74	-.34***							
(3) Education	6.15	1.51	.11	-.15*						
(4) Income	13.11	4.13	.03	-.08	.35***					
(5) Neuroticism	2.57	3.29	.24***	-.22**	-.11	-.08				
(6) Extraversion	3.29	.57	.04	-.12	.01	.02	-.33***			
(7) Mean daily pain/tenderness	.00	.73	.03	.10	-.13	-.17*	.22**	-.14		
(8) Mean daily fatigue	33.13	18.32	.13	-.03	-.11	-.12	.30***	-.12	.68***	
(9) Mean daily disability	1.78	.55	-.09	.23**	-.17*	-.16*	.15	-.11	.73***	.56***

[a] Male = 0; Female = 1

*
$p < .05$

**
$p < .01$

***
$p < .001$

Table 2

Comparisons of between- and within-person variability in daily measures of events and relationship appraisals

Variable	Between-person variance component (% of total variance)	Within-person variance component (% of total variance)
Daily Negative Events	0.92 (31.1%)	2.04 (68.9%)
Daily Positive Events	4.58 (48.1%)	4.94 (51.9%)
Daily relationship stress with friends	0.06 (14.4%)	0.34 (85.6%)
Daily relationship enjoyment with friends	0.23 (34.1%)	0.44 (65.9%)
Daily relationship stress with coworkers	0.22 (32.7%)	0.46 (67.3%)
Daily relationship enjoyment with coworkers	0.47 (49.3%)	0.49 (50.7%)
Daily relationship stress with family	0.13 (25.8%)	0.38 (74.2%)
Daily relationship enjoyment with family	0.29 (40.9%)	0.41 (59.1%)
Daily relationship stress with spouse	0.15 (27.7%)	0.40 (72.3%)
Daily relationship enjoyment with spouse	0.33 (42.9%)	0.44 (57.1%)

Table 3

Multilevel Random Effects Regression Models Predicting Negative and Positive Daily Events

Predictor	Negative Daily Events		Positive Daily Events	
	B	F	B	F
Mean daily positive (negative) events	.153	22.89 ***	(.829)	(26.52) ***
Mean daily pain/tenderness	-.125	.72	.229	.48
Mean daily fatigue	.010	3.91 *	-.004	.10
Mean daily disability	.040	.05	-.241	.34
Gender [a]	-.070	.19	.986	7.61 **
Age	-.019	13.25 ***	.013	1.03
Education	.057	1.51	-.170	2.62
Income	-.009	.30	.109	8.27 **
Neuroticism	.211	3.37	-.245	.88
Extraversion	-.180	.16	.823	8.60 **
Current day's positive (negative) events [b]	.018	.20	(.035)	(1.18)
Current day's pain/tenderness [b]	.047	1.36	.012	.03
Current day#x2019;s fatigue [b]	.005	7.30 **	-.011	11.27 ***

Note: The model predicting negative events included mean daily and current day's positive events; the model predicting positive events included mean daily and current day's negative events

*
p < .05

**
p < .01

***
p < .001

[a]Male=0; Female=1

[b]Person-centered

Table 4

Multilevel Random Effects Regression Models Predicting Daily Relationship Stress and Enjoyment with Friends

Predictor	Daily relationship stress with friends [a]		Daily Relationship enjoyment with friends [b]	
	B	F	B	F
Mean negative daily events with friends	.363	28.05 ***	----	----
Mean positive daily events with friends	----	----	.125	16.01 ***
Mean daily pain/tenderness	.021	.32	.035	.38
Mean daily fatigue	.002	1.31	-.000	.05
Mean daily disability	.060	1.47	.007	.01
Gender [c]	-.000	.00	.014	.05
Age	-.000	.00	.002	1.34
Education	.012	.94	-.017	.90
Income	-.002	.25	.007	1.21
Neuroticism	.041	1.96	.015	.70
Extraversion	-.012	.12	.175	13.12 ***
Current day's pain/tenderness [d]	.034	3.98 *	-.025	1.06
Current day's fatigue [d]	.003	12.32 ***	-.001	.48
Current day's negative events with friends [d]	.376	146.85 ***	----	----
Current day's positive events with friends [d]	----	----	.210	222.77 ***

Note: Model predicting stress included mean and current daily negative events with friends; model predicting enjoyment included mean and current daily positive events with friends.

*
p < .05

**
p < .01

***
p < .001

[a] Adjusting for mean daily and current day's relationship enjoyment with friends

[b] Adjusting for mean daily and current day's relationship stress: friends

[c] Male=0; Female=1

[d] Person-centered

Table 5

Multilevel Random Effects Regression Models Predicting Daily Relationship Stress and Enjoyment with Coworkers

Predictor	Daily relationship stress with coworkers [a]		Daily Relationship enjoyment with coworkers [b]	
	B	F	B	F
Mean negative daily events with coworkers	.741	55.19 ***	----	----
Mean positive daily events with coworkers	----	----	.222	2.32
Mean daily pain/tenderness	-.077	.89	.149	.95
Mean daily fatigue	.001	.69	-.002	.22
Mean daily disability	.234	3.95 *	-.194	.81
Gender [c]	-.092	.83	-.139	.60
Age	-.002	.32	-.002	.08
Education	-.015	.30	-.046	.92
Income	.002	.04	.015	.57
Neuroticism	.057	.93	.066	.35
Extraversion	.010	.02	.255	4.11 *
Current day's pain/tenderness [d]	.060	4.44 *	-.018	.29
Current day's fatigue [d]	.000	.02	-.002	1.81
Current day's negative events w/ coworkers [d]	.373	251.15 ***	----	----
Current day's positive events w/ coworkers [d]	----	----	.253	139.31 ***

Note: Model predicting stress included mean and current daily negative events with coworkers; model predicting enjoyment included mean and current daily positive events with coworkers.

*
p < .05

**
p < .01

***
p < .001

[a] Adjusting for mean daily and current day's relationship enjoyment with coworkers

[b] Adjusting for mean daily and current day's relationship stress with coworkers

[c] Male=0; Female=1

[d] Person-centered

Table 6

Multilevel Random Effects Regression Models Predicting Daily Relationship Stress and Enjoyment with Family

	Daily relationship stress with family [a]		Daily Relationship enjoyment with family [b]	
	B	F	B	F
Mean negative daily events with family	.709	54.51 ***	----	----
Mean positive daily events with family	----	----	.177	27.95 ***
Mean daily pain/tenderness	-.017	.11	.106	2.03
Mean daily fatigue	.004	4.93 *	-.001	.27
Mean daily disability	.043	.43	-.194	4.21 *
Gender [c]	-.039	.48	.031	.13
Age	-.002	.94	-.001	.27
Education	.024	2.00	-.060	6.27 **
Income	.011	3.36	.008	.84
Neuroticism	.031	.61	.005	.01
Extraversion	-.013	.08	.085	1.76
Current day's pain/tenderness [d]	.035	2.74	-.020	.81
Current day's fatigue [d]	.001	.82	-.002	3.91 *
Current day's negative events w/ family [d]	.665	368.68 ***	----	----
Current day's positive events w/ family [d]	----	----	.155	157.25 ***

Note: Model predicting stress included mean and current daily negative events with family; model predicting enjoyment included mean and current daily positive events with family.

*
p < .05

**
p < .01

***
p < .001

[a] Adjusting for mean daily and current day's relationship enjoyment with family

[b] Adjusting for mean daily and current day's relationship stress with family

[c] Male=0; Female=1

[d] Person-centered

Table 7

Multilevel Random Effects Regression Models Predicting Daily Relationship Stress and Enjoyment with Spouse

Predictor	Daily relationshipstress with spouse [a]		Daily Relationship enjoyment with spouse [b]	
	B	F	B	F
Mean negative daily events with spouse	.414	70.13 ***	----	----
Mean positive daily events with spouse	----	----	.220	40.34 ***
Mean daily pain/tenderness	.003	.00	.035	.25
Mean daily fatigue	.003	2.64	.000	.03
Mean daily disability	.005	.01	-.043	.24
Gender [c]	.009	.03	-.037	.13
Age	-.003	2.49	-.002	.37
Education	-.004	.05	-.017	.49
Income	.006	.72	.011	1.25
Neuroticism	.006	.02	-.045	.67
Extraversion	.027	.40	.032	.25
Current day's pain/tenderness [d]	.049	9.56 **	-.041	5.15 *
Current day's fatigue [d]	.000	.02	-.002	7.77 **
Current day's negative events w/ spouse [a]	.439	551.75 ***	----	----
Current day's positive events w/ spouse [d]	----	----	.245	163.91 ***

Note: Model predicting stress included mean and current daily negative events with spouse; model predicting enjoyment included mean and current daily positive events with spouse.

*
p < .05

**
p < .01

***
p < .001

[a] Adjusting for mean daily and current day's relationship enjoyment with spouse

[b] Adjusting for mean daily and current day's relationship stress with spouse

[c] Male=0; Female=1

[d] Person-centered