Published in final edited form as:

Psychol Health Med. 2008 October ; 13(5): 529–544. doi:10.1080/13548500801927113.

Patterns of psychosocial risk and long-term outcomes in rheumatoid arthritis

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Abstract

This study examined the extent to which patterns of psychosocial risk were uniquely associated with long-term outcomes of rheumatoid arthritis (RA), after demographic factors and self-reported symptom severity over time were accounted for. Data were collected over an 8-year period from 561 individuals with RA who were participants in the ongoing UCSF RA Panel Study in 1995. Panel members were interviewed annually, using a comprehensive structured telephone interview. Psychosocial factors assessed included mastery, perceptions about adequacy of social support, the impact of RA and self-assessed ability to cope with RA and satisfaction with health and function. Cluster analysis of psychosocial factors identified three distinctive patterns/levels of psychosocial risk (high, medium and low risk). The unique effects of psychosocial risk status on changes in depressive symptoms, basic functional limitations, global pain ratings and average annual doctor visits over an 8-year period were estimated, using growth curve analyses. Analyses controlled for demographic factors (gender, marital/partner status, education, age and ethnicity), disease duration and year in the panel and time-varying self-reported symptom severity (morning stiffness, swollen joint counts, co-morbid medical conditions, extra-articular RA symptoms and changes in joint appearance), as well as self-reported medications taken over time (disease-modifying antirheumatic drugs [DMARDs], and prednisone). Overall, 32.4% of total variance in depressive symptoms was accounted for by the fully-estimated model, with 12.9% uniquely associated with psychosocial risk status. Half of the total variance (50.0%) in basic functional limitations was explained, with 12.1% of variance uniquely predicted by psychosocial risk status. Psychosocial risk status accounted for comparatively little total explained variance in global pain ratings (total = 38.6%, incremental = 3.2%), and average annual total doctor visits (total = 10.9%, incremental = 1.5%). Thus, psychosocial risk factors are more closely linked to depressive symptoms and function over time. Global pain and utilization appear to be more closely related to disease factors.

Keywords

psychosocial risk factors; rheumatoid arthritis; growth curve analyses; cluster analysis; long-term outcomes

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Introduction

Rheumatoid arthritis (RA) is a chronic autoimmune disorder that affects well-being, functions of daily life and the fulfillment of important social roles (Callahan, 1998; Katz, Morris, & Yelin, 2006; Yelin, Henke, & Epstein, 1987; Yelin, Meenan, Nevitt, & Epstein, 1980). The manifestations of RA include inflammation, pain, swelling, and stiffness of the joints, as well as fatigue and changes in the appearance of hands and feet. Unpredictable flare-ups are common, thus disrupting family and occupational roles and functioning (Katz, 2004; Katz & Morris, 2006; Katz et al., 2006). Side effects from medications used to treat RA can include physical discomfort, sleep disturbances and emotional lability (Klippel, Weyand, & Wortmann, 1997; Pincus, 1996). Individuals may require surgery to replace joints damaged by RA. In addition, RA may be associated with extra-articular manifestations, such as damage to the eyes, heart and respiratory system (Klippel et al., 1997; Lawrence et al., 1998; Pincus, 1996).

Psychosocial resources and outcomes in RA

Psychosocial resources may affect health outcomes over time among individuals with chronic illness (Krantz & McCeney, 2002; Stanton, Revenson, & Tennen, 2007). Individual coping ability, psychological mastery, perceived control and social support may have protective effects on health (Abraido-Lanza, Guier, & Revenson, 1996; Affleck, Pfeiffer, Tennen, & Fifield, 1988; Badger, 2001; Ben-Zur, 2002; Berkman & Syme, 1979; Cohen & Wills, 1985). Conversely, inadequate social support, impaired capacity to cope, feelings of helplessness and loss of control and cognitive appraisals of health and function can exacerbate risk for poor health outcomes (Brown, Nicassio, & Wallston, 1989; Clemmey & Nicassio, 1997; Holtzman, Newth, & DeLongis, 2004; Jang, Haley, Small, & Mortimer, 2002; Nicassio et al., 1993; Revenson & Felton, 1989). On a physiological level, psychosocial factors may affect disease activity in RA through their influence on the stress response, and its effects on cardiovascular, endocrine and immune systems (Uchino, Cacioppo, & Kiecolt-Glaser, 1996; Walker, Littlejohn, McMurray, & Cutolo, 1999).

In numerous studies, social support has been found to buffer the corrosive effects of chronic stress on health and well-being (Affleck et al., 1988; Cohen & Wills, 1985; Pennix et al., 1997; Taylor & Lynch, 2004; Uchino et al., 1996). Social support also appears to mediate the relationship between disability and depression (Taylor & Lynch, 2004), as well as stress and depression (Adams, Smyth, & McClendon, 2005). Among individuals with RA, direct positive effects of social support have been observed on health, function and well-being (Revenson, Schiaffino, Majerovitz, & Gibofsky, 1991; Waltz, Kriegel, & van't Pad Bosch, 1998). Social support may also facilitate coping, and is associated with decreased pain among individuals with RA (Holtzman et al., 2004; Keefe et al., 1997).

Psychological mastery, defined as the extent to which individuals perceive that they control important aspects of their lives, including health (Pearlin & Schooler, 1978), may also facilitate coping with stress and illness, and is linked to positive health outcomes (Badger, 2001; Ben-Zur, 2002; Kempen, Jellic, & Ormel, 1997; Pearlin, Lieberman, Menaghan, & Mullan, 1981).

Smith, Peck, and Ward (Smith, Peck, & Ward, 1990) found that individuals who appraised themselves as helpless in managing their illness were more likely to become depressed. Other studies of the impact of RA have found linkages between the cognitive appraisal of illness and depression. Helplessness has also been linked to responsiveness to drug therapy (Nicassio et al., 1993) and mortality, even after controlling for disease activity in individuals with RA (Callahan, Cordray, Wells, & Pincus, 1996; Pincus & Callahan, 1985).

Objectives of the present study

In this study, we sought to identify patterns of psychosocial risk among individuals with RA that could affect outcomes over an extended period of time. We used cluster analysis to group participants in the UCSF RA Panel on the basis of psychosocial risk factors, and examined the impact of these risk profiles over an 8-year period on symptoms of depression, limitations in basic function, global perceptions of pain and the yearly number of doctor visits. Psychosocial factors used to create risk profiles included self-assessments about the ability to cope with RA, the perceived impact of RA; the adequacy of social support, psychological mastery and satisfaction with health and functioning.

We hypothesized that having inadequate psychosocial resources would put individuals with RA at greater risk for poor long-term outcomes, such as increased symptoms of depression, greater limitations in basic physical function, increased perceptions of pain and higher utilization of outpatient doctor visits.

Methods

Sample

The participants included 561 individuals with RA, who were part of a larger, ongoing study, the UCSF RA Panel Study, and who had completed an interview in 1995, the year that was used as a 'baseline' for the analyses presented here. Participants in this study had complete data on all study variables, and in longitudinal analyses had completed at least two interviews. The UCSF RA Panel began in 1982, using a two-stage sampling frame, in which individuals with RA were recruited from a random sample of rheumatologists practicing in Northern California. Participants were recruited from lists maintained by participating rheumatologists of all persons with RA presenting to their offices over a 1-month period and expressing an interest to participate in the study. The primary method of data collection for the ongoing RA Panel is an annual structured telephone interview that assesses factors such as RA symptoms, functional limitations, psychosocial factors and mental health, service utilization and medication use and quality of life. Annual retention in the UCSF RA Panel has averaged 95%, excluding attrition due to mortality. The UCSF RA Panel study has been reported in more than 50 publications, and two published reports summarize details about sampling and validity issues (Yelin, Criswell, & Feigenbaum, 1996; Yelin et al., 1985).

In the analyses presented here, data from 561 participants in the 1995 UCSF RA Panel over an 8-year period were analyzed, in order to assess the unique effects of psychosocial factors on long-term outcomes. Participants in the study contributed an average of 6.25 years of interview data ($SD = 2.56$), with 61.3% of participants ($N = 344$) completing all 8 years of interviews and having complete data on all study variables. Analyses of attrition are described further in the results section.

Measures

Demographic characteristics

In the present analyses, demographic variables of interest were participant age, gender, marital/partner status, ethnic background and years of education.

Disease-related factors

Disease-related factors included the following: disease duration; the co-occurrence of any of the following comorbid conditions: high blood pressure, heart disease, stroke, diabetes, lung disease, cancer or kidney disease; the duration of morning stiffness (scale = 0, no morning stiffness, to 5 = more than 3 hours of morning stiffness); a count (range = 0–4) of extra-articular,

non-joint symptoms of RA: eye symptoms, lung symptoms, rheumatoid nodules on joints and dry eyes or dry mouth (Sjogren's syndrome); changes in the appearance of hands and/or feet (count = 0–2), and a count of swollen joints, ranging from 0 to 14, that included the following joint groups: feet/toes, ankles, knees, shoulders, elbows, wrists and hands/fingers. All of the symptom measures were included in models as time-varying covariates. In addition, the use of DMARDs and prednisone were included as time-varying covariates of long-term outcomes in RA.

Psychosocial risk factors

Five psychosocial measures were included in cluster analyses in order to identify risk groups: (1) perceived ability to cope with RA, (2) perceived impact of RA on life and functioning, (3) satisfaction with health and function, (4) the perceived adequacy of instrumental and emotional social support and (5) psychological mastery. These psychosocial measures are described later.

Perceived ability to cope with RA included 7 items, developed for the UCSF RA Panel study (Katz, 1998), with a response format ranging from 0–10 (0 = not coping well at all, 10 = coping very well). This measure had a reliability coefficient (Cronbach's alpha) of 0.84 (mean = 7.73, SD = 1.56). Items assessed perceptions about the ability to cope with pain, changes in appearance, fatigue, unpredictability of symptoms, side effects from medications, self-care and physical limitations. *The perceived impact of RA* scale included seven items, developed for the UCSF RA Panel study (Katz, 1998), with a response scale ranging from 0–10, (10 = greater impact, alpha = 0.85, mean = 4.73, SD = 2.32). Items asked about the impact of RA on pain, changes in appearance, fatigue, unpredictability of symptoms, side effects from medicines, overall impact on life and ability to do things.

Satisfaction with function and health was measured with the 13-item Satisfaction with Abilities and Well-being Scale (SAWS), developed by Katz and Alfieri (1997). Items have a response format ranging from 1 to 5, (5 = greater satisfaction, alpha = .91, mean = 2.68, SD = 2.61), and ask about satisfaction with abilities and overall health. *Social support* was measured by two items from the Berkman Social Network Index (Berkman & Syme, 1979) assessing the perceived adequacy of instrumental support and emotional support, dichotomized to 1 = adequate, 0 = inadequate.

Psychological mastery was measured using the seven-item scale, with a response format of 1–5, developed by Pearlin et al. (1981) (5 = greater mastery, alpha = 0.69, mean = 3.54, SD = 0.50). Items include the following: 'What happens to me in the future mostly depends on me', and 'There is no way I can solve some of the problems I have' (reversed).

Long-term outcome measures

Four long-term outcomes were evaluated in the present study: (1) symptoms of depression, (2) basic functional limitations, such as self-care and mobility, (3) global perceptions of pain and (4) average annual doctor visits.

Symptoms of depression were measured by the 15-item Geriatric Depression Scale-Short Form (GDS) (Yesavage, 1988; Yesavage et al., 1982). The GDS minimizes somatic aspects of depression, such as fatigue and difficulties with sleeping, which are also often manifested as part of RA. The GDS has demonstrated high correspondence with psychiatric interviews (Dunn & Sacco, 1989). Scores range from 0 to 15. A score of 7 or above is consistent with a diagnosis of depression. In this study, 9.3% of participants scored in this range on the GDS at baseline ($n = 52$). Over its years of use in the UCSF RA Panel, the GDS has had an average internal reliability of 0.85, ranging from 0.83 to 0.87.

Functional limitations due to RA were assessed using the Health Assessment Questionnaire (HAQ). The HAQ was specifically developed to measure basic function among persons with arthritis (Fries, Spitz, Kraines, & Holman, 1980). Scores range from 0–3, with higher scores reflecting worse functioning. Among the participants in this study, the average baseline score on the HAQ scale was 1.23 (SD = 0.72).

Global perceptions of pain: A single item asked participants to rate their current pain from RA on a scale of 0–100, where 0 = ‘no pain’, and 100 = ‘very severe pain’ (Fries et al., 1980). At baseline, the average pain rating among participants was 35.5 (SD = 28.0).

Average annual doctor visits were calculated as the sum of self-reported doctor visits for RA and non-RA outpatient care in the past 12 months. For analyses, these data were log-transformed to correct for skewness. The median number of total doctor visits at baseline was 13.0 (mean = 15.06, SD = 14.37).

Analytic strategy

Our analytic strategy consisted of two phases. First, cluster analysis was used to identify distinct subgroups of individuals based on the similarity of their profiles on psychosocial variables. Second, growth curve analyses were conducted to assess the impact of psychosocial risk groups on long term-outcomes.

Cluster analysis is a multivariate technique used to identify distinct subgroups within a heterogeneous sample, based on similar profiles with respect to theoretically or clinically relevant variables (Aldenderfer & Blashfield, 1984; Rapkin & Dumont, 2000; Sellick, Littlejohn, Wallace, & Over, 1990). A K-means cluster analysis was applied to psychosocial data at baseline for 561 participants in the UCSF RA Panel Study, using SPSS version 15. A three-cluster solution was selected on the basis of its theoretical and clinical relevance, interpretability, cluster size and an assessment of cluster differences with respect to concurrently measured variables (Aldenderfer & Blashfield, 1984; Rapkin & Luke, 1993; Rapkin & Dumont, 2000). A split-half replication of the three-cluster solution yielded essentially the same pattern of results for these data, thus adding confirmatory evidence in support of the cluster solution.

Growth curve analyses

Growth curve analyses were conducted on 561 individuals with RA, using HLM version 5 (Raudenbush & Bryk, 2002; Raudenbush, Bryk, Cheong, & Congdon, 2001). Analyses assessed linear change trajectories in four outcomes over the 8-year period: (1) symptoms of depression, (2) functional limitations, (3) global perceptions of pain and (4) average annual doctor visits. A two-level model, in which up to eight measurement occasions were nested within 561 individuals with RA, assessed outcome trajectories as a function of demographic factors, time-varying disease and medication factors and psychosocial risk status.

Disease factors included the duration of morning stiffness in joints, the presence of co-morbid medical conditions, counts of swollen joints, extra-articular or non-joint manifestations of RA (RA affecting eyes, lungs, presence of RA nodules or dry eyes and/or mouth), and changes in joint appearance. Disease duration was also included as a covariate, as was time-varying medication use (DMARDS, prednisone). To control for the changes in the prevailing medical treatment of RA over the study period, a variable representing time or year in the panel was also included in analyses. Demographic covariates included gender, marital/partner status, education, age and ethnicity. Finally, groups defined by psychosocial risk that were identified through cluster analysis were dummy-coded and entered into the models, with the low-risk group being the reference group in analyses.

Results

Participant characteristics

Participants were predominantly female (79.7%), white (82.7%), married or with a partner (76.8%), and had an average disease duration of 17.8 years (SD = 10.5). The mean age of participants was 61.5 (SD = 13.4), with an average of 13.2 years of education (SD = 2.9). Nearly half of participants reported at least one comorbid illness (49.1%) at baseline. The average number of swollen joints/joint groups reported by participants was 2.9 (SD = 3.0). Overall, 79.0% of participants reported the use of DMARDS at baseline, and 57.0% reported prednisone use.

Sample attrition and mortality

Over an 8-year period, 94 participants died (16.8%), 109 (19.4%) dropped out, primarily due to health reasons, and 14 (2.5%) were lost to follow-up. Analyses of baseline measures found no statistically significant differences between individuals who dropped out and those that did not, with respect to gender, ethnicity, psychosocial risk status, comorbidities, duration of morning stiffness, counts of swollen joints, extra-articular RA symptoms, changes in joint appearance, use of prednisone or the total number of outpatient doctor visits. Significant differences were observed with respect to age, education, marital/partner status, disease duration, use of DMARDS, global pain ratings, basic functional limitations (HAQ) and symptoms of depression. Participants who had dropped out of the study were older, had a longer disease duration, less education, worse function, greater pain and were less likely to be using DMARDS, or to be married/with a partner.

Analyses of mortality revealed that men were significantly more likely to have died during the eight year period ($\chi^2 = 9.73$, DF = 1, $p < 0.01$), and participants who died during this period were older ($t = 8.29$, DF = 559, $p < 0.01$), had a longer disease duration ($t = 4.72$, DF = 559, $p < 0.01$), were more likely to use prednisone ($\chi^2 = 4.59$, $p = 0.04$), and less likely to use DMARDS ($\chi^2 = 4.02$, $p = 0.05$) than those who survived. There were no differences in mortality with respect to ethnicity, marital/partner status or education.

Psychosocial risk status was also significantly associated with mortality ($\chi^2 = 8.60$, DF = 2, $p < 0.01$). Individuals in the high and medium risk groups were more likely than low risk participants to have died (22.6% and 19.3%, respectively, vs. 11.4%). A logistic regression analysis estimated the likelihood of mortality during the 8-year period, and controlled for demographic, disease and medication factors at baseline. This analysis revealed that individuals in the high psychosocial risk group were significantly more likely to have died over the 8-year period than were other participants (adjusted OR = 4.55, 95% CI = 2.14, 9.68). Medium risk status was not a significant predictor of mortality.

Cluster analyses

The results of cluster analyses are presented in Table 1. Descriptive statistics were computed for each cluster. Multivariate and univariate ANOVAs with Bonferroni-adjusted post-hoc comparisons were used to assess group differences on clustering factors. In addition, analyses of cluster differences on concurrently measured demographic, disease-related, medication and outcome variables were conducted.

As can be seen in Table 1, individuals in Cluster 1 ‘*high risk*’ ($n = 133$, 23.7%) were characterized by low psychological mastery, inadequate instrumental and emotional social support, low satisfaction with health and function and low perceived ability to cope with RA, as well as greater perceived impact of RA. Cluster 2 (‘*medium risk*’, $n = 192$) constituted 34.2% of the sample. Although both high and medium risk groups had poor psychosocial profiles

relative to the low risk group, 89.1% of the medium risk group describe their levels of emotional support as 'adequate', compared to only 16.5% of the high risk group ($\chi^2 = 283.12, p = 0.000$). The same pattern holds for instrumental task support (87.5% vs. 15.8% 'adequate', respectively ($\chi^2 = 256.72, p = 0.000$)).

Cluster 3 ('low risk', $n = 236$) represented 42.1% of the sample. Individuals in the low-risk group (Cluster 3) assessed their coping ability, psychological mastery, instrumental and emotional social support, health and function relatively positively, and reported that RA had less of an impact on their lives, relative to individuals in the higher risk groups. Cluster differences on demographic, disease-related, medication and outcome variables at baseline are summarized in Table 1.

Growth curve analyses

The results of growth curve analyses are summarized in Table 2. All analyses controlled for demographic characteristics (gender, marital/partner status, years of education, age and ethnicity) and disease duration. Time-varying disease factors included duration of morning stiffness due to RA, the presence of any comorbid conditions, count of swollen joints, extra-articular symptoms of RA and changes in joint appearance. The use of DMARDS and prednisone were included as time-varying covariates, and year in the panel was also included (1995–2002) to take into account changes in the treatment of RA during this period.

In Table 2, the results of growth curve analyses are presented for four long term outcomes. These analyses were run using three iterations to fully estimate the models. In Model 0, a model with intercept-only was estimated as a 'baseline' or 'null' model. As can be seen, variance components were estimated for Level 1 (repeated measures within individuals, or individual growth parameters), and Level 2 (variance between individuals in individual growth parameters estimated at Level 1). In Model 1, covariates were entered into models, and explained variance was calculated as the reduction in total variance. In Model 2, dummy-coded psychosocial risk factors were added and incremental variance was calculated from a comparison of variance components from Model 1. Figure 1 graphs estimated means in outcomes over the 8-year period by psychosocial risk status, controlling for demographic and time-varying disease and medication factors.

Depressive symptoms

In Table 2, it can be seen that Model 1, which included intercept and covariates, accounted for 19.5% of the total variance in depressive symptoms. In Model 2, the inclusion of psychosocial risk status resulted in an increment in explained variance of 12.9%, and total explained variance of 32.4%. Dummy-coded psychosocial risk groups were significantly linked to growth in depressive symptoms over the eight-year period (Cluster 1 'high risk' = 2.80, SE = 0.27, $p = 0.00$; Cluster 2 'medium risk' = 1.05, SE = 0.14, $p = 0.00$).

Basic functional limitations

Half (50.0%) of the variance in basic functional limitations is explained by the fully-estimated model. Psychosocial risk status accounted for an increment of 12.1% of total explained variance.

Global perceptions of pain

Psychosocial risk status was significantly associated with global perceptions of pain. Cluster 1 ('high risk'), and Cluster 2 ('medium risk') both predicted increased levels of pain over time (coefficient = 14.18, SE = 1.85, $p = 0.01$ for Cluster 1 'high risk'; coefficient = 10.07, SE = 1.49, $p = 0.01$, for Cluster 2 'medium risk', respectively). Overall, 38.6% of the variance in

global pain was accounted for by the fully-estimated model, with 35.4% of total variance explained by demographic and disease factors. Only 3.2% of the total variance in global pain was uniquely accounted for by psychosocial risk status.

Annual doctor visits

Comparatively little of the total variance in annual doctor visits over time was explained by the fully-justified model (10.9%, overall). Psychosocial risk status accounted for only 1.5% of total variance. However, psychosocial risk groups were significant predictors of utilization (Cluster 1 'high risk': coefficient = 0.26, SE = 0.06, $p = 0.01$; Cluster2 'medium risk': coefficient = 0.14, SE = 0.05, $p = 0.01$).

Discussion

In this study, we found that patterns of psychosocial risk were uniquely associated with outcomes measured annually over an 8-year period, particularly in symptoms of depression and basic functional limitations due to RA, even after the effects of demographic variables and time-varying disease factors and medications were accounted for.

Psychosocial risk profiles accounted for relatively little of the total explained variance in global pain or in average annual doctor visits, contrary to our hypotheses. These outcomes appeared to be more closely related to demographic factors and to symptom severity and use of medications. Predictors of global pain included having less education, and ethnic minority status, suggesting possible disparities in treatment, especially in the context of significant relationships between disease factors and pain ratings over time. Neither DMARD nor prednisone use were significantly related to reported levels of pain.

It was surprising that psychosocial risk status accounted for relatively little of the variance in global perceptions of pain or in the utilization of outpatient medical services over time. It is worth noting, however that other studies have found stronger relationships between psychosocial factors and perceptions of pain than we observed in our study, spanning 8 years of interviews (Affleck, Tennen, Urrows, & Higgins, 1992; Affleck, Urrows, Tennen, & Higgins, 1992; Waltz et al., 1998). It seems that over an extended period of time in chronic illness, the relationship between psychosocial factors and perceptions of pain is not as strong as has been observed in cross-sectional designs, or in studies with shorter time duration.

Symptoms of depression and limitations in basic function can undermine well-being and contribute to poor quality of life, perpetuating limitations in important social roles and functions of daily life and increasing disability that, in turn may engender poor mental and physical health (Katz, 2004; Katz et al., 2006; Katz & Yelin, 1993, 1995; Yelin, Trupin, Wong, & Rush, 2002). Further, when symptoms of depression co-occur with chronic illness such as RA, the burden of disease is greatly increased for individuals (Greenberg et al., 2003; Katon & Sullivan, 1990; Kessler et al., 2003; Sartorius, 2001; Walker et al., 1999).

Our results highlight the need for interventions with RA patients that may be 'at risk' for poor outcomes over the course of their illness. Cognitive-behavioral interventions, emphasizing effective coping skills may be effective in improving coping abilities and reducing stress among individuals with RA (Keefe et al., 2002; Kraaimaat, Brons, Geenen, & Bijlsma, 1995; Leibing, Pfingsten, Bartmann, Rueger, & Schuessler, 1999; Parker et al., 1995).

In our study, it is striking that individuals with patterns of high psychosocial risk appear far less likely than others to have adequate social support, and that high risk patterns were associated with worse outcomes over time. Physicians and health care providers should routinely assess whether individuals in treatment have adequate social support systems, as these

factors have been linked to poor health outcomes and mortality (Berkman, 1984; Berkman & Syme, 1979; Pennix et al., 1997; Welin, Rosengren, & Wilhelmsen, 1996), and are a defining aspect of high psychosocial risk in our study.

Several limitations in the present study must be noted. First, the data reported are self-reports, and not clinical assessments of disease activity. However, a major strength of the study is the longitudinal design, which assessed a fairly representative community sample of individuals with RA. In addition, there is ample evidence that individuals can reliably report on symptoms of RA and disease activity (Figuerola et al., 2007; Fransen, Hauselmann, Michel, Caravatti, & Stucki, 2001; Fransen, Langenegger, Michel, & Stucki, 2000; Houssien, Stucki, & Scott, 1999; Pincus et al., 2003).

Future analyses should further identify distinct ‘patterns’ and correlates of psychosocial risk among individuals with RA, in order to enhance the quality of care and improve long-term outcomes.

Acknowledgments

This research was supported by a grant from NIAMS (R01 AR50015).

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Figure 1.

Long-term outcomes in RA by psychosocial risk group: Estimated means, controlling for demographic, disease related, and medication factors over an eight-year period.

Table 1

Baseline characteristics of 561 individuals with RA, defined by cluster analysis of psychosocial risk factors.

Cluster analysis	High risk (<i>n</i> = 133)	Medium risk (<i>n</i> = 192)	Low risk (<i>n</i> = 236)	Total (<i>n</i> = 561)	Multivariate
Psychosocial risk factors					
Mastery: (mean, SD)	3.19 (0.50)	3.44 (0.46)	3.82 (0.35)	3.54 (0.50)	$F^* (6, 551) = 413.87$
Emotional support enough: % (<i>n</i>)	16.5% (22)	89.1% (171)	91.9% (216)	73.0% (409)	$F = 99.90, H < M.L.; M < L$ $\chi^2(2) = 283.12$
Task support enough: % (<i>n</i>)	15.8% (21)	87.5% (168)	88.5% (208)	70.9% (397)	$\chi^2(2) = 256.72$
Satisfaction w/function: (mean, SD)	2.64 (0.53)	3.19 (0.52)	3.82 (0.36)	3.32 (0.66)	$F = 288.36, H < M.L.; M < L$
Perceived impact of RA: (mean, SD)	6.57 (1.67)	5.92 (1.44)	2.71 (1.54)	4.73 (2.32)	$F = 352.67, H < M.L.; M < L$
Coping with RA: (mean, SD)	6.56 (1.44)	7.06 (1.27)	8.93 (0.85)	7.73 (1.56)	$F = 222.97, H < M.L.; M < L$
Demographic and disease-related factors					
Female: % (<i>n</i>)	91.0 (121)	76.0 (146)	76.7 (181)	79.9 (448)	Multivariate $F(7, 551) = 27.99$ $\chi^2(2) = 13.43, p = 0.001$
White: % (<i>n</i>)	79.7 (106)	80.2 (154)	86.4 (204)	82.7 (464)	NS
Married/partner: % (<i>n</i>)	74.4 (99)	78.1 (150)	77.1 (182)	76.8 (431)	NS
Age: mean (SD)	59.78 (13.63)	63.67 (13.47)	60.71 (13.17)	61.51 (13.45)	NS
Years of education: mean (SD)	13.14 (2.76)	12.85 (3.09)	13.43 (2.78)	13.16 (2.89)	NS
Disease duration (years): mean (SD)	17.51 (9.73)	19.62 (12.09)	16.69 (9.74)	17.89 (10.66)	NS
Any comorbid conditions: % (<i>n</i>)	57.9 (77)	51.0 (98)	43.2 (102)	49.4 (277)	$\chi^2(2) = 7.65, p = 0.02$
Morning stiffness: mean (SD)	2.43 (1.52)	1.86 (1.12)	1.04 (1.02)	1.57 (1.29)	$F(2,556) = 60.91, H > L, M > L$
Extra-articular symptoms: mean (SD)	2.35 (1.02)	1.88 (0.95)	1.57 (0.92)	1.87 (1.00)	$F(2,556) = 28.47, H > M.L.; M > L$
Changes in appearance of hands and feet: mean (SD)	1.24 (0.80)	0.91 (0.79)	0.68 (0.78)	0.89 (0.81)	$F(2,556) = 21.62, H > M.L.; M > L$
Count of swollen joints: mean (SD)	4.31 (3.27)	3.47 (3.15)	1.74 (2.27)	2.94 (3.04)	$F(2,556) = 39.46, H > M.L.$
Medications					
DMARDs: % (<i>n</i>)	82.7 (110)	78.1 (150)	77.5 (183)	79.0 (443)	NS
Prednisone: % (<i>n</i>)	69.9 (93)	66.1 (127)	42.4 (100)	57.0 (320)	$\chi^2(2) = 36.2, p = 0.000$
Outcome measures					
Depressive symptoms: mean (SD)	4.91 (3.57)	2.84 (2.18)	0.99 (1.11)	2.56 (2.74)	Multivariate $F(4, 555) = 122.38$ $F(2,557) = 128.84, H > M.L.; M > L$
HAQ score: mean (SD)	1.71 (0.53)	1.50 (0.65)	0.74 (0.56)	1.23 (0.72)	$F(2,557) = 145.27, H > M.L.; M > L$
Global pain rating: mean (SD)	52.13 (26.38)	44.61 (25.11)	18.68 (21.57)	35.51 (28.07)	$F(2,557) = 103.36, H > M.L.$
MD visits in past year: mean (SD)	18.35 (11.06)	15.09 (9.07)	13.16 (18.64)	15.06 (14.37)	$F(3,557) = 5.64, H > L$

* All multivariate *F*-ratios are significant at $p < 0.000$, indicated univariate *F*-ratios are statistically significant at $p < 0.01$, indicated *post hoc* comparisons (Bonferroni) are significant at $p < 0.01$.

Table 2

Growth curve analyses of 561 individuals with RA over an 8-year period.

	Depressive symptoms coefficient (SE), <i>p</i> -value	Functional limitations coefficient (SE), <i>p</i> -value	Global pain ratings coefficient (SE), <i>p</i> - value	Outpatient MD visits coefficient (SE), <i>p</i> -value
Intercept	2.54 (0.10), <i>p</i> = 0.00	1.22 (0.03), <i>p</i> = 0.00	32.52 (0.93), <i>p</i> = 0.00	2.30 (0.02), <i>p</i> = 0.00
Variance components (SD)				
Level 1 (repeated measures)	2.74 (1.65)	0.09 (0.30)	433.02 (20.81)	0.26 (0.51)
Level 2 (between persons)	5.31 (2.30)	0.48 (0.69)	393.11 (19.83)	0.28 (0.53)
Total variance	8.05	0.58	826.13	0.55
Deviance	14770.24	3428.29	32056.18	6365.40
Model 1: Intercept and covariates				
Female	0.04 (0.23), <i>p</i> = 0.86	0.32 (0.06), <i>p</i> = 0.00	1.04 (1.59), <i>p</i> = 0.51	0.09 (0.06), <i>p</i> = 0.15
Married/partner	-0.81 (0.24), <i>p</i> = 0.00	-0.19 (0.05), <i>p</i> = 0.00	0.23 (1.44), <i>p</i> = 0.87	-0.04 (0.05), <i>p</i> = 0.47
Years of education	-0.07 (0.04), <i>p</i> = 0.08	-0.02 (0.00), <i>p</i> = 0.05	-0.60 (0.25), <i>p</i> = 0.02	0.01 (0.01), <i>p</i> = 0.36
Age	0.01 (0.01), <i>p</i> = 0.26	0.01 (0.00), <i>p</i> = 0.00	0.07 (0.05), <i>p</i> = 0.20	-0.00 (0.00), <i>p</i> = 0.27
Disease duration	0.02 (0.01), <i>p</i> = 0.08	0.01 (0.00), <i>p</i> = 0.00	0.20 (0.06), <i>p</i> = 0.00	-0.00 (0.00), <i>p</i> = 0.93
Ethnicity (white)	-0.31 (0.26), <i>p</i> = 0.24	-0.08 (0.06), <i>p</i> = 0.19	-4.41 (1.99), <i>p</i> = 0.03	.11 (0.07), <i>p</i> = 0.13
Morning stiffness	0.26 (0.03), <i>p</i> = 0.00	0.07 (0.00), <i>p</i> = 0.00	5.68 (0.40), <i>p</i> = 0.00	0.01 (0.01), <i>p</i> = 0.13
Co-morbidities	0.23 (0.09), <i>p</i> = 0.01	0.01 (0.02), <i>p</i> = 0.40	0.06 (0.99), <i>p</i> = 0.95	0.19 (0.03), <i>p</i> = 0.00
Swollen joint counts	0.09 (0.02), <i>p</i> = 0.00	0.02 (0.00), <i>p</i> = 0.00	2.08 (0.17), <i>p</i> = 0.00	0.01 (0.00), <i>p</i> = 0.12
Extra-articular symptoms	0.20 (0.03), <i>p</i> = 0.00	0.04 (0.01), <i>p</i> = 0.00	1.79 (0.37), <i>p</i> = 0.00	0.04 (0.01), <i>p</i> = 0.00
Changes in joint appearance	0.07 (0.05), <i>p</i> = 0.11	0.04 (0.01), <i>p</i> = 0.00	0.88 (0.56), <i>p</i> = 0.12	0.02 (0.01), <i>p</i> = 0.19
Use of DMARDS	-0.07 (0.10), <i>p</i> = 0.49	0.00 (0.02), <i>p</i> = 0.76	0.35 (0.89), <i>p</i> = 0.69	0.05 (0.03), <i>p</i> = 0.06
Prednisone use	0.22 (0.10), <i>p</i> = 0.03	0.02 (0.01), <i>p</i> = 0.10	-0.35 (0.89), <i>p</i> = 0.69	0.07 (0.03), <i>p</i> = 0.01
Time (year in panel)	0.13 (0.02), <i>p</i> = 0.00	0.02 (0.00), <i>p</i> = 0.00	-0.15 (0.16), <i>p</i> = 0.35	-0.03 (0.01), <i>p</i> = 0.00
Variance components (SD)				
Level 1 (repeated measures)	2.54 (1.98)	0.08 (0.29)	367.20 (19.16)	0.26 (0.51)
Level 2 (between persons)	3.94 (2.25)	0.28 (0.53)	166.55 (12.90)	0.24 (0.49)
Total variance	6.48	0.36	533.75	0.50
Deviance	14480.04	2968.41	31230.60	6280.87
Explained variance	19.5%	37.9%	35.4%	9.4%
Model 2: Intercept, covariates, & psychosocial risk groups				

	Depressive symptoms coefficient (SE), <i>p</i> -value	Functional limitations coefficient (SE), <i>p</i> -value	Global pain ratings coefficient (SE), <i>p</i> - value	Outpatient MD visits coefficient (SE), <i>p</i> -value
Cluster 1 (high risk)	2.80 (0.27), <i>p</i> = 0.00	0.64 (0.05), <i>p</i> = 0.00	14.18 (1.85), <i>p</i> = 0.00	0.26 (0.06), <i>p</i> = 0.00
Cluster 2 (medium risk)	1.05 (0.14), <i>p</i> = 0.00	.52 (0.05), <i>p</i> = 0.00	10.07 (1.49), <i>p</i> = 0.00	0.14 (0.05), <i>p</i> = 0.01
Variance components (SD)				
Level 1 (repeated measures)	2.54 (1.59)	0.08 (0.29)	365.16 (19.10)	0.26 (0.51)
Level 2 (between persons)	2.90 (1.70)	0.21 (0.45)	142.04 (11.92)	0.23 (0.48)
Total variance	5.44	0.36	507.20	0.49
Deviance	14327.69	2812.39	31146.23	6308.85
Explained variance	32.4%	50.0%	38.6%	10.9%
Increment in explained variance	12.9%	12.1%	3.2%	1.5%