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ORIGINAL ARTICLE

Are There More Than Cross-Sectional Relationships of Social Support and Support Networks With Functional Limitations and Psychological Distress in Early Rheumatoid Arthritis? The European Research on Incapacitating Diseases and Social Support Longitudinal Study

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Objective. **To investigate whether greater social support and support network are cross-sectionally associated with less functional limitations and psychological distress in patients with early rheumatoid arthritis (RA); whether this association is constant over time; and whether increases in social support or support network are associated with less functional limitations and psychological distress.**

Methods. **Subjects were from the European Research on Incapacitating Diseases and Social Support cohort and had early RA. Social support, support network, functional limitations (Health Assessment Questionnaire), and psychological distress (General Health Questionnaire) were assessed annually. Variance and covariance analyses with repeated measures were performed.**

Results. **A total of 542 subjects were assessed for 3 years. On average, patients with a greater amount of specific social support or a stronger specific support network experienced less functional limitation and less psychological distress. Changes in a given subject's functional limitations and psychological distress did not depend on his or her baseline social support or support network. Neither social support nor support network change over time.**

Conclusion. **There may be a cross-sectional link between specific social support or support network and functional limitations and psychological distress, but no longitudinal association could be evidenced.**

KEY WORDS. Social support; Support network; Rheumatoid arthritis; Functional disability; Distress.

INTRODUCTION

Rheumatoid arthritis (RA) is a chronic inflammatory disease affecting twice as many women as men and has an unpredictable course of exacerbation and remission (1). Functional disability often occurs, despite some therapeutic progress (2). Because no etiologic therapy is available, symptomatic approaches must be used to address the physical, functional, and psychological distress recognized as major problems in RA patients (3).

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There is clear epidemiologic evidence for a relationship between social support and health (4). For the most part, this evidence was gathered using mortality or morbidity due to potentially life-threatening diseases (such as cancer or vascular disorders) as the health outcome. There is a need for further information about more specific aspects of outcome, such as social support, social networks, and health (5), in populations with chronic nonlethal diseases. Numerous studies in RA patients have suggested that social support can improve both functional abilities (1,6–8) and psychological status (9–14).

Doeglas et al (15) synthesized definitions of social support and social network through the work of others. Procidano and Heller (16) defined social networks as the social connections provided by the environment. Besides a structural network component, they also identified a functional network component. The latter is being referred to as social support and includes, for example, emotional support, the provision of information, material aid, and companionship. This is what Schwarzer and Leppin (17) have called the relational content component of the social network structure. A person may feel supported by the love of a spouse or the approval of a boss. This interaction between the social network (spouse, boss) and social support (love, approval) would represent that person's support network. People within his or her social network are not necessarily supportive, but those who are also belong to the support network.

Social support (i.e., the functional network component) comprises supportive interactions as well as perceptions of social support. Whereas actual supportive interactions are objective transactions of social support, the perception of being supported depends on the perceptions of the actors involved, which are subjective. In former research, perceptions of social support were found to be most closely related to health outcome (18–21). Perceiving certain interactions as being supportive (i.e., satisfaction with the support provided) is based on the subjective definition of the situation: in terms of needs as well as expectations with respect to that situation (e.g., the availability of supportive structures and the experience of having sufficiently been supported in the past). Therefore, the number of interactions gives important information. Satisfaction with the support provided is a state of mind, which is partly based on supportive interactions that have been provided before. This feeling of being supported (or not) is also intangible, and its positive effect on physical health must be detected in the physiologic reactions in the human body (22), whereas the absence of support (which leads to dissatisfaction) is a direct source for psychological distress.

Lambert et al (10) looked at relationships between hardiness, social support, severity of illness, and psychological well-being among women with RA. Social support was assessed in terms of the amount of support available and the satisfaction with it. Women who had more resources of support or who were more satisfied with the support they received tended to be characterized by hardiness and a better sense of psychological well-being. It may be that the availability of satisfactory support improves hardiness, or that being hardy and having a good sense of psychological well-being leads to more support and greater satisfaction (10).

Another study found that social support availability and adequacy of close or more distant relationships was associated with a better psychological well-being (9). Minnock et al (23) found that the quality of life of women with RA was better when they perceived higher levels of social support from their primary caregivers (23).

Doeglas et al (12) studied relationships between social support and psychological well-being in RA. Greater access to daily emotional support and social companionship appeared to result in improved psychological status. However, more problem-oriented emotional support was associated with diminished psychological status. This was probably the result of rather than a cause of poor psychological status (12). In light of social support theory, the negative relationship between problem-oriented emotional support and psychological status can only be logically explained by the fact that a human (help) reaction was triggered by poor health status. A shortcoming of the use of cross-sectional measures is that it is impossible to determine whether social support is a cause or a consequence of well-being and psychological status.

Berkman et al (24) presented a conceptual model in which social support, provided by social networks, has a primary influence on health. The authors describe Kahn and Antonucci's convoy model in which the individual is seen as traveling through life surrounded by members of his or her cohort who share experiences and life histories and who provide support to one another reciprocally over time. Longitudinal investigations would elucidate changes in social networks and social support over time and enable chronic diseases to be followed in terms of how networks and support vary with disease duration and influence health outcome. Evers et al found that a greater social network (defined in terms of the number of friends, including family members, measured shortly after the RA diagnosis) was associated 1 year later with less anxiety and depression (13) as well as with greater upper extremity mobility (1). These authors did not find social support at the time of diagnosis of RA as a predictor of psychological distress 3 and 5 years later (25). Brown et al (7) reported that better initial emotional support was associated with less functional disability among RA patients assessed 3 times within 1 year. According to Fitzpatrick et al (11), the greater the initial availability and adequacy of social relationships, the less depressed a patient's mood was 15 months later. Doeglas (14) found that Dutch RA patients who were more satisfied with their daily emotional support and social companionship had better psychological status 3 years later. Further changes in social support satisfaction were not related to changes in health psychological status.

In this article we are interested in the relationships between social support and social networks on the one hand and functional limitations and psychological distress on the other hand. The focus will be on social support and support network, using a longitudinal design to explore relationships over time.

Questions addressed in the present article are 1) Do patients with a qualitatively better social network (i.e., a

greater support network and more social support) have less functional limitations and psychological distress at inclusion? 2) Is a greater baseline support network or more support associated with greater improvements in functional limitations and psychological distress over time? 3) Are improvements over time in support network and the support provided associated with improvements in functional limitations and psychological distress?

PATIENTS AND METHODS

Patients. The European Research on Incapacitating Diseases and Social Support (EURIDISS) is an international multicenter, multidisciplinary longitudinal cohort study investigation looking at the influence of social support on functional abilities and psychological status in RA patients over the course of their disease (26).

Subjects were from France, the Netherlands, and Norway. Depending on the country, they were identified from various sources, including hospital rheumatology departments or practices, private rheumatology practices, and general practices. In addition, local or regional media announcements called on RA patients to contact their physician or the study center (27,28).

Inclusion criteria were as follows: residence in the sampling areas, age 20–70 years, diagnosis of RA according to 4 or more of the 1987 American College of Rheumatology (ACR; formerly American Rheumatism Association) criteria (29), disease duration $\leq$ 4 years, and informed consent in accordance with ethical consideration in each country. Exclusion criteria were as follows: other serious incapacitating disease, stage IV Steinbrocker functional class (30), or probable unavailability to followup (26). Subjects were assessed at inclusion (year 1), followup year 2, and followup year 3.

Measures. Questionnaires were completed by patients, health care workers, and trained interviewers. Health care workers filled in demographic and clinical data, trained interviewers asked questions about social networks and the importance of social support, and patients completed the sections concerning social support, functional abilities, and psychological status. Measurement instruments were standardized for the 3 countries and languages.

Demographics. Data were collected on sex, age, marital status, and educational level according to the International Standard Classification of Education categories (dichotomized in $\leq$ 9 years and $>$ 9 years) (31).

Disease status. Disease duration at inclusion was defined as the time since the date of diagnosis (when a clinician had recorded 4 or more symptoms according to ACR criteria). Clinical data included details of surgical treatment in the previous year and the presence of comorbidity.

The Ritchie Articular Index was used to assess tenderness. The patient's reaction to pressure on each of 24 joints was registered as follows: grade 0 = no pain; grade 1 = patient complains of pain; grade 2 = patient complains of pain and winces; grade 3 = patient complains of pain, winces, and withdraws. The total tenderness score, obtained by adding the scores on all 24 joints, ranges from 0 to 72, a higher score indicating greater tenderness (32).

The Karnofsky Performance Status Scale measures current health status and autonomy, with scores ranging from 0 to 100. A score of 100 indicates that the person functions in a normal way without complaints; a score of 70, cannot have normal activity or work but is independent of others to take care of himself; a score of 40, depends on others to take care of himself and needs constant and specific cares; and a score of 0 is equivalent to death (33).

Social network. The characteristics of social network were assessed using the Social Network Delineating Questionnaire (34). This involves face-to-face interviews in which respondents report on whether the people in their social network are familial (partner, parents, parents in law, children, sons and daughters in law, brothers, sisters, brothers in law, sisters in law, and other important members of the family) or extrafamilial (friends, relatives, neighbors, other important people), and their numbers. The social network is characterized by its size (i.e., the number of people in it).

Social support. Social support was assessed using the Social Support Questionnaire for Transactions (SSQT) (35), a self-administered instrument that measures global supportive interactions between the respondent and members of his or her social network. The SSQT consists of 23 items, divided into 5 dimensions: daily emotional support (5 items, e.g., Does it ever happen to you that people are friendly to you? Does it ever happen to you that people show their understanding for you?); problem-oriented emotional support (6 items, e.g., Does it ever happen to you that people reassure you? Does it ever happen to you that people tell you not to loose courage?); social companionship (5 items, e.g., Does it ever happen to you that people ask you to join in? Does it ever happen to you that you go out for the day with other people just for the enjoyment of it?); daily instrumental support (4 items, e.g., Does it ever happen to you that people lend you small amounts of money? Does it ever happen to you that people give you information or advice?); and problem-oriented instrumental support (3 items, e.g., If necessary, do people help you if you call them to do so unexpectedly? If necessary, do people lend you valuable things?) (35). Response categories are 1) seldom or never, 2) now and then, 3) regularly, and 4) often. Dimension scores are obtained by adding item scores. These scores have been standardized and range from 0 (rare or no support) to 100 (much support received). This questionnaire has been validated for international use (15,35).

Support network. In each dimension of the SSQT, patients reported the list of those network members who contributed most to this dimension. The support network was determined by the list of these members across the 5 dimensions. One member could have been reported to contribute to more than one dimension. This made it possible to determine the size of the patient's support network within the social network in terms of both numbers and familial/extrafamilial status (36).

Outcomes. The Stanford Health Assessment Questionnaire (HAQ) and the General Health Questionnaire (GHQ)

were used to assess functional limitations and psychological distress, respectively.

The HAQ is a self-report tool widely used among patients with RA (37). It explores the following 8 domains of activity in daily life over the previous 8 days: dressing and grooming, arising, eating, walking, hygiene, reaching, gripping, and other. Scores are as follows: 0 = without difficulty, 1 = with some difficulty, 2 = with much difficulty, and 3 = unable to do. A score of 2 is also recorded if an activity requires the help of another person or a device. The total HAQ index is the mean of the 8 domain scores and ranges from 0 (no disability) to 3 (completely disabled); the higher a patient's score, the greater his or her functional limitations.

The GHQ measures several aspects of psychological well-being within the previous 4 weeks. The 28-item version (38,39) contains 4 dimensions (somatic symptoms, anxiety and insomnia, social dysfunction, and severe depression) of 7 items each. Each item has 4 answer categories: 0 = not at all, 1 = no more than usual, 2 = rather more than usual, and 3 = much more than usual. The total score ranges from 0 to 84 and has been standardized from 0 (no distress at all) to 100 (much more distress than usual).

Analyses. The principal characteristics of the sample were described using means and percentages. Changes over time in measures of functional limitations, psychological distress, and social support and networks were assessed using analysis of variance (ANOVA) with repeated measures. A fixed effect explored average changes over time for the cohort of patients, and a random effect was included to allow for differences between patients in how change occurred over time to be modeled.

For research question 1, correlates of dependent variables (GHQ scores [global and by dimension] and RA functional limitations scores) with social support or support network variables (SSQT dimension scores, support network size [global, familial, and extrafamilial], and by dimension of SSQT) were determined cross-sectionally at baseline using linear regressions.

For research question 2, ANOVA and analysis of covariance (ANCOVA) with repeated measures were performed to investigate the relationship between independent variables and the variation in functional limitations and psychological distress over time. For each of the dependent variables (changes over time in GHQ scores [both global scores and scores within each dimension], and changes in RA functional limitations scores over time), a model was constructed in which candidate independent variables were baseline social support or support network variables with adjustment for potential confounding variables. Social support or support network variables were the cross-sectional correlates of functional limitations and psychological distress retained from research question 1 analysis among the 5 dimensions of SSQT and the 5 subsets of the support network that contributed most to each of the 5 dimensions of the SSQT.

For research question 3, ANOVA and ANCOVA with repeated measures were performed to investigate the relationship between variations in functional limitations and psychological distress over time and variations in independent variables over time. For each of the dependent variables (changes in GHQ scores over time [both global scores and scores within each dimension] and changes in RA functional limitations scores over time), a model was constructed in which candidate independent variables were variation over time in social support or variation over time in support network variables with adjustment for potential confounding variables. Social support or support network variables were those correlated with functional limitations and psychological distress retained from research question 1 analysis among the 5 dimensions of SSQT and the 5 subsets of the support network that contributed most to each of the 5 dimensions of the SSQT.

For analyses addressing research questions 2 and 3, a random subject effect was tested using a mixed model of ANCOVA with repeated measures to detect heterogeneity in changes over time between patients. An unstructured covariance matrix was selected according to Akaike's Information Criterion, a measure of fit to the data with parameters of the model, showing the highest model fit to data (40).

Analyses addressing the 3 research questions were systematically adjusted according to country, age, sex, level of education, duration of disease, Karnofsky and Ritchie indices at each time point, surgery during the previous year, and comorbidity. Analyses were performed with SAS software, version 8 (40). Because of the large number of tests performed, the level of significance was set at $\alpha = 0.01$.

RESULTS

Patient description at inclusion. Of 693 subjects at baseline (year 1), 623 (90%) remained in the study from year 1 to year 3; 31 (4%) dropped out at year 2, and 39 (6%) dropped out at year 3. The dropout rate was 21% in France, 9% in Norway, and 5% in the Netherlands. It was twice as high among people with 9 or fewer years of education than among those with more than 9 years of education, but did not differ with regard to other demographic or clinical data. However, subjects who remained in the investigation had better global GHQ and less severe depression dimension scores ($P < 0.05$) and received more social support in 2 dimensions (daily emotional support and social companionship; $P < 0.03$) than those who dropped out. Patients who dropped out had significantly smaller social ($P = 0.01$) and support ($P = 0.006$) networks.

Among the 623 patients, 81 had missing data concerning functional limitations, psychological distress, social support, or support network at 1 or more of the 3 assessments. Therefore, data were analyzed on 542 subjects. Demographics and disease characteristics of the sample are summarized in Table 1.

Changes over time of functional limitations and psychological distress. Table 2 shows average changes in each dependent variable. On average, there was no change over time in functional limitations by HAQ ($P = 0.97$); psychological distress indicators by GHQ ($P = 0.49$); or GHQ

Table 1. Patient characteristics at baseline (mean ± SD unless otherwise indicated)

	France	Netherlands	Norway	Total
Sample size	105	248	189	542
Demographics				
Female, %	72.4	63.7	74.1	69.0
Age, years	53.6 ± 11.0	52.9 ± 12.0	51.4 ± 12.8	52.5 ± 12.1
Marital status, % married	84.8	78.6	71.4	77.3
Level of education, %				
≤9 years	62.9	36.7	19.6	35.8
>9 years	37.1	63.3	80.4	64.2
Disease characteristics				
Duration of disease, years	2.6 ± 1.5	1.9 ± 1.2	2.2 ± 1.2	2.1 ± 1.3
Ritchie Index (0–72)	11.5 ± 8.0	10.6 ± 10.3	9.0 ± 5.4	10.2 ± 8.5
Karnofsky Index (0–100)	75.9 ± 11.2	74.6 ± 12.8	77.5 ± 9.5	75.9 ± 11.5
Comorbidity, %	53.8	37.5	49.7	44.9
Past year surgery, %	9.5	11.3	13.3	11.6

dimensions of somatic symptoms ($P = 0.56$), anxiety and insomnia ($P = 0.47$), social dysfunction ($P = 0.24$), and severe depression ($P = 0.25$). However, for all of these indicators, changes over time differed between patients and changes in functional limitations and psychological distress did occur in some cases (significant random time effect $P < 0.0001$).

In the case of GHQ, individual differences were equal to 0 for <10% of the 542 subjects (8% and 5%, for each period, respectively). More than 90% of the subjects exhibited a change in GHQ score, whether an amelioration (51% and 43% for each period, respectively) or a deterioration (42% and 52%, respectively). For the first period, the magnitude of the amelioration was <1 SD for 76% of the subjects, >1 SD for 16%, and >2 SDs for 7%; the magnitude for deterioration was 80%, 10%, and 5%, respectively. For the second period, the magnitude of the amelioration was <1 SD for 78% of the subjects, >1 SD for 18%, and >2 SDs for 5%; the magnitude for deterioration was 74%, 20%, and 6%, respectively. With regard to HAQ functional limitations, 16% of subjects had no change in scores between year 2 and year 1, and 20% had no change between year 3 and year 2. Again, a large majority experienced some change. An amelioration was seen in 41%, of which 84% improved <1 SD, 13% improved >1 SD, and 1% improved >2 SDs in the first period; 38% saw an amelioration for the second period, of which 86% improved <1 SD, 13% improved >1 SD, and 1% improved >2 SDs. A decline was seen in 43% of patients during the first period, of which 88% deteriorated <1 SD, 11% dete-

Table 2. Variations of functional limitations, psychological distress, support networks, and social support over time*

	Year 1	Year 2	Year 3	*P*
Health outcomes				
GHQ (0 = best, 100 = worse)	23.5 ± 12.4	22.2 ± 11.8	23.1 ± 12.2	0.49
Somatic symptoms	32.0 ± 19.8	30.4 ± 19.1	32.6 ± 19.5	0.56
Anxiety and insomnia	28.5 ± 20.4	27.2 ± 20.9	27.7 ± 21.2	0.47
Social dysfunction	40.1 ± 14.5	38.1 ± 13.5	39.2 ± 13.7	0.24
Severe depression	11.5 ± 17.4	10.1 ± 15.5	10.5 ± 16.0	0.25
HAQ (0–3)	0.991 ± 0.71	0.976 ± 0.74	0.992 ± 0.75	0.97
Social support				
SSQT				
DES (0 = no support, 100 = much support)	64.6 ± 17.9	63.6 ± 17.1	62.9 ± 18.0	0.06
PES (0 = no support, 100 = much support)	45.9 ± 19.4	44.1 ± 18.8	43.2 ± 18.4	0.008
SC (0 = no support, 100 = much support)	45.2 ± 17.9	44.7 ± 18.3	42.9 ± 17.8	0.012
DIS (0 = no support, 100 = much support)	23.2 ± 14.1	22.3 ± 13.9	22.2 ± 14.0	0.19
PIS (0 = no support, 100 = much support)	38.8 ± 21.9	38.1 ± 23.1	39.9 ± 23.4	0.38
Support network				
DES-N	4.3 ± 2.4	4.3 ± 2.2	4.4 ± 2.3	0.49
PES-N	3.9 ± 2.3	4.2 ± 2.3	4.0 ± 2.4	0.24
SC-N	4.1 ± 2.3	4.2 ± 2.3	4.1 ± 2.3	0.93
DIS-N	2.5 ± 1.9	2.6 ± 1.9	2.4 ± 1.9	0.09
PIS-N	3.5 ± 2.2	3.7 ± 2.2	3.4 ± 2.2	0.33

* Data are presented as mean ± SD. *P* values determined by analysis of variance with repeated measures, adjusted on disease duration. GHQ = General Health Questionnaire; HAQ = Health Assessment Questionnaire; SSQT = Social Support Questionnaire for Transactions; DES = daily emotional support; PES = problem-oriented emotional support; SC = social companionship; DIS = daily instrumental support; PIS = problem-oriented instrumental support; DES-N = DES-network size; PES-N = PES-network size; SC-N = SC-network size; DIS-N = DIS-network size; PIS-N = PIS-network size.

riorated >1 SD, and 0.5% deteriorated >2 SDs. For the second period, 42% of patients worsened, of which 89% deteriorated <1 SD, 12% deteriorated >1 SD, and 2% deteriorated >2 SDs.

Thus, although there was no change over time *on average* for GHQ and for RA functional limitations, changes in functional limitations and psychological distress differed significantly *from one patient to another*.

Changes over time in social support and social networks. Table 2 shows average changes over time in social support and support network. There was a significant decrease in the problem-oriented emotional support dimension ($P = 0.008$). The size of the social network decreased significantly (year 1: 18.7 persons, year 2: 17.6 persons, year 3: 16.4 persons; $P < 0.0001$), as did its familial component (year 1: 12.1 persons, year 2: 11.2 persons, year 3: 10.4 persons; $P < 0.0001$) and extrafamilial component (year 1: 6.6 persons, year 2: 6.4 persons, year 3: 5.9 persons; $P = 0.003$). Specific support network variables did not change significantly, neither did its global extent (year 1: 8.2 persons, year 2: 8.1 persons, year 3: 7.9 persons; $P = 0.19$), its familial component (year 1: 4.9 persons, year 2: 5.0 persons, year 3: 4.8 persons; $P = 0.38$), or its extrafamilial component (year 1 and year 2: 3.2 persons, year 3: 3.1 persons; $P = 0.37$).

The magnitude or direction of changes in social support and social networks over time differed from one patient to another (significant random time effect on every modeled dependent variable; $P < 0.0001$).

The differences in daily emotional support were equal to 0 for ~20% of the 542 subjects (23% and 21% in first and second periods, respectively). More than 70% of the subjects exhibited a change, whether an amelioration or a decrease. Less than 20% experienced no change in the problem-oriented emotional support scores (15% and 19% in first and second periods, respectively). Differences in social companionship were equal to 0 for about 20% of the subjects (19% and 21% in the first and second periods, respectively). For daily instrumental support, they were equal to 0 for 30% at both periods. About 30% experienced no change in the problem-oriented instrumental support scores (22% and 28% in the first and second periods, respectively).

There was no difference in the total size of the social network for 9% of the subjects in both periods. There was no difference in the total size of the support network for 12% and 17% for the first and second periods, respectively.

Cross-sectional correlates of functional limitations and psychological distress at baseline (research question 1). Because the somatic symptoms dimension of the GHQ had no significant univariate relationship with social support and support network, this dimension was not further explored. The more daily emotional support or social companionship received, the lower the global GHQ score, i.e., the better the subject's psychological well-being (for daily emotional support, simple correlation coefficient $r = -0.15$, $P = 0.005$, adjusted partial correlation coefficient $r = -0.17$, $P = 0.0001$; for social companionship $r = -0.16$, $P = 0.0002$, partial $r = -0.14$, $P = 0.0008$). The more daily emotional support received, the lower the anxiety and insomnia dimension score, i.e., the less anxious the subject ($r = -0.14$, $P = 0.001$, partial $r = -0.18$, $P < 0.0001$). When the social companionship dimension score was greater, the social dysfunction dimension score was significantly smaller ($r = -0.18$, $P < 0.0001$, partial $r = -0.14$, $P = 0.001$). The more daily emotional support or social companionship received, the smaller the severe depression dimension score, i.e., the less depressed the subject (for daily emotional support $r = -0.19$, $P < 0.0001$, partial $r = -0.20$, $P < 0.0001$; for social companionship $r = -0.16$, $P = 0.0001$, partial $r = -0.14$, $P = 0.0008$). The greater the social companionship dimension score, the smaller the RA functional limitation score ($r = -0.23$, $P < 0.0001$, partial $r = -0.19$, $P < 0.0001$).

A univariate association between a greater support network providing daily emotional support and a greater contribution from the family on the one hand ($r = -0.16$, $P = 0.0001$; partial $r = -0.15$, $P = 0.0004$, respectively), and a lower severe depression dimension score on the other hand ($r = -0.12$, $P = 0.004$; partial $r = -0.12$, $P = 0.007$) remained significant after adjustment. The associations with the size of the support network did not remain significant after adjustment.

Associations between baseline social support, support network, and changes in functional limitations and psychological distress over time (research question 2). Only models with significant univariate association between baseline social support or support network and changes in outcomes over time are presented (Table 3).

Living in the Netherlands was associated with better functional and psychological status than living in France or in Norway ($P < 0.01$). Men had significantly better functional and psychological status than did women ($P < 0.01$), as reflected in the GHQ global score, anxiety and insomnia dimension, severe depression dimension, and HAQ scores, at all time points on average. The functional and psychological status of patients was worse when the Ritchie Index was high ($P < 0.0001$), the Karnofsky Index was low ($P < 0.0001$), and disease duration long ($P < 0.0001$).

Subjects receiving more daily emotional support at inclusion had a better sense of psychological well-being by the global GHQ (adjusted $\beta = -0.11$, $P = 0.001$), were less anxious and had less trouble sleeping according to the anxiety and insomnia dimension (adjusted $\beta = -0.22$, $P = 0.0002$), and felt less depressed according to the severe depression dimension (adjusted $\beta = -0.22$, $P < 0.0001$). Subjects receiving more baseline social companionship had smaller severe depression dimension scores (adjusted $\beta = -0.16$, $P = 0.0003$) and experienced less functional disability (adjusted $\beta = -0.005$, $P < 0.0001$). Having a greater support network to provide daily emotional support or having greater family support at inclusion was associated with less severe depression (adjusted $\beta = -1.1$, $P = 0.001$; adjusted $\beta = -0.95$, $P = 0.003$ for support network and family support, respectively).

Regarding individual change over time, no functional

Table 3. Relationships between baseline social support or social network components and changes in functional limitations and psychological distress over time, adjusted according to medical and demographic data*

Dependent variable	GHQ global				GHQ anxiety and insomnia		GHQ severe depression						HAQ	
	DES		SC		DES		DES		SC		DES-N		SC	
Independent variable (covariate)	β	P	β	P	β	P	β	P	β	P	β	P	β	P
Between subjects														
Intercept	40.3	<0.0001	37.1	<0.0001	48.5	<0.0001	41.2	<0.0001	32.9	<0.0001	30.0	<0.0001	3.26	<0.0001
Covariate	−0.11	0.001	−0.10	0.002	−0.22	0.0002	−0.22	<0.0001	−0.16	0.0003	−1.1	0.001	−0.005	<0.0001
Within subject														
Time as fixed effect	−0.83	0.46	−1.12	0.17	−1.73	0.38	−3.1	0.05	−2.1	0.06	−1.1	0.20	−0.02	0.47
Time covariate	−0.01	0.55	0.02	0.22	0.02	0.49	0.04	0.07	0.04	0.11	0.16	0.36	0.0009	0.17
Time as random effect†	7.9	<0.0001	8.1	<0.0001	28.2	<0.0001	18.5	<0.0001	19.0	<0.0001	18.7	<0.0001	0.01	<0.0001
Residual‡	79.3	<0.0001	79.3	<0.0001	235.2	<0.0001	148.0	<0.0001	149.6	<0.0001	150.2	<0.0001	0.11	<0.0001

* β = unstandardized coefficient of regression; P determined by analysis of covariance with repeated measures adjusted on country, age, sex, level of education, duration of disease, Karnofsky and Ritchie indices at each time point, surgery during the past year, and comorbidity. GHQ = General Health Questionnaire; HAQ = Health Assessment Questionnaire; DES = daily emotional support; SC = social companionship; DES-N = DES-network size.
† Estimate of the variance of β.
‡ Estimate of the residual variance.

limitations nor psychological distress indicators showed average variation over time (no significant fixed within-subject effect). Of the variables baseline daily emotional support, social companionship, the size of support network providing daily emotional support, medical variables, and demographic variables, none were significantly associated with changes in functional limitations or psychological distress over time (there were no significant interactions between time and baseline daily emotional support, social companionship, or the size of support network providing daily emotional support). Thus, for a given subject, changes in functional limitations or psychological distress were not associated with baseline daily emotional support, social companionship, the size of support network providing daily emotional support, or medical or demographic variables.

Functional limitations and psychological distress changes over time demonstrated significant heterogeneity among patients (random within-subject effect; $P < 0.0001$), that is, they differed significantly from one patient to another. Although more daily emotional support, social companionship, and the size of support network providing daily emotional support at baseline were associated with better functional and psychological status at every time point, changes in functional limitations and psychological distress did not depend on baseline daily emotional support, social companionship, or the size of support network providing daily emotional support.

Association between changes over time in social support and support network, and changes in functional limitations and psychological distress (research question 3). Models in which there was a significant association between average changes in social support or support network and changes in functional limitations and psychological distress are presented in Table 4. Demographic and clinical data revealed no significant associations except for those reported for research question 2.

Significant relationships, on average, were observed between more daily emotional support and a lower anxiety and insomnia score ($P = 0.0002$) and severe depression score ($P = 0.007$) by the GHQ. A significant relationship was also found between more social companionship and lower RA functional limitations over the 3 years ($P = 0.0002$). The association between social companionship and severe depression dimension scores did not reach statistical significance at any time point ($P = 0.013$; data not shown).

No functional limitations nor psychological distress indicators showed average variation over time (no significant fixed within-subject effect). The change over time of daily emotional support, social companionship, and the size of support network providing daily emotional support (or medical or demographic variables) were not significantly associated with functional limitations and psychological distress change over time. Changes in an individual patient's functional limitations and psychological distress did not depend on changes in his or her demographic variables, medical variables, daily emotional support, social companionship, or the size of support network providing daily emotional support. Changes in functional lim-

Table 4. Relationships between the variation of social support or support network components and the course of functional limitations and psychological distress over time, adjusted according to medical and demographic data*

Dependent variable	GHQ global		GHQ anxiety and insomnia		GHQ severe depression				HAQ	
	DES change		DES change		DES change		DES-N change		SC change	
Independent variable (covariate)	β	P	β	P	β	P	β	P	β	P
Between subjects										
Intercept	39.3	<0.0001	46.5	<0.0001	37.4	<0.0001	29.7	<0.0001	3.2	<0.0001
Covariate	−0.09	0.007	−0.18	0.002	−0.19	<0.0001	−0.96	0.008	−0.005	0.0002
Within subject										
Time as fixed effect	−0.31	0.78	−2.0	0.31	−2.5	0.10	−0.91	0.32	−0.02	0.50
Time covariate	0.0007	0.96	−0.02	0.44	0.03	0.19	0.12	0.52	0.0007	0.24
Time as random effect†	7.4	<0.0001	27.5	<0.0001	17.8	<0.0001	18.4	<0.0001	0.01	<0.0001
Residual‡	80.2	<0.0001	238.2	<0.0001	149.9	<0.0001	150.5	<0.0001	0.11	<0.0001

* β = unstandardized coefficient of regression. *P* determined by analysis of covariance with repeated measures adjusted on country, age, sex, level of education, duration of disease, Karnofsky and Ritchie indices at each time point, surgery during the past year, and comorbidity. GHQ = General Health Questionnaire; HAQ = Health Assessment Questionnaire; DES = daily emotional support; DES-N = DES-network size; SC = social companionship.
† Estimate of the variance of β.
‡ Estimate of the residual variance.

itations and psychological distress revealed significant heterogeneity (random within-subject effect; $P < 0.0001$), that is, they differed significantly from one patient to another.

Functional limitations and psychological distress did not change over time on average, but they did change in different ways in individual patients. Although daily emotional support, social companionship, and the size of support network providing daily emotional support were associated with better functional and psychological status at every time point, changes in functional limitations and psychological distress did not depend on changes in daily emotional support, social companionship, or the size of support network providing daily emotional support.

DISCUSSION

The results reported here confirm that there are indeed cross-sectional relationships between functional limitations, psychological distress, and specific social support and the support network (research question 1). On average, RA patients who receive more social support, or have a greater specific support network, have a better functional and psychological status than those who do not. These relationships between functional limitations, psychological distress, and support at baseline persist over time (research question 2). The more social support initially received or the greater the initial support network, the better the psychological or functional status over time, on average. This is consistent with results of other studies (9,12,13,41,42). However, no longitudinal within-subject variation was associated with support at baseline: for an individual patient, changes in functional limitations and psychological distress did not seem to depend on his or her baseline support network or social support. Although average relationships were observed between social support and functional limitations and psychological distress, changes in functional limitations and psychological distress did not depend on changes in support network or social support for an individual patient (research question 3).

The present findings confirm and extend previous findings that support or support network characteristics are determinant of cross-sectional differences between individuals.

The relationships discussed in this article mainly relate to 2 social support dimensions: daily emotional support and social companionship. The daily emotional support dimension is linked with all dimension scores of the GHQ (except for the somatic symptoms and social dysfunction dimensions) and with RA functional limitations. The social companionship dimension is linked with all functional limitations and psychological distress scores, except for global GHQ, the somatic symptoms, anxiety and insomnia, and social dysfunction dimensions of GHQ. There seems to be a specific mechanism whereby being friendly to a patient improves his or her psychological well-being in every dimension, with the exception of somatic symptoms and social dysfunction. Social companionship appears to have a more general effect and is linked with 1 dimension of GHQ (severe depression) and RA functional limitations. The more a patient is asked to join in, the better his or her psychological or functional status. This is consistent with the results of Doeglas (14), who found that patients who were satisfied with daily emotional support or social companionship were less depressed. However, the relationship between social support and functional limitations and psychological distress may be subject to confounding personality variables (43).

Other than that the support network brings daily emotional support, the present study indicates that the size of social networks does not appear to play an important role in determining functional limitations and psychological distress. However, other authors have reported somewhat

contradictory results in RA (1,9,10,13,42); possible differences were in the measurement indicators used: the number of friends, including family members (1,13); the availability and adequacy of intimate relationships and diffuse relationships (9); and a subset of social network members, those in monthly and yearly contact with the patient (42).

Lambert et al (10) used the definition of support network closest to the problem-oriented dimensions used here. They found that a smaller problem-oriented support network was associated with a smaller functional capacity. In the present study, the size of problem-oriented support networks was not associated with functional limitations and psychological distress. It may be that problems never occur or are too rare to affect functional limitations and psychological distress directly or indirectly through the size of the concerned support network.

Despite these interesting results, social network is usually considered to contribute less to health than qualitative aspects (24). In the present study, the total social network size decreased significantly, on average, over time, whereas support network size did not change. Moreover, the decrease in social network size did not result in decreased functional and psychological status on average. This may be a reflection of RA patients retaining supportive members of their social network. The support network seems to integrate both qualitative and structural aspects of social support.

The timing of measurements in the EURIDISS study may be problematic. The duration of disease may be too short for a deterioration in functional and psychological status to emerge. The assessments may have been too close together if meaningful changes take more than a year to occur. On the other hand, they may have been too far apart to detect relevant changes. Finally, it is possible that assessment was started too late after diagnosis, allowing patients time to cope with the disease but not so long that progression had exceeded coping ability. The study of Evers et al (25), however, included RA patients at the time of diagnosis and did not find social support as a predictor of psychological distress 3 and 5 years later. Between year 1 and year 2 and between year 2 and year 3, 5% and 6% of the cohort, respectively, dropped out of the present investigation. This annual rate is similar to that observed over 10 years of followup in the American National Rheumatoid Arthritis Study (44). The only demographic characteristic related to attrition here was country of residence. There were no medical differences between patients who dropped out and those who did not, but the latter received more social support (about 4%) in 2 dimensions of the SSQT (daily emotional support and social companionship) and had a greater social network (by about 2 people) compared with the former. This is in accord with previous findings (45). Studies using functional limitations and psychological distress as outcomes should look not only at medical differences between patients who drop out and those who do not, but also at social environment factors to identify potential selection bias.

Among intervention studies in RA patients involving support groups, Baker et al generated directed one-on-one conversations between RA patients about their disease activity and its impact on their lives (46). More positive feelings regarding disease activity and ability to cope with it were observed after the conversations. Very general in terms of the type of support provided and the patients included, these successful intervention studies shed a little light on the mechanisms in which social support improves health.

A more specific intervention study aimed to improve functional status in patients with arthritis by means of 6 months' of biweekly telephone interviews intended to provide emotional support, informational support, and tangible (monetary) incentive support to patients (6). Social support significantly increased in the 3 dimensions of support, as did functional status.

In that study, all types of support were associated with better functional status, whereas in the present investigation only daily emotional support was associated with the functional status. However, the 2 studies did not deal with the same disease and did not use the same instruments to measure social support and health outcome. Second, the specific support was provided to all patients, whatever social support they had previously received.

It may be useful to assess levels of social support to identify individuals who receive little daily emotional support or social companionship, which predicts worse outcomes. Direct action to prevent against functional limitations and psychological distress could be then initiated. Because this prospective observation study shows no significant longitudinal relationships between social support and psychological status or functional limitations, one can conclude that an intervention on social support has little if any chance to be effective over time on these outcomes.

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