


# Depression and anxiety after 2 years of follow-up in patients diagnosed with diabetes or rheumatoid arthritis

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## Abstract

We studied emotional health in patients with diabetes mellitus ( $n = 89$ ) or rheumatoid arthritis ( $n = 100$ ) aged 18–65 years, at the time of diagnosis and after 24 months. Predictors for depression or anxiety according to the Hospital Anxiety and Depression scale after 2 years were assessed by logistic regression, with psychosocial factors and coping as dependent factors. There were many similarities between patients with diabetes mellitus or rheumatoid arthritis. Having children at home, low score on the Sense of Coherence scale, and high score on the coping strategy “protest” were important risk factors for depression and anxiety after 2 years.

## Keywords

adaptation, anxiety, coping, depression, diabetes mellitus, psychosocial factors, self-care management

## Introduction

Emotional co-morbidity among people suffering from a chronic somatic illness affects the symptom pattern, so that individuals with a comorbid emotional disorder report more somatic symptoms than those without emotional disorders (Katon et al., 2007). For instance, comorbid depression in chronic somatic diseases seems to worsen health more than the somatic disease or the depression in itself (Moussavi et al., 2007). Besides, somatic symptoms in such patients seem to be at least as strongly associated with the comorbid depression or anxiety, as with more objective physiologic measures (Katon et al., 2007).

In diabetes mellitus (DM) patients, emotional disorders are more common than in the general population (Wändell et al., 2014), especially anxiety and depression which also often are difficult to detect by the healthcare staff (Poulsen et al., 2016), and also show a deep impact on quality of life (Goldney et al., 2004; Wändell, 1999). Emotional disorders also have a negative impact on disease management (Katon et al., 2007), which can accelerate diabetes progression as well. Treatment of depression in diabetes is shown to improve depression symptoms and also positively affect health economy costs (Simon et al., 2007).

In rheumatoid arthritis (RA) patients, depression and anxiety are also more common than in the general population (Dickens et al., 2002; Isik et al., 2007). Treatment of depression in patients with RA has been shown to relieve not only symptoms of depression but also pain, to improve functional status and quality of life (Lin et al., 2003), and also to increase the response to treatment (Santiago et al., 2015).

When living with a chronic disease, the process of adaptation is important, and coping is an important psychological factor in this (De Ridder and Schreurs, 2001). Coping has been defined as “constantly changing cognitive and behavioral efforts to manage specific external and/or internal demands that are appraised as taxing or exceeding the resources of a person” (Lazarus and Folkman, 1984). Another factor when managing stress in

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chronic diseases is “Sense of Coherence” (SOC), a concept created by Antonovsky (1993). This concept refers to an individual’s capacity to buffer psychosocial stress, especially the use of protective factors.

Among patients with diabetes, psychosocial stress has been shown to negatively affect metabolic control (Marcovecchio and Chiarelli, 2012), which may predispose diabetic complications, and thus affect working capacity, economy, and leisure-time activities negatively. Besides, the stress reactivity in an individual is associated with metabolic control among patients with type-2 diabetes, with greater variability in fasting glucose seen in patients with higher stress reactivity, and with increased fasting glucose among patients also experiencing less support from spouses (Rook et al., 2015). Furthermore, diabetes is associated not only with micro- and macrovascular complications but also with a slight cognitive decline (Biessels et al., 2014). The effect of this cognitive dysfunction on activities in daily life is still unknown.

Among patients with RA, passive coping and low self-esteem are strong predictors of depression (Covic et al., 2006). Low social support also predicts poor emotional adjustment to the disease (Curtis et al., 2004), functional disability and pain (Evers et al., 2003), and development of depression and anxiety (Morris et al., 2008; Zyrianova et al., 2006). Perceived stress and negative illness perception appear to be more important than the impact of medical disease status on the emotional and social adjustment to the disease (Curtis et al., 2005), as well as on depression, physical functioning, and pain (Groarke et al., 2004). Besides, the psychological effects of RA may also affect the family of a RA patient (Gettings, 2010). Furthermore, as a chronic inflammatory disease, RA is associated with symptoms such as fatigue, pain, and sleep disturbances which are also common in depression disorders, and RA symptoms may thus overlap or mimic symptoms of depression (Bruce, 2008). “A patient’s adaptation to RA must be understood within their overall social context, as the presence of interpersonal stressors and support can have short-term and long-term implications for physical health, coping strategies, and treatment responses” (Sturgeon et al., 2016). Chronic inflammation could also contribute to altered physiological response to stress and to the emotional reactions, with increased risk of depression (Sturgeon et al., 2016).

In diabetes, studies show that psychological and psychosocial interventions and enhanced support (Pouwer et al., 2001; Steed et al., 2003; Whittemore et al., 2005), or early treatment of depression (Katon et al., 2007), have positive effects on diabetes self-management and well-being. In RA, high social support might buffer distress at least in early phases (Strating et al., 2006), and high SOC is shown to protect against depression (Buchi et al., 1998). As in diabetes, psychological and psychosocial interventions and enhanced support in RA are shown to be effective for well-being, including reduced pain (Dixon et al., 2007).

As regards studies in diabetes, findings concerning emotional problems are often derived from studies on patients with long-term illness (Gafvels et al., 1993), and most of them are retrospective, and therefore, prospective studies on newly diagnosed patients are important (Arne et al., 2009). In RA, the social consequences, such as restrictions in employment and working capacity, may appear even in an early phase of the disease (Geuskens et al., 2007).

A recent review of RA suggests “that recognition and appropriate management of psychological distress may improve response to treatment and significantly reduce disease burden” (Santiago et al., 2015). As regards the psychosocial situation and coping strategies in relation to the psychological response in chronic diseases and especially in RA, the associations are complex (Ramjeet et al., 2008; Sturgeon et al., 2016). There are somewhat contradictory results in the literature as regards the importance of coping strategies in relation to emotional health, with studies showing positive findings (Englbrecht et al., 2012), and other studies showing a lack of evidence (Ramjeet et al., 2008; Santiago et al., 2015), indicating a need for further studies. Besides, different results may be found using analyses from cross-sectional or prospective studies on the effect of coping strategies, the latter of course being preferable (Burns et al., 2016).

Thus, the aim of this prospective study was to explore the risk of depression or anxiety in relation to psychosocial factors and coping strategies in a sample of patients with two common chronic diseases (diabetes or RA). We also aimed to study differences and similarities between these two chronic diseases.

## Methods

### *Setting and participants*

This study is based on a prospective study of the psychosocial consequences of DM and RA (Gafvels et al., 2012, 2014a, 2014b; Rane et al., 2011). All measurements were performed at inclusion and after 24 months. DM patients in the study were recruited from the Diabetes Outpatient Centre at Karolinska University Hospital, Solna (Rane et al., 2011), and RA patients were recruited from the Early Arthritis Clinic at the Department of Rheumatology, Karolinska University Hospital, Solna (Gafvels et al., 2012). Recruitment took place between January 2001 and December 2004. Among DM patients, the largest group was referred by general practitioners in the catchment area of Karolinska University Hospital, Solna. The second largest group was recruited from the emergency department of the same hospital. For RA patients, those fulfilling the inclusion criteria, that is, with a new diagnosis of RA according to the American College of Rheumatology (ACR) 1987 classification criteria (Levin et al., 1996), at the hospital were recruited. Only patients between 18 and 65 years of age with

a good command of the Swedish language were included. Of the 106 DM patients who received information about the study, 15 declined to participate, and 2 died of other causes than DM. Of the 123 RA patients who received information about the study, 20 declined to participate, 2 died of other causes than RA, and 1 was diagnosed with cancer and consequently withdrew from the study.

### Measurements

The social situation of each patient, that is, family, education, employment, housing, certain life events, lifestyle habits, social network, and support, was assessed using a questionnaire developed by researchers of the Epidemiological Investigation on Rheumatoid Arthritis (EIRA) study (Bengtsson et al., 2009), a study of environmental and genetic risk factors for RA that began in 1997. Questions regarding attitudes towards knowledge about and consequences of diabetes or RA were also included in the questionnaire.

Educational level was defined as the highest academic level reached, that is, compulsory school or high school or university (two alternatives). The question about expected consequences of disease in the future at baseline and effects experienced after 24 months had three response alternatives: (1) little or no, (2) moderate, and (3) severe or very severe.

The Hospital Anxiety and Depression scale (HADS), which was developed by Zigmond and Snaith (1983) to screen anxiety and depression in patients with somatic conditions, was used. The HADS has been validated in a Swedish population by Lisspers et al. (1997). The questionnaire is self-administrated and consists of two subscales (anxiety and depression) with seven items, each rated on a 4-point scale from “no” to “maximum.” According to Zigmond and Snaith, items are summed into a dimensional score for anxiety and for depression, with  $\leq 7$  points indicating “no case,” 8–10 “possible case,” and  $\geq 11$  “probable case” for the presence of anxiety or depression symptoms.

The 13-item SOC scale, which was developed and modified by Antonovsky (Antonovsky, 1993), measures attitudes to and resources for handling psychosocial stress. Four important components are included in the scale, that is, comprehensiveness, meaningfulness, manageability, and resistance resources. The scale should be treated as a single entity with no subscales, and the values may vary between 13 and 91. The higher the SOC scores, the better the ability of the responder to cope with stress. Patients were classified into three levels of SOC, with values up to 60 signifying low SOC, values 60–75 signifying moderate SOC, and values above 75 signifying high levels of SOC.

Coping strategies were measured with the General Coping Questionnaire (GCQ). This questionnaire was based on a model by Lazarus and Folkman (1984), further developed and evaluated by Persson et al. (2013), and has

previously been used in studies of patients with diabetes (Gäfvels and Wändell, 2006, 2007). The instrument is divided into five principal coping orientations dichotomized into positive and negative opposites yielding 10 coping strategies; that is, self-trust/fatalism, problem-focusing (problem-reducing action)/resignation, cognitive reevaluation (change of values)/protest, social trust/isolation, and minimization/intrusion. The use of coping strategies is presented with scores between 0 and 100, with 100 as the maximum value.

### Collection of psychosocial data

Participants completed questionnaires to report their social situation (EIRA), depression and anxiety symptoms (HAD), and coping attitude (SOC) on two separate occasions: at baseline within 3 months after they were diagnosed and 24 months after diagnosis. After inclusion, a medical social worker performed a structured interview (Rane et al., 2011). The interview was conducted as a psychosocial anamnesis, common in psychosocial work in healthcare practice (Gäfvels et al., 2012; Rane et al., 2011). In agreement with the patient, the interviewer assessed whether the patient had psychosocial problems or not. Being classified as having psychosocial problems was defined as having a need of psychosocial interventions by a medical social worker (Gäfvels et al., 2016). The medical social worker who conducted the interviews was not a member of the research group. The patients' psychosocial problems were categorized as follows: (a) crisis reactions to the disease, (b) already existing difficult social and/or psychological life conditions with no direct relationship to the disease, or (c) difficult social and/or psychosocial conditions which presumably will abstract the adaptation to the disease. Goals for the interventions were defined as (a) to strengthen the patients' capacity to cope with their problems and (b) to affect the patients' psychosocial and social situation positively according to Swedish practice for psychosocial work in healthcare. An intervention goal for the individual patient was set according to his/her problems or needs.

### Statistics

Results were analyzed in crosstabs and multivariate analyses. Statistical methods used to calculate significant differences were chi-square test, Fisher's exact test, Student's *t*-test, and Mann–Whitney's test. Results from the HAD, SOC, and GCQ scales are presented as median values with interquartile ranges because of significant skewness. Statistical significance level was set at  $p < 0.01$  owing to multiple comparisons.

In the multivariate analyses, the dependent variables were being depressed or anxious at the 2-year follow-up according to results on HADS–depression or HADS–anxiety, with cut-offs of eight points (possible or probable

depression or anxiety vs no depression or anxiety). Factors, that is, baseline variables, were tested one by one in an age- and sex-adjusted model. Four multivariate models are presented (A, B, C, D), in Model A with an age- and sex-adjusted multivariate model including only significant factors ( $p < 0.05$ ). In the further three models being diagnosed with psychosocial problems at baseline, HADS scores on anxiety and HADS scores on depression were included in Models B, C, and D, respectively, with the factors from Model A included whether significant or not. The model specification of the multivariate models was tested (satisfactory for all models) and also the goodness-of-fit by Hosmer–Lemeshow’s test.

### Ethics

This study was approved by the Research Ethics Committee at Karolinska Institutet (No. 00-065). ClinicalTrials.gov identifier: NCT01066130.

### Results

Table 1 shows social data about the participants ( $n = 189$ ) at the time of inclusion in the study and after 24 months. As regards gender distribution, men dominated among DM patients and women among RA patients. There was a trend that DM patients more often were part of the workforce and were financially independent. No other significant differences regarding social situation were found between the groups.

Psychological data, including anxiety, depression, and SOC (capacity to handle psychosocial stress) of the participants at the time of inclusion in the study, and after 24 months, are shown in Table 2. No significant differences between the groups were found at baseline or at 24 months. Categorization into anxiety or depression groups, that is, no, possible, or probable, according to HADS score, and into SOC groups, that is, low, moderate, or high, according to SOC scores, changed over time in a similar way in both DM and RA groups, but with no significant difference between the groups. Coping strategies at baseline in DM and RA patients are shown in Table 3. Scores on cognitive reevaluation were significantly higher in DM patients, while scores on protest and isolation were significantly higher in RA patients.

Table 4 shows knowledge about and influence of the disease. The only significant difference between the patient groups was a higher influence of leisure-time activities in the RA group. A trend was that the disease affected economy more among the RA patients.

Table 5 shows results of logistic regression with depression according to HADS after 2 years as outcome (possible or probable depression vs no depression). Age- and sex-adjusted results are shown for each factor separately. Four multivariate models are presented (A, B, C, and D):

significant factors in Model A were age, having children living at home, lower SOC score, and higher score on the coping strategy protest at baseline. In Model B, being diagnosed as having psychosocial problems at baseline was included, with this factor being significant, and all factors from Model A. In Model C, anxiety score at baseline was included and showed significant results together with the factors from Model A, with the exception of having children living at home. In Model D, depression score at baseline was introduced and showed significant results together with age and SOC scores at baseline, while having children living at home and scores on protest were non-significant.

Table 6 shows results of logistic regression with anxiety according to HADS after 2 years as outcome (possible or probable anxiety vs no anxiety). Age- and sex-adjusted results are shown for each factor separately. Four multivariate models are presented. Significant factors in Model A were children living at home, lower score on SOC, and higher score on protest at baseline. In Model B, being diagnosed as having psychosocial problems at baseline was included with this factor being significant and all factors from Model A. However, in Model B, the Hosmer–Lemeshow goodness-of-fit test was unsatisfactory low, 0.01. In Model C, anxiety score at baseline was introduced and was significant and together with all factors from Model A showing a good model fit. In Model D, depression score at baseline was introduced with no significant results.

### Discussion

The main finding of the study was that having children at home and showing higher scores on the coping strategy protest increased the risk of depression or anxiety at 2 years in this combined sample of diabetes and RA, while high SOC scores were found to decrease the risk. Increasing age was a risk factor only as regards risk of depression. Besides, being diagnosed with psychosocial problems at baseline was related to an increased risk of both depression and anxiety after 2 years. Anxiety scores at baseline predicted both anxiety and depression at follow-up, while depression scores at baseline predicted depression but not anxiety at follow-up. Comparing the two diseases, patients with RA experienced a more negative impact on family life, social life, work, economy, and leisure-time activities. Besides, fewer RA patients had income from work, and more of them had disability pensions or were on long-term sick leave than diabetes patients.

“Having children living at home” was predictive for both depression and anxiety at follow-up. This parental responsibility may be connected to both working capacity and the economic situation and the capacity to run the home, including the physical and emotional ability to function as a parent. This is in line with findings of “role stress,” that is, difficulties in balancing disease-related symptoms coupled to life responsibilities (including the parental role),

**Table 1.** Self-reported demographic and social background of patients aged 20–65 years who participated in a study on adaptation to newly diagnosed diabetes mellitus (DM) or rheumatoid arthritis (RA).

	DM	RA	<i>p</i> value	DM	RA	<i>p</i> value
	<i>n</i> = 89	<i>n</i> = 100		<i>n</i> = 89	<i>n</i> = 100	
Men	63 (71%)	25 (25%)	<0.001			
Women	26 (29%)	75 (75%)				
Mean age, years (SD)	41.5 (13.2)	47.5 (11.0)	<0.001			
Psychosocial problems	34 (38%)	46 (46%)	0.28			
Born in Sweden	74 (83%)	84/96 (88%)	0.40			
Living alone	16 (18%)	12 (12%)	0.25	20 (23%)	16 (16%)	0.26
Living with partner	57 (64%)	67 (67%)	0.67	53 (60%)	63 (63%)	0.63
Children at home	34 (38%)	48 (48%)	0.14	33 (37%)	42 (43%)	0.49
Educational level			0.034			
Primary school	18 (20%)	29 (32%)				
Secondary school	46 (52%)	30 (33%)				
University	25 (28%)	32 (35%)				
Income from own work	74 (83%)	68 (68%)	0.015	66 (74%)	59 (59%)	0.028
On early pension/long-term sick leave	10 (11%)	21 (21%)	0.070	19 (21%)	34 (34%)	0.053
Financial problems	18 (20%)	14 (14%)	0.26			
Social support						
From workmates	52/81 (62%)	50/82 (61%)	0.67			
Outside family and work	69 (78%)	83/96 (86%)	0.11			
Close relationship to						
Workmates (at least 3)	37/81 (46%)	33/83 (40%)	0.44			
Smoking habits			0.41			
Non-smokers	59 (66%)	59 (61%)				
Occasional smokers	13 (15%)	11 (11%)				
Daily smokers	17 (19%)	26 (27%)				
Physical exercise			0.65			
Weekly	73 (82%)	82 (85%)				
Less than weekly	16 (18%)	15 (15%)				

SD: standard deviation.

Figures at baseline and at 2 years (when applicable).

*p* values analyzed within groups by t-test and chi-square test.

being associated to depressed mood in RA patients (Coty et al., 2015).

Being classified as having psychosocial problems predisposed both depression and anxiety at follow-up. Besides, patients with psychosocial problems also show a more problematic pattern of coping strategies (Gåfvets et al., 2016). Psychosocial problems among patients with chronic diseases may be a consequence of the disease or may pre-exist the disease. Almost half of the RA patients (Gåfvets et al., 2012), and more than one-third of the diabetes patients (Rane et al., 2011), were identified to need a psychosocial intervention at the time of the diagnosis of the disease, some due to financial constraints and others due to work-related issues. As regards coping strategies, RA patients showed lower scores on the coping strategy cognitive reevaluation, and higher scores on protest and isolation, which is presented and discussed in a recent article (Gåfvets et al., 2016).

When adapting to a chronic disease, two main coping patterns could be seen. One approach is to accept the

disease, and try to integrate the demands of the disease into everyday life, thus attempting to master the disease in as constructive a way as possible. This approach was conceptualized into an integrative model of adjustment, developed from a qualitative study of patients with type 2 diabetes (Hammond and Hirst-Winthrop, 2016). The proposed model was characterized by three levels, that is, pre-morbid personality, on-going adjustment cycle, and maintenance cycle, and emphasizes the importance of acceptance of the disease (Costa et al., 2016), learning new knowledge, support, and integration into daily life activities. The second approach, opposite to the first, is to surrender to the disease and let it take command, thus to let oneself be disenchanting and dejected (Persson et al., 2013). The second approach is regarded as dysfunctional and may cause emotional disturbances, including depression (Treharne et al., 2007). Emotion-oriented coping strategies are associated with emotional disorders in a prospective study in diabetes subjects (Burns et al., 2016), as is passive coping for RA patients

**Table 2.** The emotional status of patients 20–65 years who participated in a study on adaptation to newly diagnosed diabetes (DM) or rheumatoid arthritis (RA).

	DM baseline		DM 24 months		Diff. 0–24 months	p value	RA baseline		RA 24 months		Diff. 0–24 months	p value	Diff. DM–RA		
	n = 89						n = 100							0 months	24 months
					Mean rank					Mean rank				changes	
<b>Anxiety</b>															
HAD score	5 (3–8)	5 (2–8)	–0.8	0.064	–0.9	0.0048	6 (3–9)	4 (2–8)	–0.9	0.91	0.25	0.57	0.31	0.41	
Category				<b>&lt;0.001</b>											
No anxiety	62 (70%)	64 (73%)					59 (59%)	72 (72%)							
Possible	14 (16%)	15 (17%)					21 (21%)	11 (11%)							
Probable	13 (15%)	9 (10%)					20 (20%)	17 (17%)							
<b>Depression</b>															
HAD score	3 (1–5)	2 (1–5.75)	–0.4	0.18	–0.6	0.061	4 (2–7)	3 (1–5.75)	–0.6	0.28	0.53	0.079	0.48	0.59	
Category				<b>&lt;0.001</b>											
No depression	75 (84%)	77 (89%)					78 (78%)	83 (83%)							
Possible	9 (10%)	6 (7%)					16 (16%)	9 (9%)							
Probable	5 (6%)	4 (5%)					6 (6%)	8 (8%)							
<b>SOC</b>															
Score	67 (58.5–74)	66 (55–78.5)	–0.2	0.67	–2.1	0.097	66 (61–77)	68 (58–77)	–2.1	0.96	0.67	0.29	0.074	0.36	
Category				<b>&lt;0.001</b>											
Low	28 (31%)	31 (35%)					23 (23%)	32 (33%)							
Moderate	47 (53%)	29 (33%)					47 (47%)	38 (39%)							
High	14 (14%)	29 (33%)					29 (29%)	28 (29%)							

HAD: Hospital Anxiety and Depression; SOC: Sense of Coherence. Scores presented as medians (interquartile range). p values are analyzed within groups by Wilcoxon's paired test and between groups Mann–Whitney test and for categories by chi-square test or Fisher's exact test. Bold values indicate significant changes (with p value < 0.01). Possible anxiety or depression: HAD scores 8–10; probable anxiety or depression: HAD scores ≥ 11. SOC categories: 34–60 low, 61–75 moderate, and > 75 high.

**Table 3.** Coping strategies at baseline of patients 20–65 years who participated in a study on adaptation to newly diagnosed diabetes mellitus (DM) or rheumatoid arthritis (RA).

	DM baseline <i>n</i> = 89	RA baseline <i>n</i> = 100	Difference <i>p</i> value
Coping strategies (GCQ)			
Self-trust	75 (65–90)	80 (70–90)	0.41
Fatalism	20 (10–25)	25 (10–35)	0.076
Problem focusing	90 (77.5–95)	85 (80–95)	0.25
Resignation	10 (0–20)	15 (5–25)	0.18
Cognitive revaluation	<b>50 (35–65)</b>	<b>40 (25–50)</b>	<b>0.0014</b>
Protest	<b>15 (5–35)</b>	<b>30 (15–40)</b>	<b>0.0037</b>
Social trust	86.7 (66.7–100)	86.7 (73.3–100)	0.28
Isolation	<b>8 (0–20)</b>	<b>12 (8–24)</b>	<b>0.0049</b>
Minimization	76 (68–88)	76 (60–88)	0.56
Intrusion	20 (10–35)	25 (15–45)	0.0192

GCQ: General Coping Questionnaire.

*p* values are analyzed between groups by Mann–Whitney test.

Bold values indicate significant changes (with *p* value < 0.01).

Results presented as medians (interquartile range).

**Table 4.** Influenced areas of life caused by the disease in patients with psychosocial problems diagnosed with diabetes mellitus (DM) or rheumatoid arthritis (RA) at baseline and after 2 years.

	DM baseline <i>n</i> = 89	DM 24 months	<i>p</i> value	RA baseline <i>n</i> = 100	RA 24 months	<i>p</i> value	Diff. DM-RA baseline	Diff. DM-RA 24 months
Influence of the disease			<b>0.001</b>			<b>&lt;0.001</b>	0.30	0.13
Not at all or little	24 (27.0%)	9 (10.2%)		18 (18.4%)	5 (5.1%)			
Moderately	50 (56.2%)	47 (53.4%)		65 (66.3%)	45 (45.5%)			
A lot	15 (16.9%)	32 (36.4%)		15 (15.3%)	49 (49.5%)			
Influenced areas								
Relationship to partner		17/87 (19.5%)			24/87 (27.6%)			0.21
Sexual life		26/87 (29.9%)			24/88 (27.3%)			0.70
Family life		18/88 (20.5%)			33/86 (38.4%)			<b>0.009</b>
Social life		22/88 (25.0%)			40/85 (47.1%)			<b>0.002</b>
Work		28/86 (32.6%)			53/87 (60.9%)			<b>&lt;0.001</b>
Economy		18/88 (20.5%)			42/88 (47.7%)			<b>&lt;0.001</b>
Leisure-time activities		30/87 (34.5%)			62/86 (72.1%)			<b>&lt;0.001</b>

*p* values are analyzed by chi-square analysis or Fisher's exact test.

Bold values indicate significant changes (with *p* value < 0.01).

(Iaquinta and McCrone, 2015). In accordance with this, we found high scores on the coping strategy “protest” to predict both depression and anxiety (Gåfvets et al., 2016). This finding was somewhat contradictory to the findings in a review on RA showing low evidence of an association between coping strategies and emotional well-being (Ramjeet et al., 2008). We also found high SOC scores to be protective against both depression anxiety, which also is in accordance with the findings of higher self-esteem (Iaquinta

and McCrone, 2015). Use of active, problem-focused coping strategies by family members to support a patient with a chronic disease seems superior to avoidant strategies as regards self-management and clinical outcomes of the disease (Rosland et al., 2012). Different coping instruments may reflect different aspects of coping but could also be seen to complement each other. In this study, we used the GCQ and the SOC scales. The GCQ measures positive and negative opposites of coping strategies (Persson et al.,

**Table 5.** Results of multivariate logistic regression (with 95% confidence interval (CI)), with depression (according to HADS score) at follow-up after 2 years as outcome; age- and sex-adjusted models for each variable registered at baseline, and four multivariate models with only significant variables included in Model A (Model A without having psychosocial problems, HADS-anxiety and depression scores; Model B with having psychosocial problems included; Model C with HADS-anxiety scores included; and Model D with HADS-depression scores included).

Factor	Age- and sex-adjusted	Multivariate Model A	Multivariate Model B	Multivariate Model C	Multivariate Model D
Age (years)		<b>1.09 (1.03–1.16)</b>	<b>1.10 (1.04–1.17)</b>	<b>1.10 (1.03–1.17)</b>	<b>1.11 (1.03–1.19)</b>
Sex (female)		0.97 (0.33–2.84)	0.77 (0.25–2.38)	1.04 (0.34–3.25)	1.27 (0.37–4.36)
Diabetes	0.83 (0.33–2.12)				
RA	1.0 (ref.)				
Any co-morbidity	0.76 (0.32–1.78)				
Born in Sweden	1.0 (ref.)				
Non-Swedish origin	<b>2.81 (1.08–7.33)</b>				
Living alone	1 (ref.)				
Living with partner	0.57 (0.12–2.66)				
Children at home	<b>2.77 (1.18–6.50)</b>	<b>4.48 (1.39–14.42)</b>	<b>3.57 (1.06–11.97)</b>	3.41 (0.97–11.99)	2.31 (0.60–8.87)
Educational level					
Compulsory school	1 (ref.)				
High school	0.75 (0.25–2.23)				
University grade	0.46 (0.15–1.44)				
Own income	1 (ref.)				
On early pension/long-term sick leave	<b>4.76 (1.91–11.86)</b>				
Financial problems	<b>4.99 (1.97–12.66)</b>				
Psychosocial problems	<b>14.44 (4.49–46.42)</b>	–	<b>4.31 (1.12–16.59)</b>	–	–
HADS:					
Anxiety scores baseline	<b>1.47 (1.28–1.69)</b>	–	–	<b>1.24 (1.05–1.45)</b>	–
Depression scores baseline	<b>1.72 (1.42–2.08)</b>	–	–	–	<b>1.43 (1.18–1.74)</b>
SOC scores at baseline	<b>0.87 (0.82–0.92)</b>	<b>0.86 (0.81–0.92)</b>	<b>0.87 (0.82–0.93)</b>	<b>0.90 (0.83–0.96)</b>	<b>0.89 (0.83–0.96)</b>
Coping at baseline:					
Self-trust	<b>0.97 (0.95–0.99)</b>				
Fatalism	<b>1.03 (1.01–1.06)</b>				
Problem focusing	0.99 (0.96–1.02)				
Resignation	<b>1.02 (1.00–1.05)</b>				
Cognitive reevaluation	0.98 (0.97–1.01)				
Protest	<b>1.04 (1.02–1.06)</b>	<b>1.04 (1.02–1.06)</b>	<b>1.03 (1.01–1.05)</b>	<b>1.03 (1.00–1.05)</b>	1.02 (1.00–1.05)
Social trust	<b>0.98 (0.96–1.00)</b>				
Isolation	<b>1.06 (1.03–1.08)</b>				
Minimization	<b>0.97 (0.95–1.00)</b>				
Intrusion	<b>1.04 (1.01–1.06)</b>				

HAD: Hospital Anxiety and Depression; SOC: Sense of Coherence; RA: rheumatoid arthritis.

Goodness-of-fit: Model A 0.58, Model B 0.15, Model C 0.64, and Model D 0.81.

Bold values indicate significant changes (with  $p$  value < 0.05).

2013), and the SOC concept deals with an individual's capacity to cope with psychosocial stress, especially available protective factors (Antonovsky, 1993).

There was a tendency to lower psychological distress among both diabetes and RA patients over time, especially as regards anxiety among RA patients, which is in line with earlier studies (Bacconnier et al., 2015). When using categories of depression according to HADS, we also found this tendency to lower psychological distress, in contrast to the findings by Sharpe et al. (2001).

Both depression and anxiety are associated with worse overall medication adherence (Bet et al., 2015). For diabetes, diabetes distress is a concept linked to both type 1 and type 2 diabetes (Reddy et al., 2013), although the emotional problems associated with the respective diabetes type differ (Sturt et al., 2015). For RA, earlier studies have shown that higher relatedness significantly predicted lower depression, and higher autonomy significantly predicted lower anxiety (Ryan and McGuire, 2016). The findings in this study that higher scores on depression and



**Table 6.** Results of multivariate logistic regression (with 95% confidence interval (CI)), with anxiety (according to HADS score) at follow-up after 2 years as outcome; age- and sex-adjusted models for each variable registered at baseline and four multivariate models with only significant variables included in Model A (Model A without having psychosocial problems, HADS-anxiety and depression scores; Model B with having psychosocial problems included; Model C with HADS-anxiety scores included; and Model D with HADS-depression scores included).

Factor	Age- and sex-adjusted	Model A	Model B	Model C	Model D
Age		1.01 (0.97–1.05)	1.01 (0.97–1.05)	1.00 (0.97–1.04)	1.01 (0.97–1.04)
Sex (female)		1.86 (0.80–4.30)	1.66 (0.70–3.95)	1.94 (0.80–4.70)	1.91 (0.82–4.46)
Diabetes	1.27 (0.60–2.70)				
RA	1 (ref.)				
Any co-morbidity	1.14 (0.58–2.24)				
Born in Sweden	1 (ref.)				
Non-Swedish origin	<b>3.96 (1.64–9.66)</b>				
Living alone	1 (ref.)				
Living with partner	0.38 (0.11–1.37)				
Children at home	<b>2.88 (1.47–5.67)</b>	<b>4.37 (1.81–10.54)</b>	<b>3.64 (1.46–9.09)</b>	<b>3.32 (1.33–8.29)</b>	<b>3.86 (1.54–9.64)</b>
Educational level					
Compulsory school	1.0 (ref.)				
High school	0.64 (0.26–1.63)				
University grade	0.48 (0.19–1.22)				
Own income	1.0 (ref.)				
On early pension/long-term sick leave	<b>2.74 (1.18–6.37)</b>				
Financial problems	<b>2.70 (1.21–6.04)</b>				
Psychosocial problems	<b>8.67 (3.99–18.84)</b>		<b>3.38 (1.38–8.29)</b>	–	–
HADS					
Anxiety scores baseline	<b>1.41 (1.26–1.57)</b>	–	–	<b>1.23 (1.07–1.40)</b>	–
Depression scores baseline	<b>1.32 (1.19–1.47)</b>	–	–	–	1.06 (0.93–1.21)
SOC scores at baseline	<b>0.90 (0.87–0.94)</b>	<b>0.90 (0.86–0.94)</b>	<b>0.92 (0.87–0.96)</b>	<b>0.95 (0.90–1.00)</b>	<b>0.91 (0.87–0.96)</b>
Coping at baseline					
Self-trust	<b>0.97 (0.95–0.98)</b>				
Fatalism	<b>1.03 (1.01–1.06)</b>				
Problem focusing	<b>0.97 (0.95–1.00)</b>				
Resignation	<b>1.03 (1.00–1.05)</b>				
Cognitive revaluation	0.99 (0.97–1.00)				
Protest	<b>1.04 (1.02–1.06)</b>	<b>1.04 (1.02–1.06)</b>	<b>1.03 (1.01–1.06)</b>	<b>1.03 (1.01–1.05)</b>	<b>1.04 (1.02–1.06)</b>
Social trust	<b>0.97 (0.96–0.99)</b>				
Isolation	<b>1.05 (1.03–1.07)</b>				
Minimization	<b>0.96 (0.93–0.98)</b>				
Intrusion	<b>1.04 (1.02–1.05)</b>				

HAD: Hospital Anxiety and Depression scale; SOC: Sense of Coherence; RA: rheumatoid arthritis.

Bold values indicate significant changes (with p value < 0.05).

Goodness-of-fit: Model A 0.49, Model B 0.01, Model C 0.38, and Model D 0.18.

anxiety predicted depression and anxiety outcomes at 2 years are not surprising and in line with earlier findings (Paddison et al., 2011). However, both the anxiety and depression scores at baseline were found to be predictive for being depressed after 2 years, while only anxiety scores at baseline were predictive for anxiety after 2 years.

Regarding the impact of the disease, more RA than DM patients experienced that leisure-time activities were negatively affected. This is in accordance with clinical reports from patients. Being restricted to activities outside the home may be negative for self-esteem and increase risk of depression (Burns et al., 1990).

More similarities than differences were identified regarding the risk of developing depression or anxiety between DM and RA patients. Our finding was in contrast to an earlier Swedish study performed in 2004 with patients with mixed duration of DM and RA, reporting more symptoms of anxiety and depression among RA patients than among DM patients (Arne et al., 2009). This discrepancy between that study and ours might be due to the fact that the patients in our study were diagnosed very early in the course of RA, and received modern and more active treatment, and that two different instruments were used, that is, HADS in ours and the General Health Questionnaire (GHQ) in the earlier study.

A major strength of this study was its prospective design with a characterization of the cohort of newly diagnosed patients with DM and RA already at baseline and a follow-up after 2 years. Another strength is that it explores an unselected sample of patients derived directly from everyday clinical practice. The main limitation of the study was the relatively small number of participants, meaning the statistical power was rather low in detecting differences between the two disease groups. Furthermore, diabetic patients were recruited from a hospital unit, in contrast to the fact that most patients with type 2 diabetes in Sweden, that is, 85–90 percent of all diabetic patients, are treated in primary health care. Only type 2 diabetes patients with more pronounced symptoms or worse metabolic control are referred to hospital units. Thus, the DM patients of the study could not be claimed to be fully representative of the majority of diabetic patients in the population. In contrast, the RA patients in the study are probably representative of most Swedish RA patients.

## Conclusion

Having a vulnerable psychosocial situation and young children living at home increased the risk of both depression and anxiety after 2 years in patients with two common chronic diseases (diabetes and RA). In general, high SOC scores seemed to be protective, while using protest as a main coping strategy increased the risk. Despite the fact that DM and RA are essentially different diseases from a medical point of view, the emotional reactions and psychosocial consequences seem to be quite similar. However, some important differences were noted, such as the higher impact of RA on leisure-time activities. The findings support the importance of identifying and support individuals with a vulnerable psychosocial situation as soon as a chronic disease is diagnosed and to consider the impact of life factors such as family and financial situation.

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## Author contribution

Planning and performing the clinical part of the study: Catharina Gåfväls, Margareta Hägerström and Kristina Rane; collection of data: Catharina Gåfväls, Margareta Hägerström, Kristina Rane and Alexandre Wajngot. Statistical analysis: Catharina Gåfväls and Per Wändell. Drafting of manuscript: Catharina Gåfväls and Per Wändell. Reading and commenting on manuscript: all authors. There are no conflicts of interest.

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