

Pain appraisal and quality of life in 108 outpatients with rheumatoid arthritis

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Individual differences in emotional functioning, pain appraisal processing, and perceived social support may play a relevant role in the subjective experience of pain. Due to the paucity of data regarding individuals with Rheumatoid Arthritis (RA), the present study aimed to examine pain intensity, emotional functioning (psychological distress and alexithymia), pain appraisal (pain beliefs, pain catastrophizing, and pain-related coping strategies) and social support, and their relationships with the health-related quality of life (HRQoL) in patients with RA. Data were collected from 108 female patients diagnosed with RA. Clinically relevant levels of depressive and anxiety symptoms assessed by the HADS subscales were present in 34% and 41% of the patients, respectively, and about 24% of them exhibited the presence of alexithymia. The results of hierarchical multiple regression analyses showed that pain intensity, alexithymia, the maladaptive beliefs regarding the stability of pain and the coping strategy of guarding explained 54% of the variance in the physical component of HRQoL ($p < 0.001$). Depression subscale of the HADS, alexithymia, the coping strategy of resting, and the rumination factor of pain catastrophizing significantly explained 40% of the variance in the mental component of HRQoL ($p < 0.001$). The present findings provide evidence regarding the importance of emotional functioning and pain appraisal in the negative impact of RA on patients' quality of life. These findings provide additional evidence for the biopsychosocial model of chronic pain, further supporting the complex interaction between emotional, cognitive, and behavioral processes in patients with chronic pain.

Key words: Pain appraisal, quality of life, rheumatoid arthritis, pain disease, psychosocial characteristics.

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INTRODUCTION

Rheumatoid Arthritis (RA) is a chronic, systemic, and inflammatory joint disease with an autoimmune pathogenesis. It affects the synovial lining and it is characterized by a distinctive pattern of bone and joint destruction that can lead to severe disability and premature death (Aletaha, Neogi, Silman *et al.*, 2010; Angelotti, Parma, Cafaro, Capocchi, Alunno & Puxeddu, 2017; Iaquina & McCrone, 2015; Tobón, Youinou & Saraux, 2010).

In Europe and North America, RA has an estimated annual incidence of 25–50/100,000, and a prevalence of 0.5–1.0%, which is 2–4 times higher for women than for men (Gibofsky, 2014; Gruszczynska & Knoll, 2015; Minichiello, Semerano & Boissier, 2016; Wan, He, Mak *et al.*, 2016). In Southern Europe, lower incidences of 9–24/100,000 population have been reported, and a lower prevalence of 0.3–0.7% has been found (Tobón *et al.*, 2010).

The etiology of RA is unknown, but the pathogenesis of this chronic multifactorial disease is supposed to result from interactions between genetic, psychological, and environmental factors (Hyphantis, Bai, Siafaka *et al.*, 2006; Tobón *et al.*, 2010). On one hand, a dysregulation of the innate and adaptive immune responses is believed to occur at different stages of the disease (Aletaha *et al.*, 2010; Angelotti *et al.*, 2017); while, on the other hand, environmental factors with a potential role in RA have been investigated, including the effects of infections, smoking,

pollutants, and dietary factors (Hyphantis *et al.*, 2006; Tobón *et al.*, 2010).

The association between RA and psychological factors is evident from the altered prevalence rates of some mental health disorders among patients with RA, particularly those involving dominant affective temperament or mood disturbances, of which depression and anxiety are two common manifestations (Donisan, Bojincă, Dobrin *et al.*, 2017; Lok, Mok, Cheng & Cheung, 2010; Rezvani, Aytüre, Arslan, Kurt, Eroğlu Demir & Karacan, 2014; Roger Erin, Anna, Cheak & Anselm, 2011; Sturgeon, Finan & Zautra, 2016; Zhang, Xia, Zhang *et al.*, 2017). The most common psychiatric condition associated with RA is depression, with prevalence rates ranging from 6.6 to 66.25% (Covic, Cumming, Pallant *et al.*, 2012; Iaquina & McCrone, 2015). Further, the prevalence rate of anxiety is around 13% in this population (Isik, Koca, Ozturk & Mermi, 2007; Lok *et al.*, 2010).

Aside from psychological distress, a broad association between alexithymia and various chronic health problems has been suggested (Di Tella & Castelli, 2013; Kilic, Sar, Taycan *et al.*, 2014; Sayar, Gulec & Topbas, 2004; Tesio, Di Tella, Ghiggia *et al.*, 2018), but few studies have investigated the role of alexithymia in pain perception as well as depression in patients with RA (Donisan *et al.*, 2017; Karahan, Kucuk, Balkarli *et al.*, 2016; Kojima, Kojima, Suzuki *et al.*, 2014). The prevalence of alexithymia among individuals with RA is around 22–31% (Karahan *et al.*, 2016; Kojima *et al.*, 2014), but is not clear if this

trait can be considered as a strong predictor of health-related quality of life (HRQoL) (Donisan *et al.*, 2017; Kojima *et al.*, 2014).

Moreover, many studies have reported that pain is a crucial and distressing symptom of RA (Jia & Jackson, 2016; Sturgeon *et al.*, 2016). However, most of these studies have failed to show a strong relationship between pain in RA and objective measures of inflammation (Egsmose & Madsen, 2015; Hammer, Michelsen, Provan *et al.*, 2018). In the past few years, more studies have discovered the influence of several pain appraisal variables, including cognitive beliefs, and behavioral and social responses, to explain the impact of RA on HRQoL (Morgan, 2013; Santos, Duarte, Ferreira, Pinto, Geenen & da Silva, 2018; Sturgeon *et al.*, 2016).

Although emotional functioning, especially psychological distress, influences outcomes among individuals with RA, its interaction with pain appraisal and perceived social support and the impact of these features on HRQoL have not yet been explored in this population. Therefore, the purposes of the current study were to examine pain intensity, emotional functioning, pain appraisal, and social support experienced by patients with RA, and to explore their relationship with the physical and mental components of HRQoL. We analyzed the impact of all these variables on the HRQoL based on the assumption that improving quality of life is one of the most important outcomes for patients with RA (Gettings, 2010; Graves, Scott, Lempp & Weinman, 2009; Kingsley, Scott & Scott, 2011; Kojima *et al.*, 2009; Matcham, Scott, Rayner *et al.*, 2014).

MATERIALS AND METHODS

Study design

This cross-sectional study was conducted with outpatients with RA recruited during their visits to the Rheumatology Unit (RU) of the A.O.U. Città della Salute e della Scienza – presidio Molinette, a hospital in Turin. The A.O.U. Città della Salute e della Scienza – A.O. Ordine Mauriziano of Turin – A.S.L. TO1 Ethic Committee provided ethical approval for this study. All the participants provided written informed consent to participate in the study.

Participants and procedure

The patients with RA were recruited during their routine follow-up visits. Those who fulfilled the inclusion/exclusion criteria were invited to participate. The inclusion criteria were as follows: women diagnosed with RA, without any concomitant sign or symptom indicating the presence of any other chronic pain condition; aged between 18–75 years; and having a good knowledge of Italian. The exclusion criteria were as follows: low educational level (<5 years) or insufficient knowledge of Italian; experiencing pain due to traumatic injury or structural/regional rheumatic disease; having a medically unexplained somatic illness; or having a current primary severe psychiatric diagnosis, as certified by the presence of a psychiatric report.

Out of the 224 patients contacted, 68 refused to participate in the study, 46 were excluded according to the exclusion criteria and two patients were excluded from the analyses due to the high number of missing data. Thus, 108 patients composed the final sample. The recruited patients arranged an appointment with a trained doctoral clinical psychology student, who assessed their sociodemographic and clinical characteristics, and administered the pencil-and-paper psychological scales. The appointment lasted for approximately 45 min.

Variables and instruments

In addition to pain intensity and HRQoL, we assessed the following three groups of psychological variables: (1) emotional functioning, which involved the measurement of psychological distress and alexithymia; (2) pain appraisal, including pain beliefs, pain catastrophizing, and coping strategies; and (3) perceived social support.

Pain intensity. The Visual Analog Scale (VAS) for pain was used to rate the average intensity of pain the participants experienced in the last week. It is a continuous scale comprising a 10 cm horizontal line. The scale is anchored by two verbal descriptors, “no pain” (0) and “extreme pain” (10) (Salaffi, De Angelis & Grassi, 2005). The pain VAS was completed by the patients themselves, who were asked to mark the point on the line that represents their pain intensity. A higher score indicates greater pain intensity (Kane, Bershadsky, Rockwood, Saleh & Islam, 2005).

Emotional functioning

Psychological distress. The presence of psychological distress (depressive and anxiety symptoms) was assessed using the Italian version of the Hospital Anxiety and Depression Scale (HADS) (Bjelland, Dahl, Haug & Neckelmann, 2002; Costantini, Musso, Viterbori *et al.*, 1999). It consists of 14 items on a 0–3 scale, distributed across two 7-item subscales on depression (HADS-D) and anxiety (HADS-A), respectively. Each subscale score ranges from 0 to 21, with a score of eight or more suggesting a clinically relevant level of depression/anxiety symptoms (Castelli, Binaschi, Caldera, Mussa & Torta, 2011; Zigmond & Snaith, 1983).

Alexithymia. Alexithymia was assessed using the Italian version of the 20-Item Toronto Alexithymia Scale (TAS-20) (Bressi, Taylor, Parker *et al.*, 1996; Taylor, Bagby & Parker, 2003). It comprises 20 items rated on a five-point Likert scale ranging from “strongly disagree” (1) to “strongly agree” (5). The results provide a TAS-20 total score and three subscale scores measuring the following facets of alexithymia: the subscale Difficulty Identifying Feelings (DIF) measures the inability to discern among specific emotions, and between the emotions and bodily sensations of emotional arousal; the Difficulty Describing Feeling subscale (DDF) evaluates the inability to verbalize one’s emotions to others; and the scale Externally Oriented Thinking (EOT) concerns the difficulty in focusing on the inner affective experience. Cut-off points were used to divide patients into non-alexithymic (total score ≤ 51), borderline (total score between 51 and 61) and alexithymic (total score ≥ 61) (Taylor *et al.*, 2003).

Pain appraisal

Pain beliefs. The Italian version of the Pain Beliefs and Perceptions Inventory (PBPI) was used to assess the unhelpful beliefs concerning chronic pain, which often lead to increased pain perception and maladaptive behaviors (Monticone, Baiardi, Ferrari *et al.*, 2014). This is a 16-item questionnaire with a four-point Likert scale ranging from –2 (total disagreement) to 2 (total agreement). It includes three subscales, stability of pain, pain as a mystery, and self-blame. A mean score is computed for each scale, with higher scores indicating greater agreement with the belief (Monticone *et al.*, 2014; Williams & Thorn, 1989).

Pain catastrophizing. To assess pain-related catastrophizing, the Italian version of the Pain Catastrophizing Scale (PCS) was used. It is a 13-item self-report questionnaire with three subscales, Helplessness, Rumination, and Magnification (Sullivan, Bishop & Pivik, 1995). Patients are asked to rate the degree to which they have any of the thoughts described in the questionnaire using a 5-point scale ranging from “not at all” (0) and “totally” (4) (Sullivan, 2009). The Italian version of the PCS showed a solid factor structure and a satisfying internal consistency, with good test-retest stability and validity. Further, it exhibited a strong correlation with

physical and emotional health indices such as pain intensity, pain-related disability, pain-related fear, and psychological distress (Monticone *et al.*, 2012).

Coping strategies. Coping strategies related to chronic pain were evaluated by the Italian version of the Chronic Pain Coping Inventory (CPCI) (Jensen, Turner, Romano & Strom, 1995; Romano, Jensen & Turner, 2003). It is a 42-item measure that asks patients to indicate the number of days during the last week they used each behavioral and cognitive strategy to cope with pain. Each item is scored from 0 to 7, with higher scores indicating greater use of the strategy. The eight subscales can be divided into the following two dimensions: illness-focused coping strategies that are considered maladaptive, including Guarding, Resting, and Asking for Assistance; and wellness-focused coping strategies that are considered adaptive, including Relaxation, Task-Persistence, Exercise/Stretch, Seeking Social Support, and Coping Self-Statements (Jensen *et al.*, 1995).

Perceived social support

The Multidimensional Scale of Perceived Social Support (MSPSS) is a 12-item self-report instrument designed to assess the perceived social support received from family members, friends, and significant others (Prezza & Pacilli, 2002; Zimet, Powell, Farley, Werkman & Berkoff, 1990). Each item is rated on a seven-point Likert scale ranging from 1 (very strongly disagree) to 7 (very strongly agree). The total scale score, ranging from 12 to 84, is calculated by averaging the scores on all items. Higher scores indicate a higher perceived social support (Osman, Lamis, Freedenthal, Gutierrez & McNaughton-Cassill, 2014; Xu, Zhao, Xue *et al.*, 2017).

Health-Related Quality of Life (HRQoL)

The Italian version of the Short-Form 36 Health Survey (SF-36) was used to assess HRQoL (Apolone & Mosconi, 1998). It consists of 36 items divided into eight subscales on functional ability and perceived well-being. It comprises the following two main components: the Physical Component (SF-36_PC), which comprises the Physical Functioning, Physical Role Functioning, Bodily Pain, and General Health subscales; and the Mental Component (SF-36_MC), which comprises the Vitality, Social Functioning, Emotional Role Functioning, and Mental Health subscales. This tool has been used in many physical health conditions and health care settings, and it has been found to be a reliable and valid measure for HRQoL in patients with RA (Matcham *et al.*, 2014). The scores range from 0 to 100, with higher scores corresponding to higher HRQoL (Apolone & Mosconi, 1998; Ware & Sherbourne, 1992).

Statistical analysis

The data were analyzed using Statistical Package for the Social Sciences version 25 (SPSS-25; IBM Armonk, NY). Values of asymmetry and kurtosis between -1 and +1 were considered acceptable to prove normal univariate distribution of the data. Based on these criteria, the assumption of normality was met for all variables. Mean (standard deviation, SD) scores and frequencies were used as descriptive statistics, as appropriate. Pearson's bivariate correlations were then computed to evaluate the possible relationships between the sociodemographic variables (age and educational level), pain intensity, emotional functioning, pain appraisal, perceived social support, and HRQoL. Two hierarchical multiple regression analyses were used to investigate whether pain intensity, emotional functioning, pain appraisal, and perceived social support were significant contributing factors for HRQoL in patients with RA, using the physical and mental components scores of the SF-36 as outcome variables. The stepwise method was used to include variables as competing predictors. To avoid unnecessary reductions in statistical power, confounding (age and educational level) and competing predictors variables were included in the regression models only when they were significantly correlated with the outcome variables ($p < 0.01$). Collinearity

Table 1. Participants' sociodemographic and clinical variables, and health-related quality of life

	N%	Mean (SD)	Range
Age		53.9 (10.3)	22–71
Educational level (y)		11.2 (3.7)	5–23
Marital status			
Single	11 (10.2)		
Living together	6 (5.6)		
Married	77 (71.3)		
Divorced	12 (11.1)		
Widowed	2 (1.9)		
Work status			
Student	2 (1.9)		
Employed	54 (50)		
Housewife	18 (16.7)		
Not employed	9 (8.3)		
Retired	25 (23.1)		
Drugs			
Biologic	67 (62)		
Non-Biologic	41 (38)		
Pain variables			
Pain duration (month)		158.6 (114.7)	12–480
VAS		4.4 (2.7)	0–10
SF-36			
Physical Component		46.2 (21.7)	7.8–98
Mental Component		55.3 (20.1)	12.8–96.5

Note: VAS = Visual Analogue Scale for pain intensity; SF-36 = Short-Form 36 Health Survey.

was assessed through the statistical factor of tolerance and variance inflation factor (VIF).

RESULTS

Descriptive data

Data on the sociodemographic, pain and HRQoL variables have been presented in Table 1. Patients reported a lower mean score on SF-36_PC as compared to the SF-36_MC, suggesting the presence of a poorer HRQoL in the physical rather than in the mental component.

Emotional functioning. Data regarding emotional functioning have been presented in Table 2. Concerning the rate of psychological distress (HADS total score), 38% of the patients reported a clinically relevant level of psychological distress. In particular, 37 (34.3%) and 44 (40.7%) of the patients had a score above the cut-off in the depression and anxiety subscale of the HADS, respectively. Additionally, 26 (24.1%) of them exhibited the presence of alexithymic traits at a clinical level and 28 (25.9%) showed this trait at a subclinical level.

Pain appraisal. Data concerning pain appraisal have been presented in Table 2. Scores on the three PBPI subscales were negative, indicating a low presence of maladaptive beliefs. As far as the PCS is concerned, 28 out of 108 participants (25.9%) reported a higher PCS score than the cut-off of 30, representing a clinically relevant level of pain catastrophizing. Regarding the CPCI, the mean scores showed that Relaxation and Exercise/Stretch were used less often, while Task-Persistence and Self-Statements were used most often.

Perceived social support. Data concerning the MSPSS have been presented in Table 2. The patients reported a high total score, suggesting a good level of perceived social support.

Correlational analyses

The correlations between the sociodemographic variables, pain intensity, emotional functioning, and HRQoL have been presented

Table 2. *Emotional functioning, pain beliefs, pain catastrophizing, coping strategies, and social support*

	Mean (SD)	Range
HADS	12.9 (6.4)	
HADS-D	6.3 (3.5)	
HADS-A	6.6 (3.7)	
TAS-20	50.62 (14.1)	
DIF	17.6 (7.5)	
DDF	13.6 (4.6)	
EOT	19.4 (5.1)	
PBPI		
Stability of pain	-0.1 (0.9)	-1.9 to 1.9
Pain as mystery	-0.5 (1.1)	-2 to 2
Self-blame	-1.51 (0.90)	-2 to 2
PCS	21.9 (10.5)	0-44
Helplessness	9.1 (5.3)	0-24
Rumination	9.8 (4.4)	0-18
Magnification	3.0 (1.8)	0-8
CPCI		
Guarding	2.5 (1.7)	0-7
Resting	2.9 (1.8)	0-7
Asking for Assistance	2.2 (1.8)	0-7
Relaxation	1.2 (1.4)	0-6.2
Task-Persistence	3.8 (1.9)	0-7
Exercise/Stretch	1.1 (1.3)	0-5.7
Seeking Social Support	2.2 (1.9)	0-7
Self-Statements	3.6 (1.9)	0-7
MSPSS	67.7 (12.6)	30-84

Note: HADS-D/-A = Hospital Anxiety and Depression Scale-Depression/-Anxiety subscale. TAS-20 = Toronto Alexithymia Scale – total score; DIF = difficulty identifying feelings; DDF = difficulty describing feeling; EOT = externally oriented thinking scale; PBPI = Pain Beliefs Perception Inventory; PCS = Pain Catastrophizing Scale; CPCI = Chronic Pain Coping Inventory; MSPSS = Multidimensional Scale of Perceived Social Support.

in Table 3. Educational level was significantly and positively correlated with SF-36_PC ($p = 0.003$), and pain intensity was significantly and negatively correlated with both SF-36_PC ($p < 0.001$) and SF-36_MC ($p < 0.001$), such that, higher the pain intensity was, lower was the HRQoL. All scores on emotional functioning (HADS-D, HADS-A, and TAS-20 total score) were significantly and negatively correlated with SF-36_PC and SF-36_MC (all $p \leq 0.001$).

Table 4 shows the correlations of the pain appraisal and perceived social support variables with pain intensity, emotional functioning, and HRQoL. Regarding Pain Beliefs, the subscales Stability of Pain and Pain as a Mystery were significantly and negatively correlated with SF-36_PC and SF-36_MC (all $p < 0.001$), and they were positively correlated with all the emotional functioning variables (all $p \leq 0.001$).

All the subscales of Pain Catastrophizing (PCS_H/R/M) were significantly and negatively correlated with SF-36_PC ($p \leq 0.001$) and SF-36_MC ($p \leq 0.001$). Specifically, the higher the Helplessness, Rumination, and Magnification were, the lower was the HRQoL. Pain Catastrophizing also had a significant positive correlation with emotional functioning (all $p < 0.001$), but only the subscales of Helplessness and Rumination were significantly correlated with pain intensity ($p < 0.001$ and $p = 0.001$, respectively).

None of the coping strategies related to chronic pain were significantly correlated with emotional functioning. Only the scales Guarding, Resting, and Asking for Assistance were significantly and negatively correlated with SF-36_PC (all $p < 0.001$), while only Guarding and Resting were significantly and negatively correlated with SF-36_MC (all $p < 0.001$). These findings suggested that, the higher the use of these illness-focused coping strategies was, the lower was the HRQoL.

Finally, concerning the relationships between Perceived Social Support (MSPSS) and HRQoL, significant positive correlations were found for both SF-36_PC ($p = 0.009$) and SF-36_MC ($p = 0.001$).

Regression analyses

Based on the findings of the correlational analyses, two hierarchical multiple regressions were run to investigate whether

Table 3. *Pearson's correlations among sociodemographic variables, pain intensity, emotional functioning, and health-related quality of life*

	1	2	3	4	5	6	7
1. Age	–						
2. Education	-0.224	–					
3. VAS	-0.020	-0.277*	–				
4. HADS-D	0.085	-0.014	0.275**	–			
5. HADS-A	0.005	-0.130	0.413**	0.604**	–		
6. TAS-20	0.192	-0.408**	0.193	0.388**	0.427**	–	
7. SF-36_PC	-0.135	0.287*	-0.628**	-0.341**	-0.324**	-0.398**	–
8. SF-36_MC	-0.055	0.134	-0.362**	-0.467**	-0.428**	-0.457**	0.707**

Notes: VAS = Visual Analogue Scale for pain intensity; HADS-D/-A = Hospital Anxiety and Depression Scale-Depression/-Anxiety subscale; TAS-20 = Toronto Alexithymia Scale – total score; SF-36_PC/MC = Short-Form 36 Health Survey_Physical Component/Mental Component.

* p -value < 0.01 ;

** p -value ≤ 0.001 .

Table 4. Pearson's correlations between pain appraisal and perceived social support, and pain intensity, emotional functioning, and health-related quality of life

	VAS	HADS-D	HADS-A	TAS-20	SF-36_PC	SF-36_MC
PBPI_Stab	0.533**	0.425**	0.315**	0.360**	-0.613**	-0.411**
PBPI_Myst	0.272*	0.382**	0.325**	0.545**	-0.398**	-0.402**
PBPI_Self	0.074	0.167	0.318**	0.343**	-0.090	-0.159
PCS_H	0.337**	0.315**	0.320**	0.537**	-0.487**	-0.451**
PCS_R	0.319**	0.429**	0.296*	0.514**	-0.477**	-0.512**
PCS_M	0.119	0.272*	0.314**	0.454**	-0.324**	-0.390**
CPCI_G	0.403**	0.147	0.133	0.169	-0.503**	-0.330**
CPCI_Res	0.303**	0.074	0.074	0.148	-0.378**	-0.352**
CPCI_AA	0.399**	0.039	0.090	0.010	-0.373**	-0.189
CPCI_Rel	0.179	-0.018	0.135	0.085	-0.181	-0.136
CPCI_TP	0.136	-0.054	0.056	0.012	0.026	0.107
CPCI_ES	0.099	-0.132	-0.029	-0.036	0.036	0.063
CPCI_SSs	0.256*	-0.048	0.173	0.005	-0.222	-0.149
CPCI_SS	0.378**	-0.052	0.109	-0.048	-0.219	-0.040
MSPSS	-0.178	-0.405**	-0.207	-0.348**	0.249*	0.304**

Notes: VAS = Visual Analogue Scale for pain intensity; HADS-D/-A = Hospital Anxiety and Depression Scale-Depression/-Anxiety subscale. SF-36_PC/MC = Short-Form 36 Health Survey_Physical Component/Mental Component; PBPI_Stab = Pain Beliefs Perception Inventory_Stability of Pain; PBPI_Myst = Pain Beliefs Perception Inventory_Pain as Mystery; PBPI_Self = Pain Beliefs Perception Inventory_Self-Blame; PCS_H/R/M = Pain Catastrophizing Scale_Helplessness/Rumination/Magnification. CPCI = Chronic Pain Coping Inventory; CPCI_G = Guarding; CPCI_Res = Resting; CPCI_AA = Asking for Assistance; CPCI_Rel = Relaxation; CPCI_TP = Task-Persistence; CPCI_ES = Exercise/Stretch; CPCI_SSs = Seeking Social Support; CPCI_SS = Self-Statements. MSPSS = Multidimensional Scale of Perceived Social Support.

**p*-value < 0.01;

***p*-value ≤ 0.001.

Table 5. Hierarchical multiple regression with physical component of health-related quality of life (SF-36_PC) as dependent variable

	Predictor	R ²	Adj-R ²	F	F-ΔR ²	B	SE B	β	<i>p</i>
1	VAS	0.40	0.39	34.46*	34.46*	-4.79	0.64	-0.59	<0.001
	Education					0.69	0.47	0.12	0.146
2	VAS	0.47	0.45	29.75*	12.58*	-4.60	0.61	-0.57	<0.001
	Education					0.08	0.48	0.01	0.871
	TAS-20					-0.43	0.12	-0.28	0.001
3	VAS	0.54	0.52	29.25*	15.27*	-3.22	0.67	-0.40	<0.001
	Education					0.27	0.45	0.05	0.546
	TAS-20					-0.28	0.12	-0.18	0.026
	PBPI_Stab					-8.09	2.07	-0.33	<0.001
4	VAS	0.56	0.54	25.58*	5.60*	-3.03	0.66	-0.38	<0.001
	Education					0.06	0.45	0.01	0.888
	TAS-20					-0.31	0.12	-0.20	0.012
	PBPI_Stab					-6.03	2.21	-0.25	0.007
	CPCI_G					-2.37	1.00	-0.19	0.020

Notes: VAS = Visual Analogue Scale for pain intensity; TAS-20 = Toronto Alexithymia Scale – total score; PBPI_Stab = Pain Beliefs Perception Inventory_Stability of Pain; CPCI_G = Chronic Pain Coping Inventory_Guarding.

**p*-value ≤ 0.001.

emotional functioning, pain appraisal and perceived social support were significant predictors of the physical and mental components of HRQoL in patients with RA. In each regression, the following four blocks of variables were introduced consecutively: (1) sociodemographic and pain variables; (2) emotional functioning variables; (3) pain appraisal variables; and (4) perceived social support.

Physical component of HRQoL. Findings of the regression analysis on SF-36_PC have been reported in Table 5. Pain intensity and educational level were entered in the first block; HADS-D, HADS-A, and TAS-20 in the second block; PBPI_Stab, PBPI_Myst, the three PCS scales, CPCI_G, CPCI_Res, and CPCI_AA in the third block; and the MSPSS was entered in the last block. The final model (model 4) explained a

Table 6. Hierarchical multiple regression with mental component of health-related quality of life (SF-36_MC) as dependent variable

	Predictor	R ²	Adj-R ²	F	F-AR2	B	SE B	β	p
1	VAS	0.13	0.12	15.04*	15.04*	-2.65	0.68	-0.36	<0.001
2	VAS TAS-20	0.28	0.26	19.70*	21.42*	-2.11 -0.57	0.64 0.12	-0.28 -0.40	0.001 <0.001
3	VAS TAS-20 HADS-D	0.34	0.33	17.82*	10.43*	-1.66 -0.43 -1.65	0.63 0.13 0.51	-0.22 -0.30 -0.29	0.009 0.001 0.002
4	VAS TAS-20 HADS-D CPCI_Res	0.40	0.37	16.69*	9.08*	-1.11 -0.39 -1.74 -2.78	0.63 0.12 0.49 0.92	-0.15 -0.27 -0.30 -0.25	0.081 0.002 0.001 0.003
5	VAS TAS-20 HADS-D CPCI_Res PCS_R	0.42	0.40	14.72*	4.51*	-0.92 -0.28 -1.47 -2.39 -0.92	0.63 0.13 0.50 0.92 0.43	-0.12 -0.20 -0.26 -0.21 -0.20	0.152 0.031 0.004 0.011 0.036

Notes: VAS = Visual Analogue Scale for pain intensity; HADS-D = Hospital Anxiety and Depression Scale-Depression; TAS-20 = Toronto Alexithymia Scale – total score; CPCI_Res = Chronic Pain Coping Inventory_Resting; PCS_R = Pain Catastrophizing Scale_Rumination.

*p-value ≤ 0.001.

significant proportion (54%) of the variance in SF-36_PC ($p < 0.001$). Pain intensity (VAS) appeared to be the strongest contributor, followed by stability of pain, alexithymia, and the Guarding coping strategy.

Mental component of HRQoL. Findings of the regression analysis on SF-36_MC have been presented in Table 6. Pain intensity was entered in the first block; HADS-D, HADS-A, and TAS-20 in the second block; PBPI_Stab, PBPI_Myst, the three PCS scales, CPCI_G, and CPCI_Res in the third block; and MSPSS was entered in the last block. In the first model, pain intensity predicted 12% of the variance in SF-36_MC ($p < 0.001$). However, it ceased to be a significant predictive factor when depressive symptoms and the Resting coping strategy were entered into the analysis, in the fourth model. The final model (model 5) explained a significant portion (40%) of the variance in SF-36_MC ($p < 0.001$). The HADS-D subscale was the strongest predictor of SF-36_MC, followed by the Resting coping strategy, alexithymia, and the Rumination subscale of pain catastrophizing.

DISCUSSION

The objectives of the present study were to examine the pain intensity, emotional functioning, pain appraisal, and social support experienced by 108 patients with RA, and to explore their relationship with the physical and mental components of HRQoL. Indeed, RA can have a significant impact on the quality of life of the patients because they have to deal with a potentially uncontrollable long-term condition that may affect almost all aspects of their physical, psychological, and social functioning (Hyphantis *et al.*, 2006; Rogers, Brotherton, Plaza, Durán & Altamar, 2015).

Overall, the present results confirmed the strong impact of the disease on patients' HRQoL. In agreement with the results of a recent meta-analysis (Matcham *et al.*, 2014), the present participants reported a lower physical than mental HRQoL, suggesting the greater burden of RA symptoms on physical functioning. Previous studies have confirmed that patients with RA have notably reduced levels of physical functioning in comparison to those with other health conditions (Chaigne, Finckh, Alpizar-Rodriguez *et al.*, 2017; Kingsley *et al.*, 2011; Matcham *et al.*, 2014).

Regarding emotional functioning, in the current study, 34% and 41% of the patients scored above the cut-off on the depression and anxiety subscales of the HADS, suggesting an extensive prevalence of clinically relevant psychological distress. A previous meta-analysis of 72 studies on depression in patients with RA found a prevalence of approximately 17% for major depressive disorder (Matcham, Rayner, Steer & Hotopf, 2013). Furthermore, even though many individuals with RA do not meet the full diagnostic criteria for major depressive disorder, they could experience clinically significant depressive symptoms, with an estimated prevalence ranging from 14% to 48% (Jia & Jackson, 2016; Sturgeon *et al.*, 2016). Depressive symptoms create an additional burden for adults with RA, negatively affecting their disease outcomes, especially for pain intensity, functional disability, medical adherence, and the physical component of quality of life (Calandre, Rico-Villademoros & Slim, 2018; Chaigne *et al.*, 2017; Iaquinta & McCrone, 2015; Kingsley *et al.*, 2011; Sturgeon *et al.*, 2016; Wan *et al.*, 2016; Zhang *et al.*, 2017). Data in our study further confirm these findings, showing that higher levels of psychological distress were significantly correlated with worse HRQoL. Further, alexithymia was negatively correlated with HRQoL, with 24% of the recruited

patients with RA showing the presence of alexithymia and another 26% showing a borderline TAS-20 total score, suggesting the presence of subclinical alexithymic traits. This prevalence of alexithymia is in line with those reported in previous studies (Karahan *et al.*, 2016; Kojima *et al.*, 2014). Additionally, we found a significant positive correlation between psychological distress and alexithymia.

Regarding pain beliefs, patients in the current study showed an overall low presence of maladaptive beliefs, with Stability of pain being the most prevalent maladaptive belief concerning the illness experience. Research on chronic pain (CP) indicates that low levels of maladaptive pain beliefs are combined with adaptive coping skills, which in turn lead to better psychosocial and physical functioning (Morgan, 2013; Walsh & Radcliffe, 2002). Nevertheless, usually CP patients have maladaptive mental representations of pain as persistent and mysterious, which are associated with poor adaptation to pain as well as to psychosocial and physical dysfunction (Condello *et al.*, 2015; Dysvik, Lindstrøm, Eikeland & Natvig, 2004).

Pain catastrophizing is a pattern of negative cognitive appraisal characterized by feelings of helplessness, ruminative thoughts, and a tendency to magnify the negative consequences of pain (Sullivan, 2009). In our sample, roughly 25% of the patients scored above the clinical threshold for pain catastrophizing, with the highest score on the Rumination subscale, a feature that is considered an important predictor of poor physical and psychological outcomes in patients with RA (Sturgeon *et al.*, 2016; Sullivan, 2009). Pain catastrophizing involves both cognitive and emotional components of pain perception. Several studies have confirmed that it is associated with the worst pain-related outcomes and a higher level of psychological distress in both RA and CP (Edwards, Bingham, Bathon & Haythornthwaite, 2006; Edwards, Cahalan, Mensing, Smith & Haythornthwaite, 2011; Gil, Williams, Keefe & Beckham, 1990; Penhoat, Sarau, Le Goff, Augereau, Maugars & Berthelot, 2014; Pincus & Morley, 2001; Rice, Mehta, Shapiro *et al.*, 2016). However, one study that directly compared patients with RA with patients with CP showed that the last reported statistically significant higher level of psychological distress, higher fear of pain and higher pain catastrophizing than RA patients (Rice *et al.*, 2016). Furthermore, although in both samples pain cognitions were significantly related with feeling stressed some differences emerged between RA and CP. Specifically, the excessive worrying was related to feeling stressed in patients with RA, whereas pain catastrophizing and fear of relaxation were associated with feeling stressed in patients with CP (Rice *et al.*, 2017).

Some evidence suggests that catastrophizing interferes with pain-related coping and health behaviors, such that, even when individuals with high levels of catastrophizing use coping strategies, they are less efficient in reducing pain (Condello, *et al.*, 2015; Edwards *et al.*, 2011). Coping is one of the most frequently used concepts related to the behavioral strategies used to control stress (Bussing, Ostermann, Neugebauer & Heusser, 2010; Lazarus, 1993; Tan, Teo, Anderson & Jensen, 2011). In comparison with patients with CP, such as those with fibromyalgia (Di Tella *et al.*, 2018; Lledó-Boyer, Pastor-Mira, Pons-Calatayud, López-Roig, Rodríguez-Marín & Bruhl, 2010), the role of adaptive and maladaptive coping strategies is not clear

in patients with RA (Jorge, Gerard & Revel, 2009). In the current study, the main coping strategies used to deal with pain were Task-Persistence and Self-Statements (i.e., purposefully thinking positive thoughts about the pain problem), which are considered as wellness-focused strategies (Jensen, Turner, Romano & Strom, 1995). This result is similar to those found in a meta-analysis on a population of old-age people with chronic pain (Ersek, Turner & Kemp, 2006). Indeed, the meta-analysis showed that task persistence, activity pacing, and coping self-statements were the most frequently used strategies in this population. However, the meta-analysis also found that in middle-aged patients with chronic pain, that is, in a sample aged-matched to the one of the present study, the most frequently used strategies are guarding and resting (Ersek *et al.*, 2006).

Finally, social support was positively correlated with HRQoL, confirming the results of previous studies in both RA (Lok *et al.*, 2010; Rogers *et al.*, 2015; Sturgeon *et al.*, 2016; Xu *et al.*, 2017) and CP (Dysvik, Natvig, Eikeland & Lindstrøm, 2005) patients, even though it did not directly predict the patients' HRQoL.

In accordance with previous studies (Matcham *et al.*, 2014; Sturgeon *et al.*, 2016), we found that RA has a significant negative impact on both domains of HRQoL, and it is associated with increased psychological distress. Several mechanisms, including cognitive, behavioral and affective responses, seem to have important implications for the patients' HRQoL (Sturgeon *et al.*, 2016). The present regression analysis showed that not only the pain intensity, but also the presence of alexithymia, beliefs regarding the stability of pain, and the use of the Guarding coping strategy explained a substantial proportion of the variance in the physical component of HRQoL, with the final good model explaining 54% of the variance. This result suggests that maladaptive pain beliefs, particularly regarding the stability and persistence of pain, associated with the use of illness-focused behavior coping strategy, and difficulties in the recognition and expression of emotions, have an integrative negative effect on the physical functioning in patients with RA. A similar association between psychological distress and the physical health functioning was also found in fibromyalgia, a CP condition (Lledó-Boyer *et al.*, 2010). On the contrary, Dysvik and colleagues (2004) showed that CP patients reported no significant association between pain beliefs and the physical component of HRQoL.

The present study showed that pain appraisal had an important effect not only on the physical, but also on the mental component of HRQoL, suggesting that it may be more important than the pain intensity itself. Indeed, in the present hierarchical multiple regression analysis on the mental component of HRQoL, alexithymia, the HADS-D subscale, the Resting coping strategy, and the presence of rumination regarding pain were significant predictors of SF-36_MC, with the final model explaining 40% of the variance. These results are in agreement with those reported by some previous studies in patients with CP, which found that patients' coping strategies, pain catastrophizing, and mood independently contributed to the psychosocial disability adjustment, more so than the pain intensity itself (Edwards *et al.*, 2011; Lame, Peters, Vlaeyen, Kleef & Patijn, 2005; Östlund, Björk, Thyberg, Valtersson & Sverker, 2018). It is well known that depression and pain catastrophizing are two crucial

psychosocial factors that influence the course and experience of chronic pain (Edwards *et al.*, 2011; Miller-Matero, Chipungu, Martinez, Eshelman & Eisenstein, 2017; Morgan, 2013). Moreover, in contrast to the findings of a previous study performed with RA patients (Kojima *et al.*, 2014), but in agreement with a study performed with CP patients (Tesio *et al.*, 2018), the present regression analyses showed that also alexithymia significantly contributed to the explanation of both the physical and mental components of HRQoL.

Another interesting finding regarding the current study was that the Resting and Guarding coping strategies predicted poorer quality of life, but active coping strategies did not directly predict it. This result could suggest that, in an attempt to implement more effective psychological treatments for patients with RA, it could be more useful to focus on reducing the use of illness-focused coping strategies rather than promoting the use of wellness-focused ones.

Taken together, the current results showed that individual differences related to emotional functioning and pain appraisal processing play a relevant role in influencing the HRQoL in patients with RA, further suggesting the importance of conducting psychological assessments for RA patients. Furthermore, even though also in chronic pain conditions there is a complex interaction between emotional, cognitive, and behavioral processes in the subjective experience of pain (Gil *et al.*, 1990; Jensen, Turner & Romano, 2007; Koechlin, Coakley, Schechter, Werner & Kossowsky, 2018; Rice *et al.*, 2017 2017; Walsh & Radcliffe, 2002), several differences emerged between RA and CP patients regarding the specific interactions. Future study, directly comparing RA and CP patients, could provide more detailed evidence.

It is important to consider the findings of the present study in light of some methodological limitations. Participants with longstanding RA were studied using a cross-sectional research design; thus, cause and effect cannot be determined. Moreover, another limitation is the use of the HADS. Although this questionnaire is widely used in medical conditions to avoid the overestimation of psychological distress due to somatic symptoms (Castelli *et al.*, 2011; Covic *et al.*, 2012), it could only be used as a screening tool for the presence of psychological distress in the last week and not as a diagnostic tool for the presence of anxiety and depression disorders. Future research should employ a longitudinal design and path analyses to establish any direction of causality by assessing the variation in co-occurring symptoms along illness progression. Furthermore, only female patients were evaluated and we did not include any control groups. Therefore, the generalizability of the present results to other populations is limited.

CONCLUSION

The current study provides evidence regarding the negative impact of emotional functioning and pain appraisal on the quality of life of patients with RA. Indeed, not only did alexithymia have a statistically significant independent impact on the physical and mental components of HRQoL, but the maladaptive beliefs concerning the stability of pain and the rumination factor of the pain catastrophizing were also found to be independent predictors of the

physical and mental components of HRQoL, respectively. Moreover, the use of illness-focused coping strategies had a negative impact on HRQoL. Specifically, the Guarding and Resting coping strategies had a negative impact on the physical and mental component of HRQoL, respectively. Together, these findings suggest that emotional functioning and pain appraisal can have both positive and negative effects on an individual's adaptation to RA. Therefore, clinicians should focus on helping patients become aware of their emotional regulation abilities, their pain beliefs, and their coping strategies, to reduce the burden of RA symptoms on their quality of life. Indeed, individualized emotional and cognitive psychological interventions that increase the patients' awareness of affective regulation and coping strategies may help to improve their long-term functioning and quality of life.

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CONFLICT OF INTEREST STATEMENT

The authors declare that the study was conducted in the absence of any commercial or financial relationships that could be construed as a potential conflict of interest.

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