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

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Abstract

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.

Keywords: pain appraisal, quality of life, rheumatoid arthritis, pain disease, psychosocial characteristics

Pain Appraisal and Quality of Life in 108 Outpatients with Rheumatoid Arthritis

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 et al., 2010; Angelotti, Parma, Cafaro, Capecchi, Alunno, & Puxeddu, 2017; Iaquinta & 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; Gruszczyńska, & Knoll, 2015; Minichiello, Semerano, & Boissier, 2016; Wan 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, 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 et al.,

2017; Lok, Mok, Cheng & Cheung, 2010; Rezvani et al., 2014; Roger et al., 2011;

Sturgeon, Finan, & Zautra, 2016; 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 et al., 2012; Iaquinta & McCrone, 2015). Further, the prevalence

rate of anxiety is around 13% in this population (Isik, Koca, Ozturk, & Mermi, 2012;

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 et al., 2014; Sayar, Gulec, & Topbas, 2004; Tesio et al., 2018), but few studies

have investigate the role of alexithymia in pain perception as well as depression in patients with RA (Donisan et al., 2017; Karahan et al., 2016; Kojima 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 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

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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 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; <mark>having a medically unexplained somatic illness; or having a current primary severe psychiatric diagnosis, as certified by the presence of a psychiatric report.</mark>

Out of the 224 patients contacted, 68 refused to participate in the study, 46 were excluded according to the exclusion criteria and 2 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 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 et al., 1996; Taylor, Bagby, &

Parker, 2003). It comprises 20 items rated on a 5-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

et al., 2014). This is a 16-item questionnaire with a 4-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, 1988).

Each item is rated on a 7-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 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 SPSS Statistics for Macintosh, IBM Corp., Armonk, NY, USA). 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 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 in Table 3. Educational level was significantly and positively correlated with SF-36_PC ($p = 0.003$), and

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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 ≤ 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 ≤

0.001).

All the subscales of Pain Catastrophizing (PCS_H/R/M) were significantly

and negatively correlated with SF-36_PC (p ≤ 0.001) and SF-36_MC (p ≤ 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 < .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 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 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 et al., 2018; 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 met 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., 2018; 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; Koijma 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 adaption to pain as well as to psychosocial and physical

dysfunction (Condello, Piano, Dadam, Pinessi, & Lantéri-Minet, 2015; Dysvik,

Lindstrøm, Eikeland, Natvig, 2004).

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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 (Sullivan, 2009;

Sturgeon et al., 2016). 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, Saraux, Le Goff, Augereau, Maugars, & Berthelot, 2014;

Pincus & Morley, 2001; Rice 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 et al., 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;

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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 showed that CP patients reported no significant

association between pain beliefs and the physical component of HRQoL (Dysvik et

al., 2004).

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

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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., 2016; Rice et al., 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 (Covic et al., 2012; Castelli et al., 2011), it could

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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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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

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

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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 – 1.9
Pain as mystery	-0.5 (1.1)	-2 – 2
Self-blame	-1.51 (0.90)	-2 – 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

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.

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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**

*p-value < 0.01; **p-value ≤ 0.001.*

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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.

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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**

*p-value < 0.01; **p-value ≤ 0.001.

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.

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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-$\Delta R2$	B	SE B	β	p
1		0.40	0.39	34.46*	34.46*				
	VAS					-4.79	0.64	-0.59	<0.001
	Education					0.69	0.47	0.12	0.146
2		0.47	0.45	29.75*	12.58*				
	VAS					-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		0.54	0.52	29.25*	15.27*				
	VAS					-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

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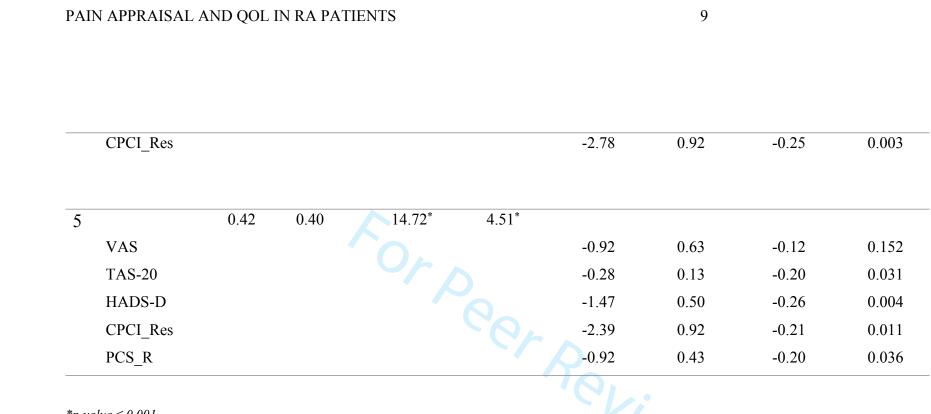| 4	0.56	0.54	25.58*	5.60*				
VAS					-3.03	0.66	-0.38	<0.001
Education					0.06	0.45	0.01	0.888
TAS-20					-0.31	0.12	-0.20	0.012
PBPI_Stab					-6.03	2.21	-0.25	0.007
CPCI_G					-2.37	1.00	-0.19	0.020

*p-value ≤ 0.001.

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.

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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-$\Delta R2$	B	SE B	β	p
1		0.13	0.12	15.04*	15.04*				
	VAS					-2.65	0.68	-0.36	<0.001
2		0.28	0.26	19.70*	21.42*				
	VAS					-2.11	0.64	-0.28	0.001
	TAS-20					-0.57	0.12	-0.40	<0.001
3		0.34	0.33	17.82*	10.43*				
	VAS					-1.66	0.63	-0.22	0.009
	TAS-20					-0.43	0.13	-0.30	0.001
	HADS-D					-1.65	0.51	-0.29	0.002
4		0.40	0.37	16.69*	9.08*				
	VAS					-1.11	0.63	-0.15	0.081
	TAS-20					-0.39	0.12	-0.27	0.002
	HADS-D					-1.74	0.49	-0.30	0.001

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CPCI_Res					-2.78	0.92	-0.25	0.003
5	0.42	0.40	14.72*	4.51*				
VAS					-0.92	0.63	-0.12	0.152
TAS-20					-0.28	0.13	-0.20	0.031
HADS-D					-1.47	0.50	-0.26	0.004
CPCI_Res					-2.39	0.92	-0.21	0.011
PCS_R					-0.92	0.43	-0.20	0.036

*p-value ≤ 0.001.

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.