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Comparison and potential determinants of health-related quality of life among rheumatoid arthritis, psoriatic arthritis, and spondyloarthritis: A cross-sectional study

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ABSTRACT

Objectives: This study aimed to compare the health-related quality of life scores among rheumatoid arthritis, psoriatic arthritis, and spondyloarthritis and to evaluate socio-demographic and clinical determinantes of quality of life across diseases.

Methods: The sample comprised 490 patients with rheumatoid arthritis, 198 with psoriatic arthritis, and 119 with spondyloarthritis who completed a series of health examinations and self-reported questionnaires. Quality of life was evaluated using the Short-Form 36 Health Survey, disease activity by DAS28-CRP, DAPSA, and ASDAS-CRP (for rheumatoid arthritis, psoriatic arthritis, and spondyloarthritis, respectively), depression and anxiety using the Hospital Anxiety and Depression Scale. ANOVA was used to compare the quality of life dimensions and their physical and mental summary measures among rheumatic diseases, and multivariate analysis was used to explore their potential determinants.

Results: Rheumatoid arthritis had significantly worse scores than spondyloarthritis in the following dimensions: physical functioning, role limitation due to physical health, physical component score, and mental health. Psoriatic arthritis was not significantly different from the other two diseases. Multivariate analysis revealed that physical quality of life was mainly associated with disease activity across rheumatic diseases, rheumatological treatment and depression in rheumatoid arthritis and psoriatic arthritis. Mental quality of life is primarily associated with depression and anxiety across rheumatic diseases.

Conclusion: There were differences in quality of life among patients with inflammatory rheumatic diseases, but overall, approximately uniform factors explained the variance in quality of life across diseases. Clinicians should develop general approaches and strategies for inflammatory rheumatic diseases to improve patients' quality of life.

1. Introduction

Rheumatoid arthritis (RA), psoriatic arthritis (PsA) and spondyloarthritis (SpA) are chronic, inflammatory, and autoimmune rheumatic diseases [1–3] having a strong impact on the physical, psychological, and social aspects of patients' lives [4]. Health-related quality of life (HRQoL) is one of the main outcomes of rheumatic diseases and treatment is particularly focused on it [5,6]. HRQoL is defined as a multidimensional concept that includes subjective reports of symptoms, side effects, functioning in multiple life domains, and general perceptions of life satisfaction and quality [7]. It is important to assess the quality of life in rheumatic diseases because their chronic and debilitating nature reflects the everyday functioning and well-being of patients. Thus, a comprehensive approach toward rheumatic diseases needs to include the assessment of quality of life as a substantial factor [8–10].

In rheumatic diseases, HRQoL deteriorates with respect to the general population [11]. The number of studies comparing the quality of life among different rheumatic diseases is modest, the results are not

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uniform, and differences do not lead to a clear conclusion. Generally, in rheumatic diseases, the physical domains of HRQoL are more impaired than the mental domains [1,10,12,13]. Comparing the HRQoL of rheumatoid arthritis patients with spondyloarthritis, the physical quality of life was worse in RA patients [14–16], while the mental quality of life was found to be similar [17], worse in RA patients [14], and worse in SpA patients [16]. Previous studies have reported that the quality of life in patients with RA and PsA is reduced, but without a significant difference [18–20].

To the best of our knowledge, only two studies have compared quality of life among patients with RA, PsA, and SpA. One study was conducted more than a decade ago [12], and it was found that patients affected by rheumatoid arthritis had the lowest scores. However, no details regarding rheumatological treatments or psychiatric assessment were included. An other study was published recently [13], and showed that after age matching, RA, PsA and SpA scores of physical quality of life were not different, and RA and PsA scores of mental quality of life were similar, but no analysis of the association between quality of life and clinical variables was performed.

Thus, the present study aimed to compare impairment in health-related quality of life among patients with rheumatoid arthritis, psoriatic arthritis and spondyloarthritis. Furthermore, it explores whether specific socio-demographic and clinical variables, including rheumatological treatments, depression and anxiety, are associated with impairment in the physical and mental quality of life domains for each diagnostic group.

2. Materials and methods

2.1. Clinical sample

This observational, cross-sectional study examined differences in health-related quality of life among patients with rheumatoid arthritis, psoriatic arthritis and spondyloarthritis. The sample consisted of a cohort of patients, aged 18 years or older, who were diagnosed with: rheumatoid arthritis - according to the ACR/EULAR classification criteria [21], psoriatic arthritis - according to the CASPAR criteria [22], and spondyloarthritis - according to the ASAS classification criteria [23]. All participants, in charge of the Unit of Rheumatology, University Hospital of Verona, Italy, were already diagnosed and assessed once clinical stability was achieved. Written informed consent was obtained after the description of the study. Recruitment was carried out sequentially during a routine outpatient visit, over a period of one year. Exclusion criteria were: diagnosis of fibromyalgia, connective tissue diseases (Systemic Lupus Erythematosus, Sjogren's disease, scleroderma, dermatomyositis, polymyositis), vasculitis, gout, infective arthritis, rheumatic polymyalgia or other severe systemic diseases [24,25]. No other exclusion criteria were applied (e.g., a specified level of disease activity, and defined disease duration). The investigation was conducted in accordance with the latest version of the Declaration of Helsinki [26] and was approved by the Ethics Committee of the Provinces of Verona and Rovigo (Ref. CESC15840, 2016).

2.2. Measurements

Standardized instruments were used to collect socio-demographic and clinical data.

Health-related quality of life was estimated using the self-reported Medical Outcomes Study 36-item Short Form Survey (SF-36; Italian version) [27], which is the most widely used instruments [10]. The instrument consists of 36 items summarized into eight dimensions representing eight health concepts: physical functioning, role limitations due to physical health, bodily pain, general health, vitality, social functioning, role limitations due to emotional problems, and mental health. These dimensions are further aggregated into two summary measures: Physical Component Summary (PCS) and Mental Component Summary (MCS). Lower scores on each dimension and summary measures indicate worse HRQoL and higher scores indicate better quality of life [28].

Disease activity was assessed using a specific instrument for each disease as recommended in clinical practice [29]. Specifically, it was assessed using the Disease Activity Score in 28 joints with C-Reactive Protein (DAS28-CRP) in RA, the Disease Activity in PSoriatic Arthritis (DAPSA) in PsA and the Ankylosing Spondylitis Disease Activity Score with C-Reactive Protein (ASDAS-CRP) in SpA.

The DAS28-CRP score includes tender and swollen joint count (based on a 28-joint assessment), level of C-reactive protein (mg/dl) and the general health assessment scored on a visual analog scale (VAS, 0–10) [30]. The DAPSA score includes tender joints count (out of 68), swollen joints count (out of 66), level of C-reactive protein (mg/dl) and patient's assessment of disease activity and pain (0−10) [31]. The ASDAS-CRP score includes back pain (0–10), duration of morning stiffness (0–10), patient global assessment of disease activity (0–10), peripheral pain/swelling (0–10) and level of C-reactive protein level (mg/dl) [32].

As previously described [33], pharmacological treatment was categorized as first-line therapy [conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) and/or anti-TNF (anti–tumor necrosis factor drugs)] and second-line therapy [biological disease-modifying antirheumatic drugs (bDMARDs) and, targeted synthetic disease-modifying antirheumatic drugs (tsDMARDs) with or without csDMARDs]. Glucocorticoids and non-steroidal anti-inflammatory drugs (NSAIDS) were also collected.

Depressive and anxious symptomatology was assessed using the Hospital Anxiety and Depression Scale (HADS) [34]. The HADS is a self-report questionnaire that is quick and easy to complete. It is composed of two scales: one for depression (HADS-D) and one for anxiety (HADS-A), each consisting of seven items. Higher scores indicate more severe symptoms.

2.3. Statistical analysis

Variables were described as absolute frequencies and percentages for categorical variables and mean (SDs) for continuous variables. Comparisons among the three diagnostic groups were performed using Chi-square tests (categorical variables) and ANOVAs with Bonferroni's post-hoc comparisons (continuous variables). The associations between each characteristic (independent variable) and each of the two SF-36 summary measures (Physical Component Score as PCS and Mental Component Score as MCS) were explored using univariate linear regression models. After that, independent characteristics associated with $p < 0.10$ in the univariate models were entered into the multivariate linear regression models with each SF-36 summary measure as dependent variable. Adjusted Beta coefficients and p-values were estimated. The adjusted R^2 value for each model was shown. Effect size was for estimated by Eta squared (for each model) and partial eta squared (for each independent variable). Partial eta squared values were interpreted by a rule of thumb as follows: 0.01 small effect, 0.06 medium effect, $\geq$0.14 large effect. All tests were bilateral with a significance of $p < 0.05$. All analysis were performed using SPSS version 28 for Windows.

3. Results

3.1. Socio-demographic and clinical characteristics

The study sample consisted of 807 patients with RA (n = 490, 60.7%), PsA (n = 198, 24.5%) and SpA (n = 119, 14.8%). With respect to socio-demographics, the three diagnostic groups differed significantly in all characteristics, with the exception of marital status (Table 1).

Briefly, patients with RA were mostly females (80%), married (72%), with secondary or vocational qualification educational level (71%) and no employment (61%). The RA group was the oldest (mean 59.5 years, SD 12). In contrast, the SpA patients were the youngest (mean 49 years, SD 12) and showed the highest proportions of males (55%): they were

Table 1
Socio-demographic characteristics ($n = 807$).

Socio-demographic variables	RA (n = 490)		PsA (n = 198)		SpA (n = 119)		p-value
	Mean or %	SD or N	Mean or %	SD or N	Mean or %	SD or N	
Age, years	59.5	12.2	56.8	11.6	48.9	11.6	<0.001[a]
Gender							<0.001[b]
Female	80.0%	392	62.6%	124	45.4%	54	
Male	20.0%	98	37.4%	74	54.6%	65	
Marital status							0.002[b]
Single	11.6%	57	11.6%	23	21.8%	26	
Married	72.4%	355	76.8%	152	72.3%	86	
Widowed	7.8%	38	4.0%	8	0%	0	
Separated/Divorced	8.2%	40	7.6%	15	5.9%	7	
Educational level							<0.001[b]
Primary (age 6–10 yrs.)	23.0%	113	16.7%	33	6.7%	8	
Secondary (age 11–13 yrs.)	38.0%	186	35.3%	70	31.1%	37	
Diploma (age 14–18 yrs.)	33.6%	165	40.0%	79	50.4%	60	
Degree	5.4%	26	8.0%	16	11.8%	14	
Employment							<0.001[b]
No	60.8%	298	48.0%	95	24.4%	29	
Yes	39.2%	192	52.0%	103	75.6%	90	

RA rheumatoid arthritis; PsA psoriatic arthritis; SpA spondyloarthritis.
a: ANOVA; Bonferroni's post-hoc comparisons (age): RA > PsA; RA > SpA; PsA > SpA; b: Chi-square test.

mostly married (72%), with secondary or vocational qualification educational level (81%) and employed (about 76%).

Regarding disease activity, 36% of RA patients and 49% of PsA patients had a moderate or high level of activity, while 63.1% of SpA patients had a high or very high level of activity (Table 2).

Disease duration was significantly different among diseases since RA patients were diagnosed approximately 12 years ago (SD 9), PsA patients about 9 years ago (SD 7), and SpA patients 10 years ago (SD 8). Groups were significantly different in having one or more comorbidities, since about 91% of RA patients, about 90% of PsA patients, and approximately 83% of SpA patients had comorbidities. Leading comorbidities across the groups were cardio-circulatory, osteoarticular, and gastroenterological comorbidities. Considering medications, the diagnostic groups did not differ in rheumatological prescriptions, while most RA patients were treated with glucocorticoids (49%), and most SpA patients were treated with NSAIDs (41%). Patients mainly had normal or mild levels of depression (86–92%) and anxiety (79–81%) and were not receiving antidepressant therapy (about 94%).

3.2. Health-related quality of life and its determinant

The SF-36 Physical component was different among the three groups, with SpA patients showing the highest score (RA: 36.0 SD 10.3, PsA: 36.9 SD 10.0, SpA: 38.6 SD 10.2, $p = 0.037$ ANOVA; Bonferroni's post hoc: RA < SpA). The Mental component did not differ among the three groups (RA: 46.1 SD 10.1, PsA: 46.3 SD 10.9, SpA: 48.0 SD 9.5, $p = 0.189$ ANOVA). Comparisons of the dimensions of rheumatic diseases are provided in the Appendix.

Univariate linear regression analysis was performed to explore the association between each socio-demographic and clinical variable (independent variable), and each physical and mental quality of life (dependent variable) distinguished by the diagnostic group.

As shown in Table 3, a worse physical component was associated, for all diagnostic groups, with being older, female, employed, with higher disease activity, having been prescribed glucocorticoids, and having higher depressive and anxiety symptoms. Indeed, some characteristics were associated with a worse physical quality of life depending on a specific diagnosis: comorbidity, second-line therapy and NSAIDs (for RA and PsA), higher education (for RA and SpA), and antidepressant therapy (for PsA and SpA).

Considering the mental component of the SF-36, a worse quality of life was associated with higher disease activity and more severe depressive and anxiety symptoms in all diagnostic groups. Being female (for RA and PsA), with higher education, employed, taking second line therapy, and having been prescribed glucocorticoids (for SpA) were characteristics associated with a worse quality of life for the specified diagnoses.

Significant at $p < 0.10$ independent variables (socio-demographic and clinical characteristics) entered the multivariate linear regression model estimated for each diagnostic group, thus giving adjusted Beta coefficients, as presented in the Table 4.

A worse physical component remained associated with higher disease activity for all diagnostic groups. By considering the specificity of each diagnosis, in patients with RA disease duration, the presence of comorbidity, having been prescribed second-line therapy, glucocorticoids and NSAIDs, and declaring more severe depressive symptoms were further associated with a worse physical quality of life. In the PsA group, taking second-line therapy, glucocorticoids, and NSAIDs, and having a higher depression severity were all associated with a lower physical component score. No more characteristics, other than disease activity, were associated with a worse physical quality of life in the SpA cohort.

Considering the mental component, worse quality of life was associated with more severe depressive and anxiety symptoms in all diagnostic groups. In patients with RA, higher disease activity was associated with a lower MCS score; in patients with PsA, employment was related to a lower MCS score, and in SpA patients, NSAID treatment was negatively related to MCS score.

The proportion of total variance in the dependent variable explained by the models ranged from $\eta 2 = 0.347$ to $\eta 2 = 0.536$ for the physical component and from $\eta 2 = 0.443$ to $\eta 2 = 0.695$ for the mental component. Considering partial eta squared, mainly disease activity in PCS models, and depression and anxiety in MCS models have medium or large effect size, while other variables have small effect sizes.

4. Discussion

To date, this study has been performed in a large cohort of patients, comparing the impairment in health-related quality of life among rheumatoid arthritis, psoriatic arthritis and spondyloarthritis, and its specific associated socio-demographic and clinical characteristics. The first main finding was that the score on the physical component of quality of life was higher in patients with SpA than in those with RA, while there were no differences in the mental component among the diagnostic groups. The second main finding is that a worse physical component is associated with higher disease activity in all diagnostic groups, while a worse mental component is associated with more severe

Table 2
Clinical characteristics (n = 807).

Clinical variables	Rheumatoid arthritis (n = 490)		Psoriatic arthritis (n = 198)		Spondylarthritis (n = 119)		*p* value
	Mean or %	SD or N	Mean or %	SD or N	Mean or %	SD or N	
Clinical (rheumatology)							
DAS28-CRP	2.8 (M)	1.0(SD)					
Remission or Low (<3.3)	63.80%	313					
Moderate or High (≥ 3.3)	36.20%	177					
DAPSA			15.1 (M)	8.7(SD)			
Remission or Low (<15)			51.00%	101			
Moderate or High (≥ 15)			49.00%	97			
ASDAS -CRP					2.5 (M)	1.1 (SD)	
Inactive or Moderate(<2.2)					36.90%	44	
High or Very high (≥ 2.2)					63.10%	75	
Disease duration (yrs.)	12.5	9.5	8.8	6.9	10	8.2	<0.001[a]
Comorbidity							
No	9.20%	45	9.60%	19	16.80%	20	0.046[b]
Yes	90.80%	445	90.40%	179	83.20%	99	
Cardio-circulatory§							
No	38.20%	170	46.90%	84	47.50%	47	0.06
Yes	61.80%	275	53.10%	95	52.50%	52	
Endocrinological§§							
No	71.50%	318	76.50%	137	87.90%	87	0.003
Yes	28.50%	127	23.50%	42	12.10%	12	
Cancer§§§							
No	87.00%	387	88.30%	158	92.90%	92	0.252
Yes	13.00%	58	11.70%	21	7.10%	7	
Respiratory°							
No	90.30%	402	87.20%	156	90.90%	90	0.45
Yes	9.70%	43	12.80%	23	9.10%	9	
Neurological°°							
No	98.00%	436	97.20%	174	98.00%	97	0.831
Yes	2.00%	9	2.80%	5	2.00%	2	
Gastroenterological°°°							
No	67.60%	301	73.20%	131	65.70%	65	0.311
Yes	32.40%	144	26.80%	48	34.30%	34	
Osteoarticular^							
No	51.00%	227	57.50%	103	66.70%	66	0.013
Yes	49.00%	218	42.50%	76	33.30%	33	
Other^^							
No	45.80%	204	29.10%	52	49.50%	49	<0.001
Yes	54.20%	241	70.90%	127	50.50%	55	
Rheumatological treatment							
First-line therapy[1]	75.70%	371	78.30%	155	84.00%	100	0.143[b]
Second-line therapy[2]	24.30%	119	21.70%	43	16.00%	19	
Glucocorticoid treatment							
No	50.60%	248	77.30%	153	79.80%	95	<0.001[b]
Yes	49.40%	242	22.70%	45	20.20%	24	
NSAID treatment[3]							
No	78.80%	386	68.70%	136	58.80%	70	<0.001[b]
Yes	21.20%	104	31.30%	62	41.20%	49	
Clinical (psychiatry)							
HADS -D	5.9 (M)	3.9 (SD)	5.6 (M)	3.7 (SD)	5.0 (M)	3.5 (SD)	0.059[a]
Normal or Mild (<11)	85.70%	420	91.40%	181	91.60%	109	0.048[b]
Moderate or Severe (≥ 11)	14.30%	70	8.60%	17	8.40%	10	
HADS -A	7.1 (M)	3.9 (SD)	6.7 (M)	3.9 (SD)	6.5 (M)	4.1 (SD)	0.273[a]
Normal or Mild (<11)	80.20%	393	81.30%	161	79.00%	94	0.878[b]
Moderate or Severe (≥ 11)	19.80%	97	18.70%	37	21.00%	25	
Antidepressant therapy							
No	93.90%	460	92.90%	184	94.10%	112	0.878[b]
Yes	6.10%	30	7.10%	14	5.90%	7	

a: ANOVA; Bonferroni's post comparisons for Disease duration: RA > PsA ($p < 0.001$); RA > SpA ($p < 0.001$). Bonferroni's post comparisons for HADS-D (depression): NS. Bonferroni's post comparisons for HADS-A (anxiety): NS. b: Chi-square test.

1: csDMARDs and/or anti-TNF; 2: anti-IL6 / bDMARDs / tsDMARDs with or without csDMARDs; 3: used in last ten days.

RA rheumatoid arthritis; PsA psoriatic arthritis; SpA spondyloarthritis; cDMARDs conventional disease-modifying antirheumatic drugs; anti-TNF anti-tumor necrosis factor; NSAID treatment non-steroidal anti-inflammatory drug treatment; DAS28-CRP disease activity score in 28 joints with c-reactive protein; DAPSA disease activity in psoriatic arthritis; ASDAS-CRP ankylosing spondylitis disease activity score with c-reactive protein; HADS-D hospital anxiety and depression scale – depression; HADS-A hospital anxiety and depression scale – anxiety.

§ heart attack, ischemic heart disease, hypertension, atrial flutter, heart failure, peripheral vascular disease, hypercholesterolemia.

§§ diabetes, hypothyroidism, hyperthyroidism.

§§§ breast, uterus, prostate, lung, skin.

° obstructive pulmonary disease, emphysema, asthma.

°° dementia, stroke, Parkinson's disease.

°°° hepatitis, cirrhosis, irritable colon, gastritis, Crohn's disease.

^ osteoporosis, femur fracture, other fracture, arthrosis.

^^ psoriasis, enthesitis, uveitis, asthenia, fever, weight loss.

Table 3
Unadjusted Beta coefficients between each summary measure of quality of life (PCS and MCS) as the dependent variable and each socio-demographic and clinical characteristic as the independent variable in RA, PsA and SpA (Univariate linear regression models).

Independent variables	Dependent variables											
	Rheumatoid arthritis				Psoriatic arthritis				Spondyloarthritis			
	PCS		MCS		PCS		MCS		PCS		MCS	
	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value	Coeff	p-value
Socio-demographic												
Age	−0.23	<0.001	−0.02	0.723	−0.14	0.018	0.04	0.502	−0.37	<0.001	−0.15	0.112
Female	−0.14	0.001	−0.09	0.036	−0.25	<0.001	−0.14	0.042	−0.26	0.004	−0.16	0.073
High education	0.11	0.019	−0.03	0.566	0.13	0.069	0.03	0.674	0.22	0.014	0.19	0.043
Employed	0.21	<0.001	0.06	0.203	0.15	0.038	−0.13	0.064	0.39	<0.001	0.28	0.002
Clinical (rheumatology)												
DAS28-CRP	−0.42	<0.001	−0.20	<0.001								
DAPSA					−0.61	<0.001	−0.23	0.001				
ASDAS-CRP									−0.68	<0.001	−0.36	<0.001
Disease duration (yrs.)	−0.14	0.002	0.01	0.798	0.03	0.716	0.08	0.252	−0.04	0.649	0.08	0.365
Comorbidity	−0.22	<0.001	−0.06	0.158	−0.18	0.010	0.03	0.650	−0.05	0.586	−0.03	0.748
Pharmacological treatment												
Second-line therapy[1]	−0.17	<0.001	−0.06	0.176	−0.18	0.011	−0.04	0.599	−0.12	0.207	−0.21	0.025
Glucocorticoid treatment	−0.29	<0.001	−0.07	0.095	−0.22	0.002	−0.13	0.057	−0.32	<0.001	−0.21	0.020
NSAID treatment[2]	−0.19	<0.001	−0.09	0.035	−0.32	<0.001	−0.08	0.272	−0.17	0.066	−0.17	0.068
Clinical (psychiatry)												
HADS -D	−0.32	<0.001	−0.60	<0.001	−0.37	<0.001	−0.66	<0.001	−0.43	<0.001	−0.77	<0.001
HADS -A	−0.18	<0.001	−0.62	<0.001	−0.28	<0.001	−0.61	<0.001	−0.37	<0.001	−0.77	<0.001
Antidepressant therapy	0.06	0.587	0.03	0.777	−0.19	0.006	0.02	0.284	−0.18	0.046	−0.12	0.177

1: anti-IL6 / bDMARDs / tsDMARDs with or without csDMARDs; 2: used in last ten days.
PCS physical component score; MCS mental component score; cDMARDs conventional disease-modifying antirheumatic drugs; anti-TNF anti-tumor necrosis factor; NSAID treatment non-steroidal anti-inflammatory drug treatment; DAS28-CRP disease activity score in 28 joints with c-reactive protein; DAPSA disease activity in psoriatic arthritis; ASDAS-CRP ankylosing spondylitis disease activity score with c-reactive protein; HADS-D hospital anxiety and depression scale – depression; HADS-A hospital anxiety and depression scale – anxiety.

depressive and anxiety symptoms.

In the current study, SpA patients had higher scores in physical quality of life (PCS) then patients with RA, and in some domains as physical functioning and role limitation due to physical health. Previous findings are consistent with these results [12,14,15]. Physical functioning and role limitation due to physical health in established rheumatic diseases are central outcomes [35,36], is caused by inflammation and structural damage [3], as indicated by disease activity and disease duration [36]. In the current study, RA patients had a lower disease activity than SpA patients, but significantly longer disease duration, older age, more comorbidities, and characteristics related to physical functioning [36,37]. In the present study, PsA patients were not significantly different from RA and SpA patients within the domain of physical quality of life, thus reinforcing the results of previous studies [18,20]. However, in one study quality of life was less reduced in PsA patients than in RA patients [11], whereas other studies found slight differences among the separate dimensions of physical quality of life [19,38]. In the present study, mental quality of life (MCS) did not differ among rheumatic diseases, as some authors concluded that adequate rheumatological care among rheumatic diseases generates a similar impact on well-being [16]. This is in accordance with some previous studies [13,39], while other studies found opposite results, where patients with RA had lower [15] or higher [16] MCS scores than those with PsA and SpA. In the present study RA patients had lower mental health, a dimension of MCS, compared to SpA patients, while PsA patients did not significantly differ from the other two clinical groups. The reduced dimension of mental health in rheumatic disease can be caused by emotional problems and fatigue [13], but the clinical groups in the current study did not differ in terms of psychological distress, and comparison of fatigue was not included in the study. Finally, comparing the impairment of quality of life among chronic rheumatic diseases in our study is noteworthy, presenting practical everyday problems of physical and emotional functioning in rheumatic patients and revealing the particularity of each clinical group.

In the present study, the results suggest that physical quality of life (PCS) primarily correlates with rheumatological characteristics, where disease activity stands out as the only variable significantly related to PCS among all the groups, and with a large effect size across the models. Other variables significantly associated with worse PCS have small or medium effect sizes, and these variables are second-line therapy, glucocorticoids, NSAIDs, and depression both in RA and PsA, and disease duration and comorbidity only in RA. In the current study, disease activity scores had different distributions among rheumatic diseases, while most of the RA patients and half of the PsA patients were in remission or with low disease activity, SpA patients predominantly had high or very high disease activity. Groups also had different age and sex distributions, and different disease durations, which makes the comparison of their disease activity challenging. Nevertheless, disease activity across inflammatory rheumatic diseases is invariably negatively associated with physical components, as previously confirmed [8,40,41]. The disease activity score is mainly used as a marker in clinical practice, through which improvement is monitored. Thus, it is intuitive that patients with lower disease activity had a higher quality of life because, having a more controlled form of the disease, they are more able to carry out daily activities. Swelling and progressive destruction of the joints are one of the main hallmarks of inflammatory rheumatic diseases and can have a substantial negative impact on physical function, activity limitation, bodily pain, – and dimensions of physical quality of life [2,39,42]. Additionally, worse clinical status was found to be associated with loss of work productivity [43,44] and reduced social activities [8], which justified the negative impact on quality of life. The practical implication is that, with the control of the illness, over the correct approach, such as early diagnosis, effective and appropriate treatment, and involvement of a multidisciplinary health team, the physical quality of life of patients will improve.

It was also found that RA and PsA patients who were taking second-line therapy, glucocorticoids, or NSAIDs had worse physical quality of life. In the current study, second-line therapy was prescribed when patients did not respond to first-line therapy, which implies an uncontrolled form of the disease, the disappointment of not achieving remission, increased necessity, and concern beliefs toward medication [33], and in those difficult circumstances, a lower quality of life is

Table 4
Adjusted Beta coefficients between each summary measure of quality of life (PCS and MCS) as the dependent variable and socio-demographic and clinical characteristics as independent variables in RA, PsA and SpA (Multivariate linear regression models; only independent variables significantly associated at $p < 0.10$ in univariate linear regression models entered the multivariate ones).

Independent variables	Dependent variables											
	Rheumatoid arthritis				Psoriatic arthritis				Spondyloarthritis			
	PCS		MCS		PCS		MCS		PCS		MCS	
	Coeff (p)	Partial η2	Coeff (p)	Partial η2	Coeff (p)	Partial η2	Coeff (p)	Partial η2	Coeff (p)	Partial η2	Coeff (p)	Partial η2
Socio-demographic												
Age	−0.08 (0.091)	0.006	–	–	−0.90 (0.152)	0.011	–	–	−0.09 (0.235)	0.013	–	–
Female	−0.07 (0.078)	0.006	0.03 (0.363)	0.002	−0.10 (0.058)	0.019	−0.03 (0.626)	0.001	−0.01 (0.887)	0.000	0.03 (0.584)	0.003
High education	0.02 (0.592)	0.001	–	–	−0.02 (0.682)	0.001	–	–	0.06 (0.421)	0.006	0.06 (0.279)	0.011
Employed	0.00 (0.860)	0.000	–	–	−0.00 (0.896)	0.000	−0.17 (0.002)	0.048	0.12 (0.130)	0.021	0.05 (0.411)	0.006
Clinical (rheumatology)												
DAS28-CRP	−0.29 (<0.001)	0.104	−0.10 (0.006)	0.016								
DAPSA					−0.44 (<0.001)	0.243	−0.06 (0.277)	0.006				
ASDAS-CRP									−0.51 (<0.001)	0.263	0.05 (0.491)	0.004
Disease duration (yrs.)	−0.10 (0.007)	0.015	–	–	–	–	–	–	–	–	–	–
Comorbidity	−0.12 (0.003)	0.018	–	–	−0.08 (0.119)	0.013	–	–	–	–	–	–
Pharmacological treatment	−0.10 (0.007)	0.015	–	–	−0.11 (0.028)	0.026	–	–	–	–	0.02 (0.723)	0.001
Second-line therapy[1]												
Glucocorticoid treatment	−0.15 (<0.001)	0.029	0.01 (0.735)	0.000	−0.12 (0.017)	0.031	−0.09 (0.097)	0.014	−0.06 (0.407)	0.006	−0.13 (0.828)	0.000
NSAID treatment[2]	−0.09 (0.019)	0.012	0.00 (0.988)	0.000	−0.20 (<0.001)	0.071	–	–	−0.04 (0.525)	0.004	−0.12 (0.035)	0.040
Clinical (psychiatry)												
HADS -D	−0.25 (<0.001)	0.045	−0.31 (<0.001)	0.076	−0.21 (0.006)	0.040	−0.43 (<0.001)	0.143	−0.19 (0.087)	0.027	−0.43 (<0.001)	0.176
HADS -A	0.06 (0.297)	0.002	−0.40 (<0.001)	0.121	0.01 (0.909)	0.000	−0.27 (<0.001)	0.066	0.08 (0.422)	0.006	−0.001 (<0.001)	0.183
Antidepressant therapy	–	–	–	–	−0.07 (0.164)	0.010	–	–	−0.05 (0.461)	0.005	–	–
Model η2	**0.347**		**0.443**		**0.528**		**0.499**		**0.536**		**0.695**	

1: (anti-IL6, bDMARDs, tsDMARDs) with or without csDMARDs; 2: used in last ten days. PCS physical component score; MCS mental component score; cDMARDs conventional disease-modifying antirheumatic drugs; anti-TNF anti-tumor necrosis factor; NSAID treatment non-steroidal anti-inflammatory drug treatment; DAS28-CRP disease activity score in 28 joints with c-reactive protein; DAPSA disease activity in psoriatic arthritis; ASDAS-CRP ankylosing spondylitis disease activity score with c-reactive protein; HADS-D hospital anxiety and depression scale – depression; HADS-A hospital anxiety and depression scale – anxiety.

expected. This is in contrast with recent reports of improvement in quality of life even with multiple rheumatological treatment failures [6], and this effect has been maintained over time [45]. Their longitudinal study design gives them more reasons to conclude correctly in comparison to the cross-sectional design of the present study. Few studies have found that the association between therapy and quality of life could be mediated by disease activity, disease duration [46], or comorbidities [47]. In the present study patients had a long disease duration and comorbidities, which possibly decreased the effect of therapy on quality of life.

Contrary to PCS, multivariate models of MCS in the present study were poorly explained by rheumatological variables, demonstrating the advantage of separately understanding and approaching physical and mental quality of life. The worst MCS among rheumatic diseases was principally correlated with symptoms of depression and anxiety, and their effect size in the models was large or medium. Employment, disease activity, and NSAID treatment were variables associated with worse MCS in some of the models, but the effect size was small. Several studies in RA, PsA, and SpA have pointed out the contribution of depression and anxiety in the explanation of poorer mental [48,49], or both mental and physical quality of life [50,51], and the association could be bidirectional [52]. The detrimental effect of chronic illness is often followed by depressive and anxiety symptoms, and its prevalence is steadily confirmed in rheumatic disease [50,51]. The present finding of the association between psychological distress and mental quality of life points to the necessity of intervention for these treatable outcomes. This encourages physicians to incorporate an assessment of depressive and anxiety symptoms into their clinical practice and to include mental health professionals in the management of the disease. Eventually, exploration of variables related to physical and mental quality of life in rheumatic diseases is applicable because accurate identification of correlates of worse HRQoL may guide clinical practice and the understanding of the key drivers of RA, PsA and SpA disease burden [53].

Regarding quality of life, it should be taken into account that in the present study, clinical groups were significantly different regarding socio-demographic characteristics, such as age, gender, marital status, educational level, and employment. Considering the literature, it was expected that older [37,54], female [10,55,56], less educated [17], and

unemployed [43] patients have a worse quality of life. Among the socio-demographic variables in the current study, only employment was significantly negatively related to mental quality of life in PsA, but with a small effect size. Employment declined with disease duration in rheumatic disease [17]. In the present study, PsA and SpA had significantly lower disease duration and more employed patients than RA patients. The fact that employed PsA patients had lower mental quality of life could be explained by reduced work productivity [43], and considerable difficulties in carrying out their jobs because of the disease. However, employment is an advantage for the patient, contributes to autonomy and self-esteem, gives the sense of accomplishing the social role, and mitigates the financial burden of chronic disease [57], so it remains unclear why it did not have a positive impact on quality of life.

The present study has several strengths. First, the sample consisted of a large cohort of patients affected by the three most frequent inflammatory rheumatic diseases, recruited from a clinical practice setting. Patients were consecutively recruited, thus minimizing a possible selection bias. Second, patients were stable and without changes in prescribed pharmacotherapy in the last three months, the association between treatment and quality of life was not influenced by intensive changes. Third, in all sample assessments quality of life was assessed with the same validated questionnaire, which allowed us to compare absolutely the same concepts across diseases. Subjective quality of life was examined because it is the perceived impact of the disease on a patient's life satisfaction. Fourth, the analysis included most of the basic clinical variables essential for clinical practice, which was reflected in the effect size of the models (0.347–0.695).

This study had some limitations. The main limitation of this study was its cross-sectional design, which permitted only exploring the association between a set of characteristics and health-related quality of life. A longitudinal study would reveal the direction of influence between quality of life and clinical variables, and a better understanding of causal relationships would lead to more precise practical implications. Second, even if the explained proportion of variance in the models of quality of life among diseases was high, there must be additional significant factors that could be added as independent variables. It would be advantageous to include fatigue, pain, disability, work productivity, or an extended range of data on disease progression, which would improve the explanation of quality of life. Third, the comorbidity index was not evaluated, not permitting comparison between different diseases and related disabilities. The present study would benefit from the exploration of the influence of different comorbidities on quality of life.

In conclusion, the current study indicates that quality of life in RA, PsA, and SpA, even with underlined differences, could be considered similar from in a wider perspective of disease outcomes. Health-related quality of life is an important and complex outcome in inflammatory rheumatic diseases and comparison among RA, PsA and SpA, could reveal the consequences of disease burden useful for clinical practice. Further studies should focus on the association between disease activity and quality of life, to develop a better understanding of this interaction and to base treatment strategies. In general, following the predictors of quality of life in patients with early diagnosis would guide the development of interventions to improve quality of life among rheumatic diseases.

Declaration of Competing Interest

The authors declare no conflict of interest.

Appendix A. Supplementary data

Supplementary data to this article can be found online at https://doi.org/10.1016/j.jpsychores.2023.111512.

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