Patient-reported outcomes in European spondyloarthritis patients: a systematic review of the literature

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Objective: This review aims to summarize the current literature on patient-reported outcomes (PROs) in spondyloarthritis (SpA).

Patients and methods: We performed a systematic literature review to identify studies (original articles and narrative and systematic reviews) regarding PROs (health-related quality of life [HRQoL], satisfaction, preferences, adherence/compliance, and persistence) in SpA patients published in the European Union through December 2016. International databases (Medline/PubMed, Cochrane Library, ISI Web of Knowledge, Scopus) were searched using keywords in English. The methodological quality of the studies was assessed using the Oxford Centre for Evidence-Based Medicine criteria.

Results: A total of 26 publications met the inclusion criteria. Generally, studies indicated that SpA has a negative impact on patients’ HRQoL. In patients with ankylosing spondylitis, physical domains were more affected than emotional ones, whereas for psoriatic arthritis, both physical and psychological factors were strongly affected by the disease. Data indicated that biological agents (BAs) greatly contributed to improvement in HRQoL in both ankylosing spondylitis and psoriatic arthritis patients. Findings on compliance with BAs were heterogeneous. However, persistence rates exceeded 50% irrespective of the BA administered. Results on preferences indicated that most SpA patients prefer being involved in decisions regarding their treatment and that besides efficacy and safety, frequency and route of administration may influence patients’ preferences for BAs.

Conclusion: Implementing management programs for SpA patients focuses on the physical, emotional, and social consequences of the disease, in addition to assessing and including patient preferences in the treatment decision-making process, could be crucial to improve patients’ HRQoL and ensure their satisfaction and compliance with treatment.

Keywords: spondyloarthritis, ankylosing spondylitis, psoriatic arthritis, patient-reported outcomes, European Union, systematic review

Introduction

Spondyloarthritis (SpA) refers to a group of interrelated inflammatory diseases that share some features, including articular and extra-articular manifestations.¹ SpA affects 1%–3% of the general population. In European countries, the reported prevalence varies between 0.3% and 1.9%.² Ankylosing spondylitis (AS) and psoriatic arthritis (PsA) are the most frequent types of SpA. AS mainly affects the spine and sacroiliac joint and to a lesser extent the peripheral joints and entheses. PsA is characterized by the involvement of both peripheral and/or spinal joints and skin manifestations.³ The European prevalence of AS is 0.03%–1.8%, while prevalence is 0.05%–0.42% for PsA.⁴
PsA causes joint damage that leads to loss of articular function; specifically, a high percentage of PsA patients have more than one deformed joint and about 20% develop a very destructive disabling form of arthritis. As a consequence, progression of PsA leads to a reduction in patients’ functional capacity, affecting their social and working lives. Various studies have suggested that SpA has a negative impact on functional status and patients’ health-related quality of life (HRQoL), and it is associated with an increased risk of death.

AS patients typically present axial skeleton and sacroiliac joint involvement, resulting in structural and functional impairment. Additionally, many extra-articular features may also occur in AS patients, including uveitis, osteoporosis, bowel disease, and cardiac, pulmonary, skin (psoriasis), and kidney involvement. The incidence of cardiovascular disease and mortality is also increased in AS patients. Adults with AS may thus have significantly reduced HRQoL, in addition to limitations in physical functioning and comorbidities that are strongly associated with decreased work productivity.

In view of the clinical and social implications of SpA, management of SpA patients should aim to prevent structural damage and preserve their functional status, in order to optimize HRQoL. With this aim, new therapies, such as biological therapies, have been developed, and new treatment strategies, eg, treat to target, have been adopted over the last decade. The implementation in routine-practice of biological agent (BA) therapy has led to a significant improvement in clinical outcomes, including the physical functioning of patients with rheumatic disease. However, poor adherence to medication in SpA patients remains a challenge in clinical practice. New BAs involve different routes of administration and different toxicity, and are sometimes associated with higher drug costs, all of which may influence patient adherence and preference for medication. In view of the new scenario, a more patient-centered approach to decision making is needed. In fact, assessing and including patients’ preferences within routine clinical practice are related to an increase in medication adherence, as well as improved treatment outcomes. This work reviews and summarizes the current literature on patient-reported outcomes (PROs) in patients with SpA (AS and PsA) in the European Union (EU).

Methods
We performed a systematic literature review to identify studies on PROs in SpA (AS and PsA) patients. Studies assessing HRQoL, satisfaction, adherence/compliance, or persistence with treatment and patients’ preferences for treatment in SpA populations published in the EU through December 2016 were selected. As recommended by the Cochrane Handbook for Systematic Reviews of Interventions, publicly accessible international databases (Medline/PubMed, Cochrane Library, ISI Web of Knowledge, Scopus) were searched using keywords in English joined by the Boolean operators “OR” and “AND” (Table 1).

Inclusion criteria
We included original articles, narrative reviews, and systematic reviews in English and Spanish that evaluated PROs (HRQoL, satisfaction, adherence/compliance, or persistence with treatment and patients’ preferences) in SpA patients in EU setting.

Exclusion criteria
We excluded studies conducted in non-EU countries, letters to the editor, editorials, experts’ opinions, case studies, congress proceedings, mixed-population studies, those that focused on only one explanatory factor, and studies related to specific medical interventions.

Selection of studies
Following removal of duplicates and irrelevant publications, two independent researchers screened the remaining studies based on preset inclusion and exclusion criteria. Discrepancies were resolved by consensus. The methodological

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<th>Number of search terms</th>
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<tr>
<td>1</td>
<td>Ankylosing spondylitis (MeSH)</td>
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<td>Ankylosing spondylitis</td>
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<td>3</td>
<td>Psoriatic arthritis (MeSH)</td>
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<td>Psoriatic arthritis</td>
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<td>Medication adherence (MeSH)</td>
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<td>Utilities</td>
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Search strategies
(1 OR 2) AND (5 OR 6 OR 7 OR 8)
(3 OR 4) AND (5 OR 6 OR 7 OR 8)
(1 OR 2) AND (9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18)
(3 OR 4) AND (9 OR 10 OR 11 OR 12 OR 13 OR 14 OR 15 OR 16 OR 17 OR 18)
quality of the studies was assessed using Oxford Centre for Evidence-Based Medicine criteria.¹⁹

**Results**

**Studies selected**

The database searches yielded a total of 8,954 titles. Of these, 8,864 were excluded as irrelevant to study purposes (4,748, 53%) or duplicates (3,916, 43.7%). Following full-text reading and application of the inclusion/exclusion criteria, 26 of the remaining 290 publications were included in the review (Figure 1). Most publications reviewed (n=16, 61.5%) were cross-sectional studies examining HRQoL in SpA patients, while a lower proportion evaluated other PROs such as persistence, satisfaction, or preferences (Table 2).

**HRQoL in SpA patients**

Of the 18 publications examining HRQoL in SpA patients, 13 (72.5%) employed generic HRQoL instruments, while only four used disease-specific questionnaires, alone or in combination with generic ones (Tables 2 and 3).

**HRQoL in SpA patients compared with other rheumatological disorders and the general population**

Salaffi et al²⁰ revealed that inflammatory rheumatic diseases, including SpA, have a negative impact on patients’ HRQoL, affecting both physical (physical component summary [PCS]) and mental (mental component summary [MCS]) dimensions. PCS was more affected in AS, whereas both physical and emotional well-being deteriorated in patients with PsA.

**Correlation between clinical variables and HRQoL in SpA**

Of the studies selected, two²⁰,²¹ sought to identify explanatory clinical factors for HRQoL in SpA. In particular, Salaffi et al²⁰ showed that for inflammatory rheumatic diseases, high disease-activity score, chronic comorbidity, and radiographic damage negatively affected PCS, while the severity of psoriatic lesions (Psoriasis Area and Severity Index) was significantly associated with poor MCS in PsA patients. In the same line, Jajić et al²¹ observed that for AS patients, clinical variables correlated mainly with PCS, whereas in PsA patients both PCS and MCS were affected by the disease. Functional status, measured by the Bath Ankylosing Spondylitis Functional Index (BASFI), had the strongest impact on PCS in both diseases.

**Depression, anxiety, and HRQoL in SpA**

Kotsis et al²² and Hyphantis et al²³ investigated the prevalence of major depressive disorders in SpA and rheumatoid arthritis (RA) and their association with HRQoL. Both studies showed that psychological factors were strongly associated with HRQoL in PsA patients. In particular, both anxiety and concern about bodily symptoms were independent correlates of the physical domain of HRQoL.²² On the other hand, only cognitive variables were important correlates of HRQoL in AS patients, with illness concern being the only significant independent correlate of physical HRQoL.²³

**HRQoL and work productivity in SpA patients**

Two studies evaluated the relationship between HRQoL and productivity loss in SpA patients. Chorus et al²⁴ showed a positive association between work and HRQoL PCS; however, no association was found with MCS. Kawalec et al²⁵ observed that patients’ HRQoL, expressed as utility scores, was negatively correlated with absenteeism, presenteeism, and indirect costs, suggesting that higher HRQoL was associated with higher productivity and lower indirect costs. Disease-activity score was positively correlated with indirect costs and negatively correlated with HRQoL. Therefore, the greater the disease activity, the lower the utility and the larger the indirect cost.

**Compliance and HRQoL in SpA patients**

Hromadkova et al²⁶ assessed the relationship between drug compliance and HRQoL in patients with different rheumatic
disorders, including SpA. A significantly negative correlation between compliance and HRQoL PCS was found in SpA patients, suggesting that patients with worse HRQoL might be more compliant with treatment.

Influence of biological therapies on SpA-patient HRQoL

Three of the studies investigated the impact of BAs on HRQoL in SpA patients in the clinical practice setting. Saad et al27 reported a significant improvement in all Short Form (SF)-36 subscales after 6 months of therapy with BAs, with greatest improvements observed in PCS. Sieper et al29 found that in nonradiographic axial SpA (nr-axSpA) patients, treatment with BAs was associated with improved clinical outcomes (pain, remission, acute episodes) compared to BA-naïve patients. Furthermore, BA-naïve patients reported greater presenteeism, overall work impairment, and activity impairment than BA-treated patients. In line with previous studies, Wallman et al29 showed that following BA treatment, both HRQoL (EuroQoL 5D utility and visual analog scale) and clinical outcomes (pain, erythrocyte-sedimentation rate and CRP) improved rapidly in both nr-axSpA and AS patients.

HRQoL in AS patients

Factors influencing HRQoL in AS patients

Kucharz et al30 observed that almost two-thirds of AS patients considered pain a very important risk factor in their HRQoL.
Table 3 Characteristics of HRQoL-related studies reviewed

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<th>Objective</th>
<th>Demographic and clinical characteristics</th>
<th>Main results</th>
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<tr>
<td>Salffi et al&lt;sup&gt;20&lt;/sup&gt; (Italy)</td>
<td>To compare HRQoL scores among patients with RA, PsA, and AS and a selected sample of healthy people and determine their relationship with measures of clinical condition</td>
<td>Compared to healthy controls, both components of the SF36 questionnaire (PCS and MCS) were significantly impaired in patients with the three inflammatory diseases ($P&lt;0.0001$). Compared to other rheumatoid diseases, MCS were lower in PsA patients. The PCS was influenced by high disease activity (DAS, $P&lt;0.0001$), chronic comorbidity ($P&lt;0.0001$), and radiographic damage ($P=0.004$) in all diseases. An association was found in AS ($P=0.001$) and axial PsA ($P=0.009$) with low educational level and MCS. In peripheral PsA ($P&lt;0.0001$) and axial PsA ($P=0.03$), severity of psoriatic lesions was associated with poor MCS.</td>
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<td>Jajić et al&lt;sup&gt;21&lt;/sup&gt; (Croatia)</td>
<td>To assess clinical variables with the best correlation with HRQoL in patients with SpA</td>
<td>Although perception of general health was similar in both groups, AS patients had reduced HRQoL values for physical domains, whereas PsA patients presented reduced HRQoL values for both PCS and MCS. For AS patients, clinical variables correlated mainly with the PCS, while in PsA patients correlations between clinical variables and SF36 were more distributed. In both diseases, BASFI had the strongest correlation with PCS.</td>
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<td>Kotsis et al&lt;sup&gt;22&lt;/sup&gt; (Greece)</td>
<td>To compare psychological distress in PsA and RA and test whether the association between psychological variables and HRQoL was similar in the two forms of arthritis</td>
<td>The prevalence of moderate and severe levels of depressive symptoms (PHQ 9 $\geq 10$) was similar in PsA (21.7%) and RA (25.1%) patients. Among PsA patients, depression symptoms were more frequent in those with polyarthritis (36.7%) compared to those with oligoarthritis (9.8%) and spondyloarthritis (16.7%). In general, all participants perceived their arthritis as a chronic disease that could not be controlled. According to a regression analysis, both anxiety ($\beta=-0.28$) and concern about bodily symptoms ($\beta=-0.33$) were independent correlates of the physical domain of HRQoL in PsA patients.</td>
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<tr>
<td>Hyphantis et al&lt;sup&gt;23&lt;/sup&gt; (Greece)</td>
<td>To compare psychological distress symptoms and illness perceptions in AS and RA and test whether their association with HRQoL was similar</td>
<td>The prevalence of clinically significant depressive symptoms (PHQ 9 $\geq 10$) was lower in AS (14.8%) compared to RA (25.1%) patients ($P=0.09$), but psychological distress levels and HRQoL were similar in both disorders. Illness concern ($\beta=-0.37$) was the only significant independent correlate of physical HRQoL in AS. Symptoms of anxiety and depression had a minor contribution to physical HRQoL.</td>
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<td>Chorus et al&lt;sup&gt;24&lt;/sup&gt; (the Netherlands)</td>
<td>To investigate the relationship between work and HRQoL in patients with RA and AS aged 16–59 years</td>
<td>PCS was worse in patients with RA than AS, although MCS was reported to be more favorable in RA than AS. A positive association between work and PCS in both group of patients was assessed. However, no association between work and MCS was found.</td>
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<td>Kawalec et al&lt;sup&gt;25&lt;/sup&gt; (Poland)</td>
<td>To investigate associations among activity, utility of PsA-affected patients, and productivity loss</td>
<td>PsA has been demonstrated to reduce patients’ HRQoL and generate considerable indirect costs, mainly due to lower productivity at work.</td>
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<td>Hromadkova et al26 (Czech Republic)</td>
<td>To elucidate the relationship between drug compliance and HRQoL in patients with different rheumatic disorders</td>
<td>SpA (n=41, 68.1% female, mean age 50 [22–79] years, disease duration 3.8 [0.7–8.3] years) RA (n=178, 78.7% female, mean age 59 [26–82] years, disease duration 7.4 [0.5–19.9] years) SSc (n=41, 75.6% female, mean age 58 [26–80] years, disease duration 6.8 [0.5–23.9] years) JIA (n=23, 73.9% female, mean age 28 [18–51] years, disease duration 6.8 [0.6–20.9] years)</td>
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<td>Saad et al27 (UK)</td>
<td>To evaluate the impact of BAs on HRQoL, functional status in PsA patients, and study potential predictors for HRQoL</td>
<td>PsA (n=596, 52.3% female, mean age 45.7 [SD 11.1] years, disease duration 12.4 [SD 8.7] years)</td>
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<td>Sieper et al28 (Germany, France, Spain, Italy, UK)</td>
<td>To assess the impact of nr-axSpA on patients and society based on real-world evidence from the Adelphi Disease Specific Programme</td>
<td>axSpA (n=631, 29.6% female, mean age 41.8 [SD 12] years, disease duration 51.6 [SD 60] months, cDMARD, 25.58%, BAS 36.1%, 66.5% responders to treatment, 24.8% nonresponders)</td>
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<td>Wallman et al29 (Sweden)</td>
<td>To compare clinical development, HRQoL, and treatment adherence between nr-axSpA and AS patients during 3 years of BA in clinical practice</td>
<td>nr-axSpA (n=86, 38% female, mean age 38 [SD 13] years, disease duration 9 [SD 9] years) AS (n=238, 24% female, mean age 43 [SD 12] years, disease duration 16 [SD 12] years)</td>
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<td>Kucharcz et al30 (Poland)</td>
<td>To obtain patients’ opinions on factors associated with AS that may potentially influence their HRQoL</td>
<td>AS (n=53, 22.2% female)</td>
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<tr>
<td>Ariza-Ariza et al (Spain)</td>
<td>To determine physical function and HRQoL of Spanish patients with AS</td>
<td>BasFi had a good correlation (Pearson &gt;0.6) with PCS ($r=0.75$, $P&lt;0.0001$), patient and physician global assessment, pain measurements, BASDAI, and most HRQoL scores. Physician global assessment ($P=0.043$), patient pain assessment ($P=0.036$), and BASFI score ($P=0.002$) were independently associated with the EQSD health profile ($P=0.002$).</td>
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<tr>
<td>de las Peñas et al (Spain)</td>
<td>To assess correlations among mobility, function, and HRQoL in subjects with AS</td>
<td>All domains of HRQoL except mental health were negatively correlated with BASFI score ($r=-0.35$ to $-0.75$, $P&lt;0.05$). Physical function, bodily pain, general health, vitality, and social role were negatively correlated with BASDAI score ($r=-0.35$ to $-0.63$, $P&lt;0.05$). Few mobility measures of BASMI showed a positive correlation with SF36 domains: lumbar flexion (modified Schöber) correlated with physical function ($r=0.36$, $P=0.03$), and maximal intermalleolar distance correlated with physical function ($r=0.36$, $P=0.034$) and social role ($r=0.33$, $P=0.04$).</td>
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<td>Ariza-Ariza et al (Spain)</td>
<td>To identify variables associated with utility of health states in patients with AS</td>
<td>In the univariate analysis, patient global assessment ($r=0.66$, $P&lt;0.0001$), BASDAI ($r=0.68$, $P&lt;0.0001$), and BASFI ($r=0.75$, $P&lt;0.0001$) had good correlations with EQSD values. In the multivariate analysis, BASFI ($β=0.0679$, $P=0$) and BASDAI ($β=0.0441$, $P=0.004$) kept an independent association with utility.</td>
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<td>O’Dwyer et al (Ireland)</td>
<td>To assess health-related physical fitness of adults with AS, compare this to the general population, and examine the relationship between physical fitness and condition-specific outcomes</td>
<td>Compared to age- and sex-matched population controls, AS patients showed significantly lower cardiorespiratory fitness, flexibility, muscular strength and endurance, and increased body fat. Physical fitness was associated with physical function (BASFI). Flexibility (BASMI) had the largest contribution of any individual physical fitness component, and accounted for 35.9% of the total variance in BASFI score ($β=0.599$, $P=0.038$). Aerobic capacity was associated with HRQoL, accounting for 11.2% of the variance ($β=0.334$, $P=0.001$). Disease activity was not associated with any physical fitness component.</td>
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<tr>
<td>Talli et al (multicenter)</td>
<td>To explore the meaning of PGA in PsA by examining associations with domains of health assessed by the PsAID</td>
<td>Physical domains of PsAID – pain ($0.72$, $P&lt;0.0001$), discomfort ($0.73$, $P&lt;0.0001$), work and/or leisure activities ($0.70$, $P&lt;0.0001$), and functional capacity ($0.68$, $P&lt;0.0001$) – had stronger correlation with patients’ assessment (PGA) than other PROs or physician-based assessments, such as HAD ($0.59$, $P&lt;0.0001$) and SF36 PCS ($0.56$, $P&lt;0.0001$). A good correlation was established between PGA and psychological and social impact of PsAID: coping ($0.77$, $P&lt;0.0001$), anxiety ($0.68$, $P&lt;0.0001$), fatigue ($0.66$, $P&lt;0.0001$), depression ($0.65$, $P&lt;0.0001$), and social participation ($0.58$, $P&lt;0.0001$). A moderate or low correlation was found between PGA and impact related to skin ($0.34$–$0.47$, $P&lt;0.0001$), joint counts were poorly correlated with PGA ($0.24$–$0.52$, $P&lt;0.0001$).</td>
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<tr>
<td>Puymard-Zemmour et al (multicenter)</td>
<td>To explore the link between PASS and patient-perceived impact in RA and PsA</td>
<td>PsA (n=446, 50.6% female, mean age 50.6 [SD 12.6] years, disease duration 9.6 [SD 9.5] years) RA (n=531, 78.5% female, mean age 55.8 [SD 13.3] years, disease duration 12.6 [SD 10.3] years) Multivariate analyses of the five domains of PsAiD – pain, functional capacity, fatigue, sleep disturbance, and coping – indicated that in PsA patients, pain (OR 0.63, 95% CI 0.52–0.75) and coping (OR 0.63, 95% CI 0.52–0.75) were associated in PASS after adjustment on DAS28 (OR 0.83, 95% CI 0.71–0.97).</td>
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<td>Brodsky et al (Hungary)</td>
<td>To compare PsAQoL, HAQ, and EQ5D in terms of ability to assess disease severity in PsA</td>
<td>PsA (n=183, 57% female, mean age 51.1 [SD 12.9] years, disease duration 9.2 [SD 9.2] years) EQSD and PsAQoL scores were strongly correlated with clinical variables, such as HAD (β=0.71 to 0.64, P&lt;0.05), BASDAI (β=0.69 to 0.62, P&lt;0.05), PGA (β=0.63 to 0.52, P&lt;0.05), and patient pain VAS (β=0.68 to 0.54, P&lt;0.05). Disease duration (β=0.14 to 0.15, P&lt;0.05) and psoriasis (β=0.13 to 0.12, not significant) correlated weakly with HRQoL instruments.</td>
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Abbreviations: axSpA, axial spondyloarthritis; AS, ankylosing spondylitis; BAs, biological agents; BASDAI, Bath Ankylosing Spondylitis Disease Activity Index; BASFI, BAS Functional Index; BASMi, BAS Metrology Index; DAS, disease-activity score; EQ, EuroQol; ESR, erythrocyte-sedimentation rate; HAQ, Health Assessment Questionnaire; HRQoL, health-related quality of life; MCS, mental component summary; nr, nonradiographic; PASS, patient-acceptable symptom state; PCS, physical component summary; PGA, patient global assessment; PHQ 9, Patient Health Questionnaire; PsA, psoriatic arthritis; PsAiD, Psoriatic Arthritis Impact of Disease; SF, Short Form; VAS, visual analog scale.

In addition, around 50% of patients indicated that the need for assistance in activities of daily living (ADL) and impairment in family life potentially influenced their HRQoL. Young male patients were more concerned by the risk of losing their jobs than older ones, while impairment of sexual life due to the disease was more important to males than to females. Management of the disease (treatment or frequent hospitalization) was not considered a significant factor impairing their HRQoL.

Patient-reported measures and HRQoL in AS patients

Mobility and physical function are the most important end points for AS patients, and several instruments have been developed to evaluate disease activity from patient perspectives (BAS Disease Activity Index [BASDAI]) and physical functioning (BASFI and BAS Metrology Index). A correlation between physical function (BASFI) and HRQoL in AS patients was established by Ariza-Ariza et al,31 showing that BASFI score presented an independent association with HRQoL. This association was confirmed by de las Peñas et al.32 These authors observed that function (BASFI) and disease activity (BASDAI) were correlated with HRQoL (physical function, pain, and vitality domains). In the same vein, Ariza-Ariza et al33 found that physical function (BASFI) and disease activity (BASDAI) were the main determinants of health-state utility values in AS patients. Finally, a recent study published by O’Dwyer et al34 confirmed that adults with AS show a significant reduction in physical fitness compared to age- and sex-matched healthy controls. The AS group demonstrated significantly lower cardiorespiratory fitness, flexibility, muscular strength, and increased body fat compared to controls. All components of physical fitness were associated with physical function (BASFI), while only aerobic capacity was associated with HRQoL (ASQoL).

HRQoL in PsA patients

Patient-reported measures and HRQoL in PsA patients

Tälli et al35 showed that patient global assessment (PGA) in PsA was determined mainly by physical but also physiological aspects of the disease. In particular, coping, pain, work, leisure activities, and anxiety were identified as the main explanatory factors for PGA scores. Skin lesions seemed to have a lower impact on PGA than joint involvement, which had a larger effect on PsA patients’ HRQoL. Similarly, Puymard-Zemmour et al36 established an association between pain and coping with patient-acceptable symptom state, showing that less pain and better coping were correlated with better level of acceptability of disease status.

Disease severity and HRQoL in PsA patients

Brodsky et al37 found strong correlations between both generic (EuroQol 5D) and specific HRQoL (PsAQoL) instruments...
and disease severity assessed by Health Assessment Questionnaire (HAQ) disability score, patient-pain visual analog scale, PGA, and BASDAI. However, disease duration and psoriasis correlated weakly with these HRQoL instruments.

Compliance and persistence in SpA patients
According to the definition of adherence/compliance (extent to which patient acts in accordance the prescribed interval and dose of dosing regimen) and persistence (duration of time from initiation to discontinuation of therapy), five studies evaluated persistence to BA therapy in SpA patients, one assessed compliance with BA treatment, while the remaining publication was a systematic review (Table 4).

The systematic review reported great variability in the operational definition and measurement of adherence/compliance among studies. Most studies focused on persistence, measured by survival time, retention, or continuation rates, while fewer publications assessed adherence based on proportion of days covered or medication-possession ratio. The results suggested better compliance with biological therapy in SpA compared to RA. Age, female sex, comorbidity, SpA patients with BAs in naïve AS treatment continuation predictors of long-term characteristics as possible predictors of long-term treatment continuation with BAs in naïve AS patients

Table 4 Characteristics of adherence/persistence-related observational studies reviewed

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<tr>
<td>López-González et al (Spain)</td>
<td>To analyze evidence on adherence to BAs in RA, SpA, and PsA</td>
<td>A total of 24 publications were reviewed: 19 included RA patients, nine SpA, and five chronic arthritis in general</td>
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<tr>
<td>Lyu et al (Germany)</td>
<td>To evaluate treatment persistence among RA, AS, and PsA patients initiating subcutaneous BAs in Germany</td>
<td>RA (n=576, 75% female, mean age 56.9 years, SD 13.1 years) Survival time of the BA was the most common measure of persistence (n=16); MPR or PDC the usual method to assess adherence (n=5)</td>
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<tr>
<td>Saad et al (UK)</td>
<td>To assess persistence with first-course and second-course treatment with BAs in PsA patients</td>
<td>PsA (n=566, 53% female, mean age 45.7 years, SD 11.1 years), disease duration 12.4 years, SD 8.7 years</td>
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<tr>
<td>Kristensen et al (Sweden)</td>
<td>To examine clinical characteristics as possible predictors of long-term treatment continuation with BAs in naïve AS patients</td>
<td>Isolated AS (n=122, 25% female, mean age 42 years, SD 12 years), disease duration 15 years, SD 12 years AS peripheral arthritis (n=121, 10% female, mean age 44 years, SD 12 years), disease duration 16 years, SD 12 years</td>
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(Continued)
### Table 4 (Continued)

<table>
<thead>
<tr>
<th>Objective</th>
<th>Demographic and clinical characteristics</th>
<th>Main results</th>
</tr>
</thead>
<tbody>
<tr>
<td>Wallman et al (Sweden)</td>
<td>To compare clinical development, HRQoL and treatment adherence between nr-axSpA and AS patients during 3 years of BAs in clinical practice</td>
<td>After 3 years of follow-up, the proportion of patients with nr-axSpA and AS remaining on BA therapy was 70% and 77%, respectively. Male sex and higher baseline CRP levels were significantly associated with better treatment persistence.</td>
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<tr>
<td>Favalli et al (Italy)</td>
<td>To evaluate the 8-year survival of first-BA patients with axSpA or PsA and identify predictive factors for withdrawal</td>
<td>The cumulative 8-year retention rate was 51.9% in PsA patients and 57.2% in axSpA patients. 43.1% of patients with PsA and 42.1% with axSpA stopped the first-line BA. 22.4% of patients with PsA and 15.8% with axSpA reported that discontinuation was due to inefficacy, while 15% and 41.2% of patients, respectively, indicated that they stopped the treatment due to AE. Male sex (HR 0.595, 95% CI 0.405–0.875; (P=0.008)) and concomitant methotrexate use were associated with a lower overall risk of withdrawal in PsA, but not in axSpA patients. High baseline BASDAI was a predictor of drug persistence in axSpA (HR 1.016, 95% CI 1.002–1.030; (P=0.028)).</td>
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<tr>
<td>Hromadkova et al (Czech Republic)</td>
<td>To elucidate the relationship between drug compliance and HRQoL in patients with different rheumatic disorders</td>
<td>Mean CQR score (0 nonadherence to 100 complete adherence) in SpA patients was 77.1 (42.1–97.9). 38.3% of patients with SpA were considered compliant (CQR &lt;80). Patients with JIA were the least adherent (CQR 66), while patients with RA presented higher rates of adherence (CQR 82.5).</td>
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</table>

**Abbreviations:** axSpA, axial spondyloarthritis; AS, ankylosing spondylitis; BAs, biological agents; CQR, Compliance Questionnaire Rheumatology; HRQoL, health-related quality of life; JiA, juvenile idiopathic arthritis; MPR, medication-possession ratio; nr-axSpA, nonradiographic axial spondyloarthritis; PDC, proportion of days covered; PsA, psoriatic arthritis; SSc, systemic sclerosis.

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**Satisfaction with decision making**

Renzi et al examined PsA patients' preferences about their role in the decision-making process, as well as their satisfaction with both their care and their knowledge about PsA therapies (Table 5). Overall, the majority of PsA patients (72.7%) wanted to be involved in decision making, although 40.6% preferred that their doctors make the final decision after considering their opinion; 65.5% of PsA patients reported being completely or fairly satisfied with their care and information. Multivariate analysis showed that information on both treatment side effects and treatment options was significantly associated with overall satisfaction, confirming that improving patient–doctor communication may improve patients’ satisfaction with their care.

**Patient preferences for SpA treatments**

Two publications examined patient preferences for treatment characteristics (Table 5). Nolla et al assessed the relative importance given by patients with rheumatic diseases (RA, AS, and PsA) and rheumatologists to attributes of BAs.

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The cumulative 8-year retention rate was 51.9% in PsA patients and 57.2% in axSpA patients. 43.1% of patients with PsA and 42.1% with axSpA stopped the first-line BA. 22.4% of patients with PsA and 15.8% with axSpA reported that discontinuation was due to inefficacy, while 15% and 41.2% of patients, respectively, indicated that they stopped the treatment due to AE. Male sex (HR 0.595, 95% CI 0.405–0.875; \(P=0.008\)) and concomitant methotrexate use were associated with a lower overall risk of withdrawal in PsA, but not in axSpA patients. High baseline BASDAI was a predictor of drug persistence in axSpA (HR 1.016, 95% CI 1.002–1.030; \(P=0.028\)).
Table 5. Characteristics of studies of satisfaction and preferences for treatment that were reviewed

<table>
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</tr>
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<tr>
<td>Renzi et al (Italy)</td>
<td>To examine attitudes toward and satisfaction with decision making of patients with PsA compared with patients who had cutaneous psoriasis</td>
<td>PsA (n=33, 51% female, 61.5% aged ≥50 years, disease duration 76.9% &lt; 12 years) PsO (n=207, 29.5% female, 64.7% aged ≥50 years, disease duration 54.4% &lt; 12 years)</td>
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<tr>
<td>Nolla et al (Spain)</td>
<td>To define importance of values assigned to attributes of BAs by Spanish patients with rheumatic diseases (RA, AS, and PsA) and rheumatologists</td>
<td>AS (n=158, 28.2% female, mean age 46.3 [SD 11.4] years, disease duration 13.1 [SD 9.2] years) PsA (n=165, 44.2% female, mean age 49.5 [SD 11.4] years, disease duration 12.6 [SD 8.2] years) RA (n=165, 73.8% female, mean age 55.9 [SD 11.5] years, disease duration 13 [SD 7.8] years) Treatment: 100% of study participants were currently being treated with BAs, 34% had received previous treatment with BAs</td>
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<tr>
<td>Rothery et al (UK)</td>
<td>To assess patients’ preferences for treatment-related benefits and risk of disease relapse in the management of patients in low disease states of PsA</td>
<td>PsA (n=136, 46.6% female, 56.3% aged ≥55 years, 57% &lt; 9 years’ disease duration) Treatment 31.2% methotrexate alone, 15.4% other cDMARDs alone, 12.2% BAs alone, 27.5% methotrexate combined with cDMARDs or BAs, 3.2% other cDMARDs combined with BAs, 10.5% no medication</td>
</tr>
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</table>

Abbreviations: AE, adverse event; AS, ankylosing spondylitis; BAs, biological agents; cDMARDs, conventional disease-modifying antirheumatic drugs; HRQoL, health-related quality of life; PsA, psoriatic arthritis; PsO, psoriasis; RI, relative importance; SpA, spondyloarthritis.

For these patients, although efficacy (pain relief and improvement in functional capacity) and safety (risk of adverse events) were key aspects, both the frequency (time until perceiving the need for a new dose) and method of administration played an important role as attributes of BAs. Rothery et al observed that PsA patients conferred the greatest importance to eliminating severe side effects of sickness/nausea and the least importance to a change in risk of relapse. Patients were willing to accept a large increase in the risk of relapse in order to reduce the side effects of sickness/nausea.

Discussion

This review reports current knowledge on PROs in SpA patients in the EU. To date, the evidence indicates that similar to other rheumatic conditions, SpA patients report poorer
HRQoL compared to the general population. For AS patients, physical domains were more impaired than emotional well-being, whereas for PsA patients both physical and psychological factors were strongly affected by the disease. Indeed, prevalence of depressive symptoms was higher in PsA than in AS and particularly high in patients with polyarthritis. In PsA, anxiety symptoms and concern about somatic symptoms were independently correlated with HRQoL, while in AS patients only impairment of cognitive function was found to be associated with HRQoL deterioration.

Work disability is a major problem for SpA patients. Indeed, these diseases tend to occur in the working-age population, and studies have suggested that the ability to work and to perform ADL positively influence patients’ perceptions of their physical performance. In a cross-sectional study conducted in the US, limitations in ADL were significantly associated with lower PCS scores in patients with AS whereas for PsA patients ADL limitations were associated with both lower PCS and MCS scores, which supports results from EU reports in this review.

The PCS in AS patients is important. In these patients, physical restrictions in joint mobility, particularly of the spine, in addition to reductions in aerobic capacity and loss of skeletal muscle, are frequent. We found that physical function measured by the BASFI was highly correlated with HRQoL indicating that functional impairment associated with AS can cause a significant impact on patients’ HRQoL, with important limitations on their daily activities. Conversely, PsA is a heterogeneous disease that is greatly influenced by psychological and social aspects of the disease. The most affected aspects of HRQoL in PsA patients were coping with a chronic disease, limitations on work and/or leisure time, and anxiety or depression. Interestingly, joint symptoms had a greater effect on PsA patients’ lives than skin symptoms.

Overall, SpA treatment has changed dramatically with the development of BAs. Substantial improvements in the signs and symptoms of PsA patients have been reported for these agents, although all BAs are similar in terms of efficacy and safety. The current evidence suggests that routine clinical use of BAs contributes greatly to the improvement of HRQoL in SpA patients. Significantly, the greatest improvements were found in the PCS, with smaller but still significant improvements in the MCS.

However, the potential clinical benefits demonstrated by BAs in clinical trials may be reduced by poor adherence and early discontinuation of treatment in clinical practice, thereby increasing medical costs and resulting in the need for more aggressive treatments. Results on compliance with biological treatment of SpA patients were heterogeneous in real-life situations; nonetheless, all rates of persistence at 12 months were >50% of the population, with no significant differences between PsA and AS patients and irrespective of the individual BA administered. A recent retrospective cohort study conducted in 53,477 BA-naïve patients with rheumatic conditions in the US reported that the majority of patients remained persistent in the first year of BA therapy; however, they observed lower adherence ratios when 12-month medication-possession ratios were measured. Overall, in line with our results, patient characteristics, such as male sex, high disease activity, or peripheral arthritis, and treatment characteristics, such as concomitant methotrexate use, positively influence treatment persistence. Interestingly, higher HRQoL and a lower rate of functional disability were associated with lower compliance with treatment. According to Calip et al, young adults were less likely to be treatment-compliant, resulting in more comorbidities, hospitalizations, or visits to the emergency department.

In rheumatic diseases, assessing and including patient preferences in the decision-making process have been found to contribute to increased medication adherence, improved treatment outcomes, reduced health care costs, and enhanced patient satisfaction. The available evidence suggests that European SpA patients attach great importance to outcomes (pain relief and improvement of functional capacity, low risk of adverse events); however, process attributes, such as self-administration at home or longer time between doses, were also considered important attributes for BAs. Preferences varied depending on the PsA-disease states: low-disease-state patients were more concerned about the side effects of sickness/nausea than about the risk of relapse.

Results on PsA patients confirm that most patients want to be involved in decision making about their treatment. Satisfaction was associated with doctors providing treatment information and actively involving patients in decision making. In line with these results, Nota et al reported that most patients with rheumatic disease preferred to be involved in decisions about their medication and especially preferred more participation in decision making regarding their first treatment, which most commonly occurs in newly diagnosed patients.

**Limitations**

Possible limitations of this review include the heterogeneity of the articles retrieved in terms of patients, treatments, or methodology. Regarding the design, all studies assessing HRQoL in SpA were cross-sectional, and it is important to take into account that cross-sectional design might limit...
comparisons among SpA patients and with other diseases and does not allow the drawing of final conclusions about the factors associated with HRQoL and their cause–effect relationship. On the other hand, there may be relevant publications in languages other than English and Spanish or that are indexed in different databases than those searched that we have not identified in this review.

**Conclusion**

SpA has a negative impact on patients’ HRQoL. The physical aspects of HRQoL, especially functioning limitations and pain, are severely affected in both AS and PsA patients. In PsA patients, the impact of disease on emotional well-being is considerable. In both disease, BA therapy is associated with improvements in both physical and emotional status. However, these potential improvements may be reduced by poor adherence. Even though there are inconsistent findings, persistence rates in SpA patients are >50%, irrespective of the individual BA administered. Finally, results on preferences showed that most SpA patients preferred to be involved in decisions regarding their treatment, and although efficacy and safety are both considered essential, frequency and methods of administration also play a role as preference attributes for BA. These findings suggest that implementing management programs for SpA patients focused on the physical, emotional, and social consequences of the disease, in addition to assessing and including patient’s preferences in the treatment decision-making process, could be crucial in improving patients’ HRQoL and ensuring their satisfaction and compliance with treatment.

**Acknowledgment**

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**References**


