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Pain catastrophizing negatively impacts drug retention rate in patients with Psoriatic Arthritis and axial Spondyloarthritis: results from a 2-years perspective multicenter GIRRCS (Gruppo Italiano di Ricerca in Reumatologia Clinica) study

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Abstract

Background Chronic pain and inflammation are common features of rheumatic conditions such as Psoriatic Arthritis (PsA) and Axial Spondyloarthritis (axSpA), often needing prolonged medication treatment for effective management. Maintaining drug retention is essential for both achieving disease control and improving patients' quality of life. This study investigates the influence of pain catastrophizing, a psychological response to pain, on the drug retention rates of PsA and axSpA patients.

Methods A two-year prospective multicenter observational study involved 135 PsA and 71 axSpA patients. Pain Catastrophizing Scale (PCS) was employed to assess pain catastrophizing. Univariable and multivariable regression analyses were utilized to identify factors associated with drug retention.

Results In the PsA group, patients early discontinuing therapy showed higher baseline disease activity as well as higher incidence of comorbid fibromyalgia. Notably, pain catastrophizing, specifically the domains of Helplessness, Magnification, and Rumination, were significantly elevated in PsA patients who interrupted the treatment. Multivariable analysis confirmed pain catastrophizing as an independent predictor of drug suspension within two years.

In axSpA, drug discontinuation was associated with female gender, shorter disease duration, higher baseline disease activity as well as elevated levels of pain catastrophizing. Univariable analysis supported the role of pain

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catastrophizing, including its domains, as predictors of treatment interruption. However, limited events in axSpA patients precluded a multivariate analysis.

Conclusion This prospective study emphasizes the impact of pain catastrophizing on drug retention in patients with PsA and axSpA.

Keywords Psoriatic Arthritis, Axial Spondyloarthritis, Pain Catastrophizing, Retention Rate

Background

Spondyloarthritis (SpA), a group of interconnected chronic rheumatic diseases, displaying various clinical features, shares common clinical signs and distinctive genetic traits [1, 2]. The most prevalent forms of SpA are Psoriatic Arthritis (PsA) and Axial Spondyloarthritis (axSpA). Individuals with SpA often show a higher prevalence of obesity, type 2 diabetes, hypertension, metabolic syndrome, an increased risk of cardiovascular issues, and psychological comorbidities [3–7]. These conditions significantly impact the pain perception and the quality of life in SpA patients. In recent years, several studies were published focusing the extended-term usage of conventional synthetic disease-modifying antirheumatic drugs (csDMARDs) and biologic and targeted synthetic agents (bDMARDs and tsDMARDs) in spondyloarthritis, especially analasying the real-world data; despite of these works the factors associated to the retention rate of bDMARDs remain a pivotal question to be addressed [8].

Psychosocial factors are acknowledged as crucial elements influencing the pain experienced by patients with inflammatory arthritides, with particular attention given to pain catastrophizing (PC). The concept of catastrophizing was originally introduced by Albert Ellis and subsequently adapted by Aaron Beck to describe a maladaptive cognitive style observed in patients with anxiety and depressive disorders. Catastrophizing refers to the irrational anticipation of negative future events. In the context of pain, catastrophizing is broadly defined as an exaggeration of negative cognitive and emotional responses during actual or anticipated painful situations [9–11]. To assess catastrophization, the PC Scale (PCS) is employed, which evaluates three domains encompassing various aspects of pain catastrophizing. The first component, referred to as "rumination," comprises four items related to ruminative thoughts, worry, and the inability to suppress pain-related thoughts. The second component, termed "magnification," consists of three items reflecting the exaggeration of pain's unpleasantness and the anticipation of negative outcomes. The third component, labeled "helplessness," encompasses five items from the Coping Strategies Questionnaire (CSQ) and an additional item indicating the inability to cope with painful situations [12].

In a previous study we showed that PC negatively impatcs, the achievement of remission and/or low disease activity in inflammatory arthritis [13]. A largely unexplored topic is the relationship between PC and drug retention rate. Patients with PC may be more likely to struggle with adhering to their prescribed treatment plans; this may include non-compliance with medications, missing appointments, or reluctance in changing their lifestyle and engaging physical therapy. Thus, we planned a multicentric prospective observational study to address the possible impact of PC and its related domains on two years drug retention rate in patients with PsA and axSpA.

Methods

A multicenter, prospective (two years) observational study was conducted on enrolled participants with Psoriatic Arthritis and Axial Spondyloarthritis in 7 Rheumatology Clinics of Italy, widely distributed throughout the Country. Consecutive outpatients were recruited between January 2021 and July 2021. At the initial assessment, PsA participants met the Classification Criteria for Psoriatic Arthritis (CASPAR), while axSpA participants met the 2009 Assessment of Spondyloarthritis International Society (ASAS) Criteria [14, 15]. The study received approval from the Ethics Committee of the University Campus Bio-Medico of Rome (approval no. 78.20 OSS) and was conducted in accordance with the Declaration of Helsinki and its subsequent revisions. Inclusion criteria encompassed individuals of both genders, aged over 18 years, who fulfilled the CASPAR or 2009 ASAS criteria. Exclusion criteria included a history of psychiatric disorders as per DSM-V prior to recruitment, a history of malignancy, pregnancy, age exceeding 75, or an inability to provide informed consent for participation in the study. Upon enrollment, the following PsA disease activity scores were recorded by the examining clinicians: Disease Activity for Psoriatic Arthritis (DAPSA), Minimal Disease Activity (MDA), Bath Ankylosing Spondylitis Disease Activity Index (BASDAI), Psoriasis Area Severity Index (PASI), and Leeds Enthesitis Index (LEI). Additionally, the following axSpA disease activity scores were collected: BASDAI, Bath Ankylosing Spondylitis Functional Index (BASFI), and Ankylosing Spondylitis Disease Activity Score-C-Reactive Protein (ASDAS-CRP)

[16]. To assess the drug discontinuation rate (considering csDMARDs and/or bDMARDs), any occurrence of withdrawal therapy and adverse events recognized or suspected as linked to therapies were recorded during the two-years follow-up. PC, including its domains of Helplessness, Rumination, and Magnification (as continuous variables), was assessed using the PCS.

Patients fulfilling the 2016 American College of Rheumatology revised criteria for fibromyalgia were further identified in our cohort [17, 18].

Continuous variables were presented as the median with the interquartile range (25th–75th percentile), while categorical variables were expressed as percentages (%). The normality of the data was assessed using the Shapiro–Wilk test. Contingency tables were analyzed using the Chi-squared test, whereas rank-based comparisons were conducted using the Mann–Whitney test and Kruskal–Wallis test with Holm's pairwise comparison adjustments. To identify variables associated with drug retention rate, both univariable and multivariable regression analyses were employed. In the multivariable analysis, variables with a p-value of less than 0.1 in the univariate analysis, along with age and sex, were considered. Multivariable analysis of retention predictors was computed using the Cox proportional-hazards model.

All the statistical analyses were carried out by using Stata version 14, and statistical significance was defined as p-values less than 0.05.

Results

The study population included 135 patents affected by Psoriatic Arthritis (PsA) and 71 by Axial Spondiloarthritis (axSpA). The main demographic, anthropometric and clinical characteristics of the study populations are reported in Table 1 for PsA and in Table 2 for axSpA.

In PsA patient cohort, the one-year Retention Rate was 79.26%. [Drug suspension related to primary failure in 7.20% of patients, secondary failure in 60.71% of patients, side effects in 14.23% and other reasons in 17.86% of patients]. Moreover, the two-year Retention Rate was 69.63% ($n=94$), and most of the patients (73%) discontinued the drug for secondary failure. A large percentage of PsA patients discontinuing therapy were at the same time assuming steroid (drug suspenders 34.15% vs still treated 18.09%, $p=0.041$), had higher values of baseline DAPSA (drug suspenders 20.3 still treated 11.06, $p=0.0011$), and were more frequently affected by fibromyalgia (drug suspenders 47.37% vs still treated 21.84%, $p=0.004$). The PCS showed significantly increased levels of PC (drug suspenders 29 vs still treated 16, $p=0.0002$) and all its specific domains: Helplessness (drug suspenders 13 still treated 7, $p=0.0004$), magnification (drug suspenders 4 vs still treated 2, $p=0.0127$) and rumination (drug suspenders 12.5 vs still treated 6, $p=0.0005$) in PsA patients discontinuing therapy.

To further evaluate the relationship between PC and the drug retention rate of these patients, univariable (Table 3) and multivariable linear regression (Table 4) analysis were also performed.

The univariable linear regression, as reported in Table 3, confirmed fibromyalgia comorbidity, corticosteroids assumption, higher disease activity at baseline DAPSA and incremented PC levels as best predictors for drug suspension, within two years of follow-up. Of note, the multivariable logistic regression (adjusted for age, sex, DAPSA and CCS use) showed significant relationships between drug discontinuation and: high PCS, helplessness domain, rumination domain, but not for magnification domain.

As far as axSpA patients are concerned, the one-year Retention Rate was 84.51%. [Drug suspension related to primary failure in 9.09% of patients, secondary failure in 54,55% of patients, side effects in 27.27% and other reasons in 9.09% of patients]. Moreover, the two-year Retention Rate was 80.28%, and the most frequent cause of suspension (45%) was secondary failure. In axSpA, the drug discontinuation was significantly more frequent in female patients (69.23%, $p=0.04$), in patient with a shorter disease duration (drug suspenders 59 months vs still in treatment 87 months, $p=0.035$), with higher baseline BASDAI disease activity (7 vs 3.75, $p=0.0002$) and higher level of PC (31 vs 17.5, $p=0.0001$). Of note, the univariable logistic regression showed that female gender, increased baseline BASDAI, and higher PCS and all its components: helplessness, magnification, rumination) may be significant predictors of treatment discontinuation in the first two years of follow-up (Table 5).

Due to the limited number of events (discontinuation of csDMARDs and/or bDMARDs at 2 years of follow up), a multivariate analysis was not performed for axSpA participants.

Discussion

Rheumatic conditions, including PsA and axSpA, are characterized by chronic pain and inflammation, which often require long-term pharmacological treatments. The drug retention, in these conditions, is crucial to achieve optimal disease control and a better quality of life (8, 19, 20). However, several factors may influence drug retention, and in this context, the role of PC is still largely unknown [9]. In this study we described, as primary aim, that PC, independent of treatments efficacy, is significantly associated with drug discontinuation both in PsA and axSpA patients. Furthermore, we observed that all the specific PC domains, such as Helplessness, Rumination and Magnification, were significantly

Table 1 Clinical characteristics of PsA participants

	PsA (135)	***PsA 1 year Retention (107)***	***PsA 1 year suspension (28)***	***p***	***PsA 2 year Retention (94)***	***PsA 2 year Suspension (41)***	***p***
Age	56 (47–64)	55 (46–63)	61 (51.5–65)	0.11	55.5 (46–62)	61 (48–65)	0.12
Female (%)	59.26	53.27	82.14	**0.006**	55.32	68.29	0.16
Disease duration (months)	84 (48–144)	80 (48–144)	111.5 (52–150)	0.41	80 (48–144)	97 (51–144)	0.69
BMI	26.6 (24.6–30.2)	26.4 (24.35–30.07)	27.14 (25–31.91)	0.60	26.2 (24.2–29.7)	27.2 (25–31.2)	0.40
Fibromyalgia (%)	29.6	22.22	57.69	**< 0.0001**	21.84	47.37	**0.004**
Smokers (%) Yes	23.88	24.53	21.43	0.62	26.88	17.07	**0.005**
ex	6.7	5.66	10.71		2.15	17.07	
Peripheral arthritis (%)	95.56	94.39	100	0.20	93.62	100	0.098
Axial involvement (%)	48.89	46.73	57.14	0.33	48.94	48.78	0.99
Enthesitis (%)	35.56	35.51	35.71	0.98	36.17	34.15	0.82
Dactylitis (%)	14.07	14.95	10.71	0.57	15.96	9.76	0.34
Psoriasis (%)	74.07	74.44	71.43	0.72	74.47	73.17	0.87
Nail psoriasis (%)	12.59	14.02	7.14	0.33	14.89	7.32	0.22
csDMARDs use (%)	49.63	47.66	57.14	0.37	44.68	60.98	0.08
bDMARDs use(%)	74.07	71.96	82.14	0.27	71.28	80.49	0.26
Ccs (%)	22.96	18.69	39.29	**0.02**	18.09	34.15	**0.04**
***NSAIDs** (%)*	34.81	30.84	50.00	0.06	31.91	41.46	0.24
SNRI (%)	7.41	6.54	10.71	0.45	6.38	9.76	0.49
Anticonvulsivant drugs use (%)	8.15	7.48	10.71	0.58	7.45	9.76	0.65
TJ/68	2 (0–6)	1 (0–5)	3.5 (0–9)	0.08	1 (0–4)	4 (0–9)	**0.01**
SJ/66	0 (0–0)	0 (0–0)	0 (0–1)	**0.03**	0 (0–0)	0 (0–1)	0.051
PtGA	5 (2–7)	4.5 (2–7)	7 (5–8)	**0.002**	4 (2–7)	7 (5–8)	**0.0003**
PP	6 (3–8)	5 (1–7)	8 (6–9)	**0.0005**	5 (1–7)	8 (5–9)	**< 0.0001**
EGA	1 (0–2)	1 (0–2)	2 (1–3)	**0.012**	0.5 (0–2)	2 (1–3)	**0.001**
CRP	0.37 (0.14–0.8)	0.3 (0.12–0.64)	0.45 (0.31–0.92)	**0.0351**	0.315 (0.13–0.73)	0.4 (0.21–0.87)	0.33
DAPSA	13.34 (5.21–22.2)	11.5 (3.4–21.51)	20.31(11.78–23.25)	**0.0065**	11.06 (3.36–19.85)	20.3 (11.56–23.86)	**0.0011**
PCS	18 (6–31)	16 (5–29)	29.5 (17–38.5)	**0.0001**	16 (5–28)	29 (12–38)	**0.0002**
Helplessness	9 (2–14)	7 (2.12)	13(9–26)	**0.0001**	7 (2–11)	13 (5–16)	**0.0004**
Rumination	8 (2–13)	6 (2–12)	13(7–26)	**0.0003**	6 (2–11)	12.5 (5–16)	**0.0005**
Magnification	3 (1–5)	2 (1–5)	5 (2–6)	**0.0059**	2 (1–4)	4 (2–6)	**0.0127**
HADS anxiety	7 (3–11)	5 (3–10)	9.5 (7–14.5)	**0.0002**	5 (3–10)	9 (4.14)	**0.003**
HADS depression	4 (1–8)	3.5 (1–7)	7 (3–10)	**0.0091**	3 (1–7)	6 (2–10)	**0.02**
Acceptance and Action Questionnaire II (AAQ)	14 (9–24)	12 (9–22)	22 (9–30)	**0.026**	12 (9–22)	20 (9–28)	0.07
Trait Hope Scale (THS)	24 (21–26)	24 (21.5–26)	22 (16.5- 25)	**0.0392**	24 (22–26)	22 (17–25)	**0.02**
THS agency	12 (10–13)	12 (10–13)	11 (7.5- 12)	**0.0361**	12 (11–13)	12 (8–12)	0.1
THS pathway	12 (11–13)	12 (11–14)	11 (8.5–13)	**0.0449**	12 (11–14)	11 (85–13)	**0.01**

PsA Psoriatic Arthritis, *BMI* Body Mass Index, *csDMARDs* conventional synthetic disease-modifying anti-rheumatic drugs, *bDMARDs* biologic disease-modifying anti-rheumatic drugs, *CCS* corticosteroids, *NSAIDs* Non-steroidal anti-inflammatory drugs, *SNRI* Serotonin–norepinephrine reuptake inhibitor, *TJ* tender joints, *SJ* swollen joints, *PtGA* patient global assessment, *PP* patient pain, *EGA* Examiner global assessment, *CRP* C-reactive protein, *DAPSA* Disease Activity in PSoriatic Arthritis, *PCS* Pain Catastrophizing Scale, *HADS* Hospital Anxiety and Depression Scale

associated with therapy discontinuation after 2 years follow-up. We observed that PsA patients suspending therapy, before the end of the second year of follow up, were more frequently affected by fibromyalgia and showing higher baseline disease activity, thus suggesting the correlations between fibromyalgia and higher

Table 2 Clinical characteristics of axSpA participants

	axSpA (71)	***axSpa 1 year retention (60)***	***axSpa 1 year suspension (11)***	***p***	***axSpa 2 year retention (57)***	***axSpa 2 year suspension (14)***	***p***
Age	49 (37–58)	51 (38–60)	44 (35–46)	0.10	49 (37–58)	46 (43–56)	0.78
Female (%)	43.66	40.32	66.67	0.13	37.93	69.23	**0.040**
Disease duration (months)	72 (48–120)	87 (50–132)	48 (18–60)	**0.0083**	87 (50–132)	59 (21–75)	**0.035**
BMI	26.04 (23.5–30.4)	26.22 (23.63–30.45)	24.7 (22.6–30.1)	0.61	26.4 (23.9–30.5)	24.14 (20.35–29.6)	0.20
Fibromyalgia (%)	12.5	12.73	11.11	0.89	13.46	8.33	0.63
Smokers (%) yes	28.17	25.81	44.44	0.36	25.86	38.46	0.34
ex	9.86	11.29	0.00		12.07	0.00	
Peripheral arthritis (%)	54.53	0	100	**< 0.0001**	0	100	**< 0.0001**
HLA B27 (%)	43.08	45.61	25	0.27	47.17	25.00	0.16
Positive MRI (%)	74.65	74.19	77.78	0.82	75.86	69.23	0.62
Positive Rx (%)	49.28	50	44.44	0.76	50	46.15	0.80
Active Uveitis (%)	1.41	1.61	0	0.91	1.72	0	0.80
Past uveitis (%)	19.72	19.35	22.22	0.91	20.69	15.38	0.80
csDMARDs use (%)	22.12	12.96	11.76	0.90	25.86	15.38	0.42
bDMARDs use (%)	91.23	42.86	9.38	**0.011**	93.10	76.92	0.08
Ccs (%)	5.63	6.45	0	0.43	6.9	0	0.33
NSAIDs (%)	47.89	45.16	66.67	0.23	44.83	61.54	0.28
SNRI (%)	2.82	1.61	11.11	0.11	0	15.38	**0.002**
Tricyclic antidepressant (%)	4.23	4.84	0	0.5	3.45	7.69	0.49
Anticonvulsivant drugs use (%)	8.45	8.06	11.11	0.76	6.9	15.38	0.32
Myorelaxant agent (%)	9.86	8.06	22.22	0.18	8.62	15.38	0.46
Opioid drugs (%)	4.23	3.23	11.11	0.27	3.45	7.69	0.49
LEI	0 (0–0)	0 (0–0)	0 (0–1.5)		0 (0–0)	0 (0–1.5)	
CRP	0.2 (0.08–0.5)	0.14 (0.07–0.44)	0.55 (0.42–2.23)	**0.0213**	0.13 (0.07–0.43)	0.5 (0.32–1.4)	**0.017**
ESR	9 (4–19)	8 (4–19)	12(9–14)	0.20	8 (4–18)	14 (9–25)	0.07
BASDAI	4.17 (2.1–6.3)	3.88 (2–5.8)	7 (6–9)	**0.0023**	3.75 (2–5.7)	7 (6–8.8)	**0.0002**
PtGA	5 (3–8)	4.5 (2.5–7)	8 (7–10)	**0.0081**	4 (2–75)	8 (7–10)	**0.0014**
PhyGA	1 (0–3)	1(0–3)	3 (1–6.5)	0.23	1 (0–3)	1 (25–6.5)	0.14
ASDAS-PCR	2.32 (1.29–3.16)	2.25 (1.25–2.99)	3.37 (2.48–4.12)	**0.0192**	2.19 (1.24—2.84)	3.35 (2.45–3.91)	**0.0042**
BASFI	5.7 (0.3–16)	4.9 (0.3–16)	7.9 (6.8–9.5)	0.18	4.9 (0.3–16)	6.8 (4.6–9.5)	0.32
PCS	16 (6–28)	13.5 (6–25.5)	40 (30–44)	**0.0002**	12.5 (6–25.5)	31 (25–44)	**0.0001**
Helplessness	7 (2–12)	5 (2–10)	18.5 (13.5–21)	**0.0002**	5 (2–10)	16 (11–20)	**0.0004**
Rumination	7 (4–12)	6(3–11)	16 (9.5–18.5)	**0.0018**	6 (2–11)	13 (7–18)	**0.0018**
Magnification	2 (0–4)	2 (0–3)	5.5 (2.5–6.5)	**0.007**	2 (0–3)	4 (2–6)	0.0712
HADS anxiety	7 (4–10)	6 (3–10)	9 (8–11)	**0.023**	7 (3–10)	9 (5–11)	0.14
HADS depression	5 (2–6)	4 (1–6)	6 (5–10)	**0.044**	4 (2–6)	5 (3–9)	0.27
Acceptance and Action Questionnaire II (AAQ)	14 (9–22)	13 (9–22)	17(15–21)	0.22	13 (9–22)	17 (13–21)	0.41
Trait Hope Scale (THS)	24 (22–28)	25 (22–28)	22 (19–24)	**0.0371**	25 (22–28)	22 (20–25)	0.14
THS agency	12 (10–14)	12 (11–14)	10 (9–13)	0.1	12 (11–14)	11 (10–13)	0.33
THS pathway	12 (11–14)	12 (11–15)	11 (10–12)	**0.0192**	12 (11–15)	12 (10–12)	0.081
Compassionate Engagement and Action Scales – self compassion	74.5 (64–88)	75 (67–90)	68 (63–75)	0.17	75 (67–90)	68 (63–75)	0.09

Table 2 (continued)

	axSpA (71)	*axSpa 1 year retention (60)*	*axSpa 1 year suspension (11)*	*p*	*axSpa 2 year retention (57)*	*axSpa 2 year suspension (14)*	*p*
Compassionate Engagement and Action Scales- compassion from others	66 (52–83)	68.5 (55–83)	61 (52–69)	0.32	69 (55–83)	62 (52–69)	0.22

axSpA axial Spondyloarthritis, *BMI* Body Mass Index, *MRI* Magnetic Resonance Imaging, *csDMARDs* conventional synthetic disease-modifying anti-rheumatic drugs, *bDMARDs* biologic disease-modifying anti-rheumatic drugs, *CCS* corticosteroids, *NSAIDs* Non-steroidal anti-inflammatory drugs, *SNRI* Serotonin–norepinephrine reuptake inhibitor, *LEI* Leeds enthesitis Index, *CRP* C-reactive protein, *ESR* erythrocyte sedimentation rate, *BASDAI* Bath Ankylosing Spondylitis Disease Activity Index, *PtGA* patient global assessment, *PhyGA* Physician global assessment, *ASDAS* Ankylosing Spondylitis Disease Activity Score, *BASFI* Bath Ankylosing Spondylitis Function Index, *PCS* Pain Catastrophizing Scale, *HADS* Hospital Anxiety and Depression Scale

Table 3 Univariable linear regression (PsA participants)

Two year discontinuation (PsA participants)	***Univariable***		
Independent variables	**OR**	**95%CI**	***p***
Fibromyalgia	3.22	1.42 7.28	0.005
CCS	2.35	1.02 5.40	0.04
TJ	1.10	1.02 1.18	0.01
PP	1.09	1.00 1.18	0.04
PtGa	1.3	1.12 1.49	< 0.0001
DAPSA	1.06	1.02 1.10	0.001
PCS	1.05	1.02 1.08	< 0.0001
Helplessness	1.12	1.05 1.19	0.001
Rumination	1.13	1.05 1.21	< 0.001
Magnification	1.22	1.05 1.42	0.009

PsA Psoriatic Arthritis, *CCS* corticosteroids, *TJ* tender joints, *SJ* swollen joints, *PP* patient pain, *PtGA* patient global assessment, *DAPSA* Disease Activity in PSoriatic Arthritis, *PCS* Pain Catastrophizing Scale

levels of disease activity with drug discontinuation in PsA patients [21, 22]. Furthermore, in a previous paper, we published that PC specifically correlated with the number of tender joints, patient-reported pain, and patient global assessment, thus, confirming its predominantly impact on the subjective dimension of the disease activity scores, independent of inflammation [13, 23, 24]. In this setting we recently published how various aspects of the PCS may influence the achievement of low disease activity and remission, as measured by DAPSA and BASDAI. Of note, the significant correlation between PCS and the disease activity of other rheumatic diseases was already described in scientific literature [11, 25–27]. In detail, multivariable linear regression analyses showed that PC and its components helplessness and rumination were independent predictors of drug suspension within two years. In contrast, a predictive relationship was not observed for magnification. This discrepancy may be due to our decision to deliberately exclude individuals with a documented history of psychiatric disorders, as outlined in DSM-V. In fact, it has been reported that magnification shows a significant association with both physical and mental health-related quality of life (QOL) and depressed mood [28]. These results partially mirror what we already published in which females with longer disease durations significantly correlate with drug discontinuation [8]. Nonetheless, another study, despite demonstrating the mentioned relation between female and low retention

Table 4 Multivariable regression (PsA participants)

	OR	***95%CI***	***P***		***OR***	***95% CI***	***P***
Age	1.02	0.98–1 05	0.32	Age	1.02	0.99–1.06	0.23
Sex	0.99	0.41—2.40	0.99	Sex	1.02	0.39–2.63	0.97
DAPSA	1.04	0.99–1 08	0.10	DAPSA	1.03	0.99–1 08	0.15
PCS	1.04	1.00–1.07	**0.03**	**Rumination**	1.10	1.02–1.20	**0.02**
CCS	1.98	0.78–4.99	0.15	CCS	1.99	0.76–5.20	0.16
Age	1.02	0.99–1.06	0.20	Age	1.02	0.98–1.06	0.26
Sex	1.17	0.47–2.94	0.72	Sex	1.29	0.53–3 14	0.58
DAPSA	1.03	0.98–1.08	0.20	DAPSA	1.04	1.00–1.09	0.04
Helplessness	1.09	1.01–1.18	**0.03**	**Magnification**	1.15	0.97–1.36	0.10
CCS	1.91	0.78–4.95	0.18	CCS	1.87	0.72–4.81	0.20

DAPSA Disease Activity in PSoriatic Arthritis, *PCS* Pain Catastrophizing Scale, *CCS* corticosteroids

Table 5 Univariable linear regression (axSpA participants)

Two year discontinuation (AxSpA participants)	*Univariable*		
Independent variables	**OR**	**95%CI**	***p***
Sex	3.68	1.01 13.40	0.04
BASDAI	1.81	1.28 2.57	0.001
Asdas CRP	2.49	1.30 4.72	0.006
PCS	1.13	1.05 1.20	< 0.0001
Helplessness	1.24	1.09 1.40	0.001
Rumination	1.25	1.07 1.45	0.004
Magnification	1.35	1.02 1.78	0.03

axSpA axial Spondyloarthritis, *BASDAI* Bath Ankylosing Spondylitis Disease Activity Index, *ASDAS* Ankylosing Spondylitis Disease Activity Score, *PCS* Pain Catastrophizing Scale

rate for anti-TNFi assumption, did not found differences in both genders for methotrexate [29].

For axSpA, drug suspension was significantly associated with higher levels of PC, female gender, shorter disease duration, as well as higher baseline BASDAI. Univariable logistic regression analysis strongly confirmed that female gender, higher baseline BASDAI, and higher PC levels, along with its components, were predictors of treatment suspension within two years. Available literature already reported a higher retention rate in axSpA male patients, as well as the relationship between drug withdrawal and higher BASDAI levels [30–32].

Conclusions

Taking together all these data, we may assume that PC is not just a psychological response to pain but may have important consequences on the patient's ability to adhere to treatments and a better knowledge of this problem may help healthcare providers in managing patients with rheumatic conditions.

We are aware that our study has some limitations including the relatively low number of participants, which does not allow us to derive robust conclusion; on the other hand, despite the limitations, the screening for any previous psychological intervention in our participants allow us to select a well-defined cohort to assess the role of PC. Moreover, our Italian multicenter approach had the advantage to grant a sample representative of the whole national population; these results could therefore be generalized to Caucasian populations.

In conclusion, PC has emerged as a significant factor affecting drug retention in PsA and axSpA patients.

These findings highlight the critical need for clinicians to assess and address PC to improve treatment outcomes. Given the potential impact on patient management and quality of life, further research is essential to explore the mechanisms underlying this relationship and to develop targeted interventions. Future studies should also examine the generalizability of these results to diverse populations.

Abbreviations

SPA	Spondyloarthritis
PsA	Psoriatic Arthritis
axSpA	Axial Spondyloarthritis
csDMARDs	Conventional synthetic disease-modifying anti-rheumatic drugs
bDMARDs	Biologic disease-modifying anti-rheumatic drugs
PC	Pain catastrophizing
PCS	Pain Catastrophizing Scale
CSQ	Coping Strategies Questionnaire
CASPAR	Classification Criteria for Psoriatic Arthritis
ASAS	Assessment of Spondyloarthritis International Society);
DAPSA	Disease Activity for Psoriatic Arthritis
MDA	Minimal Disease Activity
BASDAI	Bath Ankylosing Spondylitis Disease Activity Index
PASI	Psoriasis Area Severity Index
LEI	Leeds Enthesitis Index
BASFI	Bath Ankylosing Spondylitis Functional Index
ASDAS-CRP	Ankylosing Spondylitis Disease Activity Score-C-Reactive Protein
BMI	Body Mass Index
CCS	Corticosteroids
NSAIDs	Non-steroidal anti-inflammatory drugs
SNRI	Serotonin–norepinephrine reuptake inhibitor
TJ	Tender joints
SJ	Swollen joints
PtGA	Patient global assessment
PP	Patient pain
EGA	Examiner global assessment
CRP	C-reactive protein
HADS	Hospital Anxiety and Depression Scale

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Authors' contributions

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Data availability
No datasets were generated or analysed during the current study.

Declarations

Ethics approval and consent to participate
The study received approval from the Ethics Committee of the University Campus Bio-Medico of Rome (approval no. 78.20 OSS) and was conducted in accordance with the Declaration of Helsinki and its subsequent revisions.

Consent for publication
Not applicable.

Competing interests
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